

Calligraphy Based on Visual Art to Promote Rehabilitation of Children With ADHD: A Systematic Review of The Literature

Jun Dong^{1,2}, Kamal Sabran^{1*}

¹ School of Arts, Universiti Sains Malaysia, Penang, Malaysia

² Communication University of China Nanjing, Nanjing, China

*Corresponding Author: kamalsabran@gmail.com

Received: 20 April 2023 | Accepted: 15 June 2023 | Published: 30 June 2023

DOI: <https://doi.org/10.55057/ajact.2023.5.2.2>

Abstract: *ADHD is a health issue faced by children and their guardians around the world. From the perspective of respecting the needs of children with ADHD and their guardians, visual arts can enhance the hands-on skills and enrich the spiritual needs of children with ADHD, in addition to promoting the needs of their guardians. The purpose of this study was to evaluate the effectiveness of visual art-based calligraphy in promoting ADHD rehabilitation in children. Through a systematic review and analysis of relevant literature, this study found that calligraphy based on visual art has the effect of improving children's attention and cognitive function, enhancing emotional regulation, and promoting cognitive development and cognitive restructuring. The results of this study provide theoretical support for clinical practice and promote research in related fields, and the study suggests that calligraphy based on visual art can be an effective way to promote rehabilitation for children with ADHD.*

Keywords: Children with ADHD, Calligraphy, Visual Art, Promote Rehabilitation

1. Introduction

ADHD (Attention Deficit Hyperactivity Disorder) or Attention Deficit Hyperactivity Disorder, or ADHD for short, is a behavioral disorder that is prevalent in infancy. ADHD was first described by George Still in 1902, and in the 10th edition of the International Classification of Diseases, the World Health Organization (WHO) referred to the disorder as Childhood Hyperactivity Syndrome (icd-10). According to a report by the World Health Organization (WHO), a meta-analysis (META) of 175 studies worldwide revealed that approximately 7.2% of the world's population under the age of 18 has ADHD, which equates to approximately 129 million children worldwide (Meta 2020). - According to the global epidemiological data established by Meta-regression analysis, the prevalence of ADHD ranges between 4.6% and 12.2%, with a prevalence of 5.29–7.1% in children and adolescents. [1]The incidence of attention deficit hyperactivity disorder (ADHD) in children continues to rise at an exponential rate, but it is largely ignored.

Many members of society's families believe that ADHD is a natural component of childhood development. Inattention or difficulty concentrating, hyperactivity, lack of self-control, and in some cases cognitive impairment and learning difficulties, which can affect learning in mild cases and intellectual development in severe cases, are common symptoms of attention deficit hyperactivity disorder. The prevalence of ADHD is significant, and more than fifty percent of children have multiple psychiatric disorders, making it a chronic illness with lifelong

repercussions. Attention deficits are the most prevalent cause of ADHD in adolescents and may account for as many as 129 million cases. According to the 2016 National Survey of Children's Health (NSCH), approximately 6.1 million children have been diagnosed with ADHD in the United States alone. [2] This survey revealed that children with ADHD aged 2 to 5 years (388,000) represented 2.4% of children in this age group; children aged 6 to 11 years (2.4 million) represented 9.6% of the total population in this age group; and children aged 12 to 17 years (3.3 million) represented 13.6% of the total population in this age group. This implies that males are more likely to develop ADHD than females. Professor Yi Zheng, a Chinese child psychiatrist, conducted the first survey on the prevalence of psychiatric disorders in Chinese children and adolescents in 2021. The results were published in the journal *Child Psychology and Psychiatry*. This report revealed that the prevalence of ADHD in China is approximately 6.4%, affecting over 23 million children, but the consultation rate is only 10%. Even "how to increase the consultation rate" and "how to detect and treat ADHD early" have become pressing concerns for ADHD patients' guardians.

Globally, the problem of supervising ADHD-afflicted youth is a pressing one. As the disease progresses, children with ADHD will develop a greater aversion to social interaction. ADHD has a highly complex etiology, clinical presentation, and diagnosis; therefore, comprehensive treatment must be considered. Psychological and behavioral therapy, family therapy, art therapy, and medication are the current treatments for ADHD. Some studies have concluded that non-pharmacological therapies, such as cognitive-behavioral therapy, family therapy, and art therapy, are the most effective treatments. [3] Non-pharmacological treatment methods have become a new treatment method due to their advantages of fewer side effects and relatively low cost as a result of the ongoing research of experts around the globe.[4]

Visual interactive art is the reflection of design thinking; therefore, the interactivity of visual design can be viewed as the design of thinking; in this sense, the interactivity of visual design has reached a new level; visual design from the initial design for thinking is a leap; thinking is a philosophical concept; he and human activities are closely intertwined; he is associated with human emotions, sociology, culture, and the arts; and he has a profound impact on the human condition. It is a philosophical concept closely associated with human activities, such as human emotions, sociology, culture, and art, among others. Humans are interested in social interaction, interpersonal relationships, human emotions, and the understanding and appreciation of art forms in order to meet their own requirements, and the interactivity of visual design is frequently the result of these cognitive processes.[5] This interaction can be applied to the rehabilitation of children with ADHD, and numerous studies have demonstrated that the use of interactive devices has a significant impact on the amelioration of ADHD symptoms in children.

In a broad sense, the term "calligraphy" refers to the principles of writing written symbols. In other words, calligraphy is an art form that is written in accordance with the characteristics and meanings of words, using their stylistic strokes, structures, and chapters to make them visually appealing. Calligraphy is a uniquely Han expressive art that has been compared to poetry without words, dance without lines, painting without images, music without sound, etc. Calligraphy is an art form that expresses the beauty of words in a way that is unique to the country or region and to the countries and regions influenced by the culture of that region. It is comprised of Chinese, Mongolian, Arabic, and English calligraphy. One of the most distinctive features is Chinese calligraphy. Chinese calligraphy is a traditional art form exclusive to the Chinese alphabet.

This paper will provide a systematic literature review of current literature on the art of calligraphy based on the art of visual interaction to promote calligraphy rehabilitation for children with ADHD, with the goal of identifying the most recent research advancements in this field and gaining an understanding of the methods and outcomes achieved by calligraphy designed for children with ADHD. This literature review will provide a summary of previous studies in order to assist future studies and serve as a reference for future studies.

2. Methodology

This article examines the research literature on promoting calligraphy in children with ADHD, with primary reference to Yu Xiao and Maria Watson's guidelines for conducting systematic literature reviews.[6] This review's methodology was divided into four phases.

2.1 Problem Statements

Art is a comprehensive concept that can be broadly divided into auditory art and visual art. In general, auditory art refers to sound or music. Sculpture, painting, calligraphy, photography, and design are examples of the visual arts. These are clearly distinct. Diverse groups have divergent perspectives on art. In accordance with the purpose of this literature review, the review's queries are presented. The results of such a study will provide children with ADHD with practical assistance and vital information for future research. This paper seeks to respond to the following research questions:

RQ1: What types of artistic facilitation did the study provide for children with ADHD?

RQ2: What types of facilitation do different forms of artistic expression provide for children with ADHD?

RQ3: What is the effectiveness of interactive art and calligraphic art in promoting children with ADHD?

After identifying the research questions, it is possible to propose the selection criteria for this review based on these three research questions. First, the keywords to be searched for and the topic of the investigation were determined. Calligraphy is a visual art form that incorporates both natural and written writing, as well as glyphs and font effects.[7] ADHD in children is primarily caused by attention deficit disorder, so it should also be included in the investigated research area. Childhood ADHD, attention deficit, calligraphy, visual arts, interaction, and rehabilitation promotion were identified as the search terms. Numerous previous studies have verified the efficacy of art interventions in treating ADHD in children. This review concentrates on daily art facilitation for children with ADHD, including interactive art-based facilitation for calligraphy training.

2.2 Search Strategy

Start by searching the databases PubMed, SPRINGER, Google, and CNKI. The queries were then examined individually, and duplicates were eliminated. The titles and abstracts of documents in the databases were searched based on the identified keywords, and keyword filtering criteria were constructed based on the study selection criteria of the various database search methods to filter the to-be-analyzed documents. A relatively small number of relevant studies promoting calligraphy for children with ADHD were identified after an initial search. Then, a search was conducted to broaden the search terms, and a survey was conducted based on the documents retrieved to increase the number of papers included in this evaluation.

2.3 Literature Screening Criteria

The relevance of the documents retrieved to the research query was directly determined by the titles and abstracts. Then, the contents of the documents that satisfied the requirements were perused individually to determine their relevance to the keywords for this criterion. (1) This research must be designed with pediatric ADHD patients in mind. (2) The calligraphy intervention's test results should be analyzed in the literature. (3) The experiment for this research requires the participation of pediatric ADHD patients. Utilize this criterion to identify documents that can be included in this evaluation. Table 1 provides an overview of each electronic database's results.

Table 1: General overview of the results

Databases	Results
PubMed	32
SPRINGER	93
Google	163
CNKI	32
Total	320

2.4 Screening Process And Quality Assessment

After removing duplicate articles, 13 articles were eventually included in the scope of this study. Three research questions identified in the preparation phase were the focus of this review. The literature was analyzed for research topic areas to determine what calligraphy was provided to pediatric ADHD patients in the study and what facilitation was provided to pediatric ADHD patients? After screening, the full text was read and evaluated. Figure 1 shows a visual description of the process of this systematic literature review using the PRISMA flow chart in the meta-analysis.

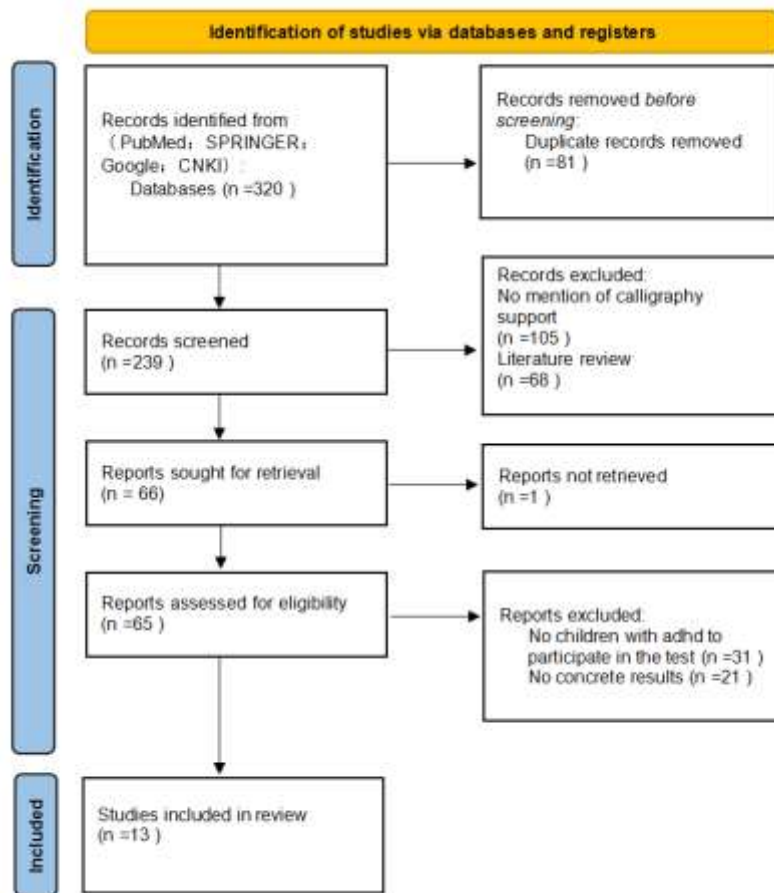


Figure 1: Using the PRISMA flow chart in the meta-analysis

3. Results

This search resulted in the retrieval of 320 relevant documents from four electronic databases. After filtering, thirteen documents met the review's criteria. The inquiry revealed a relative paucity of research utilizing interactive art and calligraphy to aid children with ADHD. The majority of healthcare researchers view calligraphy as a means of enhancing concentration. Writing can alleviate patients' stress, increase their enthusiasm for life, and make their domestic environment more comfortable.[9]

Calligraphy as a non-pharmacological intervention has had a positive impact on patients with the disease in recent years. [10] Providing a suitable writing environment can reduce patients' symptoms, and interactive art therapy has been shown to enhance the mental state and outlook of pediatric ADHD patients. After scrutinizing the 11 papers included in this review, a summary of the papers according to the research questions is provided in Table 2. [11]

Table 2: Summary of study findings

No.	The research topic	Participants in the sample size	Measures	Results&calligraphy Rehabilitation support
[1]	Nature writing has positive influence on children's ADHD	32 kids with ADHD	Put forward the Chinese calligraphy handwriting (CCH) the psychological characteristics of concept.	To promote the reasoning, judgment, and in 30 children with ADHD cognitive promote improvements.

[2]	Long-term training in the CCH may be related to specific aspects of executive function improved	50 kids with ADHD	Investigated their functions in the implementation of the three components.	Long-term training in the CCH may be associated with specific aspects of executive function improvement and enhanced brain neural network, the function of improving can reduce the symptoms of ADHD kids.
[3]	CCH's background and its influence in the field of cognitive, physical and emotional.	2 children with ADHD in two groups	They offer shows the CCH strongly associated with ADHD symptoms of empirical evidence, and discusses the CCH for rehabilitation of children with ADHD	Natural writing practice of visual attention, cognitive activation, physiological slowing, mood relaxed and the beneficial effect of behavior change.
[4]	English letters different visual space structure can produce different psychological effects	12 kids with ADHD	Study looked at whether English letter writing brush has a similar effect on practitioners of the visual spatial ability. Because in the process of Chinese and English writing and visual space are common in closed form, enclosed English letters will also lift the patient's general visual spatial ability, to improve their detection to the cognitive ability of 2d and 3d clues.	They also found that the involved in the process of visual space model can be used in the treatment of attention deficit hyperactivity disorder (ADHD) children and adults with autism, gently their mood swings. Therefore, this view shows the reasonable universality of the theory of writing and the practical application of between two writing systems.
[5]	Now in Saudi Arabia on ADHD children in art therapy intervention rules and cultural issues	9 kids with ADHD	Through interviews with 12 art therapist from Britain and nine from KSA ADHD children	For art therapy, in the form of the art of calligraphy as main development art therapy with cultural sensitivity for ADHD children play a key role. It can reduce the ADHD children with hyperactivity and impulsive and inattention. In addition, the intervention can improve interpersonal relationships, social skills and emotional health. The study of the actual meaning may be childhood ADHD treatment have a significant impact on the world.
[6]	Discusses how to use art to promote mental health factors.	A 13-year-old boy named SaMin	They told a 13-year-old boy named SaMin was studied, the boy is being treated for a the art of	These problems as the effect of treatment for art has a different attitude. Although art therapy is regarded as a

			ADHD. This kind of English calligraphy practice working to increase her attention, to ease his mood swings.	relatively new professional, but they found that the calligraphy because of its abstract and mysterious art form and highly regarded, because of its unique artistic features, The study shows how art practice mode application in ADHD children.
[7]	Aesthetic properties and its influence on cognitive process.	16 children with ADHD in two groups	To investigate the Chinese cursive aesthetic experience. Subjects were left in the car to rest for a few minutes. Then, ask them to appreciate the art of cursive script works.	Results show that (1) under the condition of calligraphy of pillow, the forehead top, bilateral parietal and occipital area in the function of the connection between changes significantly, (2) the brain function network shows alpha2 and of the conditions of the gamma band in calligraphy normalized clustering coefficient increases. They found that in the process of the Chinese calligraphy aesthetic experience, brain function network experienced a dynamic reconfiguration.
[8]	The study to evaluate visual difficulties and influence in the design of multimodal in education text	A student with ADHD	Her experiment offers a student a tablet app, the experimental results show that through the tablet app on calligraphy creation to raise children with ADHD personal thinking and emotional responses.	She as a art teacher, she has many years experience of calligraphy writing, the author concludes that Chinese calligraphy is of great significance to the students with ADHD.
[9]	An attention deficit disorder and the concept of the principle of human-computer interaction research	A kid with ADHD	Proposed a framework, which contains a set of specific guidelines for software, a developing used in calligraphy education for children with ADHD gesture interface.	Non-contact tool to reduce the difficulty of these students handwritten, because they don't need physical contact, and forgave them. The fine motor skills required to perform calligraphy. They can also be used as a motivational tool, and more intuitive than the touch screen and graphical user interface.
[10]	To study and put forward in a person's intrinsic psychological and	A kid with ADHD	Parallel to the calligraphy, the patient and therapist together create metaphor, and to	This research through the case illustrates the synergy in the clinical application of calligraphy art. The case

<p>there is a scene dialogue between external reality.</p>	<p>expand the scene of the integration of patients with heart. Through this process, the patient will eventually turn to the discovery of the coherent structure of self and real self.</p>	<p>was a was diagnosed with attention deficit hyperactivity disorder (ADHD) in children, after calligraphy practice to accept the treatment, the symptoms have got better.</p>	
<p>[11] Chinese calligraphy handwriting (CCH) shows a new role in health and treatment</p>	<p>30 Chinese Taiwan students suffer from stress, there are some for children with ADHD</p>	<p>The study by general health questionnaire that 30 people were randomly assigned to three treatment group and the eight weeks of the CCH, meditation group or control group. In the treatment of before, during, and after measuring changes in physiological parameters.</p>	<p>They found that ADHD children who practice calligraphy character recognition reaction time are much faster than children without practice calligraphy, and CCH has very good effect in reducing the pressure. The CCH is a particularly promising new way to reduce stress. This method can apply to promote the rehabilitation of ADHD children.</p>

Human civilization is documented by the written word. Even more so than writing, the art of calligraphy is a transmitter of human civilization. In the course of their lives, individuals experience the tactile sensation of writing, and the consequent perception of the environment by the extremities can be a point of intervention facilitation. [12] One study concluded that calligraphy can improve individuals' mental concentration.[13] Since the three questions planned in Section 2.1 build upon one another, the study's keywords are categorized and analyzed to illustrate the facilitation afforded by calligraphy for children with ADHD.

3.1 Natural Handwriting

Natural handwriting has a positive effect on ADHD in children, aiding mental health recovery and enhancing cognitive reaction speed. Three studies on Natural handwriting training for adolescents with ADHD were included in this review. In a study by HSR Kao, researchers introduced the concept of Chinese calligraphic handwriting (CCH) as a psychological characteristic and devised a research framework in accordance with this concept. In the design, Chinese calligraphy theory, character perception theory, and excellent therapy theory were applied to artistic creation, and a qualitative research methodology was utilized for the study. The collected data revealed that the cognitive effects of CCH practice included speedier reaction times, enhanced performance in discrimination and graphic recognition, and improved visuospatial abilities, spatial relationships, abstract reasoning, and aspects of memory and attention in practitioners. Particularly, individuals with autism, attention deficit disorder (ADD), and attention deficit hyperactivity disorder (ADHD) benefit from CCH treatment (ADHD). It enhanced reasoning, judgment, and cognitive facilitation in 30 children with ADHD, hand stability in children with moderate mental retardation, and memory, attention, spatial orientation, and motor coordination in Alzheimer's disease patients. [14] Traditional calligraphy requires a high level of concentration and motor control. Prior research has correlated brief CCH training with improvements in attention and memory. Little is known about the possible effects of long-term CCH training on executive function and its neural substrates. In a study conducted by Chen W, He Y, Gao Y, Zhang C, Chen C, Bi S, et al., 36

practitioners with at least five years of CCH experience and 50 control subjects with less than one month of CCH practice were recruited and evaluated on three aspects of executive function (i.e., transfer, renewal, and inhibition). Long-term CCH training may be associated with improvements in specific aspects of executive function and enhancement of neural networks in relevant brain regions, and this enhancement of function may reduce ADHD symptoms in children, according to these findings. [15]

In addition, a study by Henry S. R. Kao, Min Xu, and Tin Tin Kao et al. discovered positive effects of natural writing practice on visual attention, cognitive activation, physiological deceleration, emotional relaxation, and behavioral changes. They provide a concise overview of the history of CCH and its cognitive, physiological, and affective effects. The authors then address the facilitative effects of CCH on the rehabilitation of children with ADHD based on empirical evidence of the strong association between CCH and ADHD symptoms. [16]

3.2 English Calligraphy

A study by HSR Kao, WS Lui, M Guan, H Cao, et al. revealed that the response time effects of brush writing on symmetrical and asymmetrical English character structures were distinct. [17] Another study corroborated the effect of character composition closure on the practitioners' handwriting visuospatial ability. Recognizing that different visuospatial structures of the English alphabet may have varied psychological effects, this study investigated whether brush writing of the English alphabet has comparable effects on practitioners' visuospatial abilities. Due to its prevalence in both Chinese and English writing processes as well as closed forms of visuospatial representation, closed English letters would also enhance patients' general visuospatial abilities, thereby enhancing their cognitive ability to detect two- and three-dimensional cues. This expectation is consistent with the practice of brush writing English characters. Additionally, they discovered that this process involving visuospatial patterns could be used to treat attention deficit hyperactivity disorder (ADHD) in children and adults with autism, thereby reducing their mood fluctuations. Thus, this observation demonstrates the practical applicability of writing theory and the reasonable generality of writing theory between the two writing systems.

Alrazain, Badr, et al. conducted their study using a mixed-methods design in two phases. In the first phase, the prescriptive and cultural issues of current art therapy interventions for ADHD children in Saudi Arabia were identified. [18] They recruited 21 study participants, including 12 art therapists and 9 children with ADHD, and acquired data by interviewing 12 art therapists from the United Kingdom and 9 children with ADHD from the Kingdom of Saudi Arabia. As the primary art form, they discovered that calligraphy plays a crucial role in developing culturally sensitive art therapy for children with ADHD. In adolescents with ADHD, it can reduce hyperactivity, impulsivity, and inattention. This intervention may also enhance interpersonal relationships, social skills, and emotional health. The practical implications of this study may have a substantial effect on the global treatment of ADHD in children.

Alrazain, Badr, et al. conducted their study using a mixed-methods design in two phases. In the first phase, the prescriptive and cultural issues of current art therapy interventions for ADHD children in Saudi Arabia were identified. They recruited 21 study participants, including 12 art therapists and 9 children with ADHD, and acquired data by interviewing 12 art therapists from the United Kingdom and 9 children with ADHD from the Kingdom of Saudi Arabia. As the primary art form, they discovered that calligraphy plays a crucial role in developing culturally sensitive art therapy for children with ADHD. In adolescents with

ADHD, it can reduce hyperactivity, impulsivity, and inattention. This intervention may also enhance interpersonal relationships, social skills, and emotional health. The practical implications of this study may have a substantial effect on the global treatment of ADHD in children. [19]

3.3 China Calligraphy

In a study by Alrazain, Badr, et al., the research consisted of a two-phase, mixed-methods design. The first phase consisted of identifying the prescriptive and cultural aspects of current art therapy interventions for ADHD children in Saudi Arabia. They interviewed 12 art therapists from the UK and 9 children with ADHD from Saudi Arabia to obtain data. They discovered that calligraphy serves an important role in developing culturally sensitive art therapy for children with ADHD as the primary art form for art therapy. It can decrease hyperactivity, impulsivity, and inattention in ADHD children. Additionally, this intervention may enhance interpersonal relationships, social skills, and psychological health. The practical implications of this study could have a significant effect on the treatment of ADHD in children worldwide. [20]

A 2020 study provides children with ADHD with a touchable calligraphy application. The study reevaluates the effects of visual impairments and multimodality on the design of educational texts, and researcher R. Cochell is conducting a study on the effects of calligraphy. As an art teacher with years of experience writing calligraphy, the author concludes that Chinese calligraphy may be beneficial for students with ADHD. Her experiment provided a student with a tablet app, and the results revealed that composing calligraphy on the tablet app evoked personal thoughts and emotional responses in children with ADHD. Patients could associate their handwriting with the feeling of their fingertips. and attain concentration and character perception. [21]

Non-contact tools reduce the difficulty of handwriting for these students because they do not require physical contact and eradicate the effort required to perform calligraphy with fine motor skills. Additionally, they are more intuitive than touch screens and graphical user interfaces and can be used as motivational aids. Leonardo Ramon Nunes de Sousa and Ismar Frango Silveira et al. discovered and proposed a framework with a set of specific guidelines for software, software for children with ADHD to develop a gestural interface for calligraphy education. [22] The framework contains 25 guidelines in 3 phases, including prototyping, development, and evaluation, that take into account the characteristics of ADHD and identify fine-motor skill techniques, interrelate all proposed guidelines, and support the creation of appropriate gestural interfaces to aid in the rehabilitation of these children with ADHD.

China has adapted to its external reality of accelerated urbanization, industrialization, and the importation of Western ways of thinking since the early 1980s. Many Chinese are preparing to reflect on their own internal realities and cultural continuity now that stability and prosperity are assured. Literary scholars and artists, who are sometimes translated as scholastic gentlemen or literati, shaped a significant portion of China's cultural and ideological heritage. The enduring legacy of their ideology is the calligraphy known as the art of writing; literally the penmanship of writing. Historically, the art of Chinese calligraphy has flourished in the aftermath of social unrest and served as a source of cultural rehabilitation. This is achieved through the creation of artworks based on the principle of communion with nature. Chinese calligraphy heals by bringing the artist and viewer into a state of oneness with nature, in which they transcend worldly suffering and realize their interior truths and selves. Even East Asia has been influenced by this art. R.Wu, a researcher, believes that although psychoanalysis and

psychotherapy are internally distinct, they typically commence with trauma and schizophrenia. In a manner similar to calligraphy, the patient and therapist co-create metaphors and proceed to expand the patient's interior scene integration. Through this process, the patient ultimately transforms and attains a coherent self-structure and self-discovery. [23] Thus, there is a correlation between calligraphy and psychotherapeutic practice. The research suggests that one's interior psyche and outer reality engage in a scene-based dialogue. This is readily detected in the fine art of calligraphy. A case study is used to illustrate the synergy between the art of calligraphy and clinical applications. The case involves a child with Attention Deficit Hyperactivity Disorder (ADHD) whose symptoms significantly improved after calligraphy practice and treatment.

Researchers including Henry SR Kao, Lin Zhu, An An Chao, Hao Yi Chen, Ivy CY Liu, and Manlin Zhang have discovered that Chinese calligraphy handwriting (CCH) has a new function in health and healing. Traditionally, meditation is an effective method to manage stress and maintain health. This study contrasted the efficacy of CCH and meditation as distinct and parallel interventions for stress reduction. [24] They recruited 30 stressed-out students from Taiwan and China, including some children with ADHD. Using a general health questionnaire, the study randomly assigned 30 participants to one of three treatment groups, the CCH group, the meditation group, or the control group for eight consecutive weeks. Before, during, and after treatment, changes in physiological parameters were evaluated. They discovered that adolescents with ADHD who practiced calligraphy had significantly faster reaction times for character recognition than those who did not, and that CCH was highly effective for stress reduction. CCH is an especially promising new method for reducing tension. The procedure is completely applicable to rehabilitating children with ADHD.

4. Discussion

ADHD is presently one of the most prevalent physical deficiencies among children worldwide. Although certain medications can help reduce the symptoms of ADHD in children, their efficacy is limited, and their toxicity can result in certain adverse effects. Consequently, complementary art therapy is emerging as a novel treatment for children with ADHD. [25] Based on the art of Chinese calligraphy and interactive visual art, promoting the recovery of pediatric ADHD patients is a multifaceted endeavor that concentrates primarily on the psychological health and quality of life of patients.

The most fundamental types of calligraphy, according to the previous article, are natural handwriting, English calligraphy, and Chinese calligraphy. According to the available research, Chinese calligraphy that exercises the body's fine motor can reduce stress, alleviate anxiety, strengthen one's concentration, and cultivate emotions, among other benefits for children with ADHD. [26] The results also suggest that the non-contact tool reduces the difficulty of handwriting for some of the more symptomatic children with ADHD, and because it does not require direct physical contact, it alleviates the burden of fine motor movements required by some of the more symptomatic children. It can also be used as a motivational tool and is easier to use than tablet devices' touch screens and UI user interfaces. Thus, calligraphy can be combined with interactive devices to assist children with ADHD in their rehabilitation.

Natural writing handwriting, English calligraphy, and Chinese calligraphy are the most fundamental types of calligraphy, as described in the preceding section. According to the available research, Chinese calligraphy that exercises the fine motor of the body can reduce stress, alleviate anxiety, strengthen concentration, cultivate emotions, and benefit other aspects

of childhood ADHD patients, among others. [27] The results also suggest that the non-contact tool reduces the difficulty of handwriting for some of the more symptomatic children with ADHD. Furthermore, because the tool does not require direct physical contact, it alleviates the burden of fine motor movements required by some of the more symptomatic children with ADHD. It is easier to use than the touch screen and UI user interfaces of tablet devices and can be utilized as a motivational tool. In other words, calligraphy can be combined with interactive devices to aid in the rehabilitation of children with ADHD.

All of the reviewed calligraphy provided clear evidence that training in calligraphy has a significant impact on the rehabilitation of children with ADHD. However, many of the studies chosen for this paper's literature review have limitations. Insufficient research has been conducted on the facilitation of rehabilitation for children with ADHD, a topic that requires community-wide attention. The creation of a facilitated app for pediatric ADHD patients by a program development company necessitates the collaboration of multiple experts from a variety of fields. Medical professionals, program designers, and parents of children with ADHD can only produce more accurate research results if they collaborate.

The technology used to teach calligraphy to children with ADHD is constantly evolving. Early designs and program development focused primarily on conventional home computer hardware. In recent years, the development and design of wearable devices, such as smartphone apps, tablets, smart bracelets, and smart watches, have been applied to an increasing number of patients. As if it were a game-breaker, they can assist pediatric ADHD patients in interacting with their devices and performing calligraphy training on those devices.[28]

In the current situation, with the global neo-coronavirus pneumonia pandemic, we also found that an emerging field, "AI," i.e. artificial intelligence, came to our attention, and we can completely link AI with the promotion of rehabilitation of pediatric ADHD patients by attempting to design and develop AI-related devices or apps, and then attempting to intervene with pediatric ADHD patients to produce experimental data. [29] Obviously, the above research proposal is still based on the health of pediatric ADHD patients, so additional observation and inference are required for the study's results.

5. Conclusion

The purpose of this paper is to investigate the rehabilitation promotion of Calligraphy for children with Attention Deficit Hyperactivity Disorder (ADHD) and how Calligraphy can improve the health status of children with ADHD through the visual arts. In conclusion, Calligraphy has been shown to promote four primary aspects in children with ADHD: the ability to exercise fine motor skills, improve the child's attention, reduce hyperexcitability and calm the child's emotions, and improve mental perception. Some studies have also concluded that calligraphy is too time-consuming and requires a certain amount of muscle strength in the child's limbs. Studies have shown that Calligraphy training programs must be tailored to the perception level of children with ADHD, and that children's sensitivity to the various scripts in Calligraphy varies with their artistic perception levels. It is also essential to confirm with the parents beforehand that the child with ADHD has normal limb strength.

Although research on the use of Calligraphy to aid in the rehabilitation of children with ADHD is increasing annually, the overall research results are still limited. As the prevalence of ADHD in children continues to rise, the rehabilitation of children with ADHD has become one of the top global research priorities. Future research should concentrate more on the needs of children

with varying levels of ADHD and provide appropriate rehabilitation promotion programs for the parents and families of children with ADHD. Diverse app designs can be created to incorporate Calligraphy into the lives of children with ADHD similar to a video game, compensating for the lack of spirituality in the lives of children with ADHD. In recent years, the concept of "metaverse" has emerged, and to some extent, it has been applied to the field of healthcare. Based on the concept and function of the "metaverse," we can offer children with ADHD a variety of Calligraphy art experiences. It is anticipated that the future development of the concept of "meta-universe" will result in improved rehabilitation for pediatric ADHD patients.

References

- Kao, H. et al. (2014) "Calligraphy and meditation for stress reduction: An experimental comparison," *Psychology Research and Behavior Management*, p. 47. Available at: <https://doi.org/10.2147/prbm.s55743>.
- Kao, H.S.R. et al. (2012) "Cognitive effects of English brush handwriting: The case of visual-spatial aptitude," *Asia Pacific Journal of Counselling and Psychotherapy*, 3(2), pp. 190–201. Available at: <https://doi.org/10.1080/21507686.2012.703443>.
- Kao, H.S.R. et al. (2012) "Cognitive effects of English brush handwriting: The case of visual-spatial aptitude," *Asia Pacific Journal of Counselling and Psychotherapy*, 3(2), pp. 190–201. Available at: <https://doi.org/10.1080/21507686.2012.703443>.
- Leczycki, M. and MacMaster, E. (2021) "Visual-tactile phobic hallucinations in a child with stimulant-managed attention-deficit/hyperactivity disorder (ADHD)," *Cureus* [Preprint]. Available at: <https://doi.org/10.7759/cureus.20012>.
- Liu, Z. et al. (2014) "Effect of calligraphy training on hyperarousal symptoms for childhood survivors of the 2008 China earthquakes," *Neuropsychiatric Disease and Treatment*, p. 977. Available at: <https://doi.org/10.2147/ndt.s55016>.
- Naguy, A., Hashem, M.S. and AlKhadhar, S. (2019) "Atypical antipsychotics for attention-deficit/hyperactivity disorder- science, art, or fad?," *European Psychiatry*, 62, pp. 58–59. Available at: <https://doi.org/10.1016/j.eurpsy.2019.08.013>.
- Papavasiliou, A. (2008) "Effects of psycho-educational training and stimulant medication on visual perceptual skills in children with attention deficit hyperactivity disorder," *Neuropsychiatric Disease and Treatment*, Volume 3, pp. 949–954. Available at: <https://doi.org/10.2147/ndt.s2234>.
- Qaysi, M. (2018) ADHD augmented - mobile app development (IOS) - researchgate.net. Available at: https://www.researchgate.net/profile/Mohsen-Qaysi/publication/364950482_ADHD_Augmented_-_Mobile_app_development_iOS/links/636034c796e83c26eb6ec241/ADHD-Augmented-Mobile-app-development-iOS.pdf (Accessed: August 15, 2018).
- Tang, Y. (2021) "Art therapy: Intervention study of immersive interaction animation on children with ADHD," *E3S Web of Conferences*, 271, p. 03048. Available at: <https://doi.org/10.1051/e3sconf/202127103048>.
- Xue, J. et al. (2021) "Meta-analysis study on treatment of children's attention deficit disorder with hyperactivity," *Journal of Healthcare Engineering*, 2021, pp. 1–7. Available at: <https://doi.org/10.1155/2021/8229039>.
- Jiang, H. et al. (2018) "Effect of neurocognitive training for children with ADHD at improving academic engagement in two learning settings," *Journal of Attention Disorders*, 25(3), pp. 414–431. Available at: <https://doi.org/10.1177/1087054718799931>.
- Johnson, M.I. (2022) How neurodiversity centered museum education within art museums can benefit children with ADHD and autism spectrum disorders, *Digital Commons at*

- Buffalo State. Available at: https://digitalcommons.buffalostate.edu/museumstudies_theses/38/ (Accessed: May 3, 2022).
- Kaya Kara, O. et al. (2021) “Home participation, support and barriers among children with attention-deficit/hyperactivity disorder before and during the COVID-19 pandemic,” *Public Health*, 196, pp. 101–106. Available at: <https://doi.org/10.1016/j.puhe.2021.04.015>.
- Kejani, M. and Raëisi, Z. (2020) “The effect of drama therapy on working memory and its components in primary school children with ADHD,” *Current Psychology*, 41(1), pp. 417–426. Available at: <https://doi.org/10.1007/s12144-019-00564-8>.
- KOHARA, A. et al. (2018) “Consideration of constructs for the social skill training program development for children with ADHD tendency,” *Asian Journal of Human Services*, 14, pp. 66–83. Available at: <https://doi.org/10.14391/ajhs.14.66>.
- Lopes, E. (2021) Effectiveness of art therapy with children with both attention-deficit/hyperactivity and autism, *DigitalCommons@Lesley*. Available at: https://digitalcommons.lesley.edu/expressive_theses/426/ (Accessed: May 15, 2021).
- Luiselli, J.K. and Fischer, A.J. (2016) *Computer-assisted and web-based innovations in psychology, Special Education, and health*. Amsterdam, USA: Academic Press, an imprint of Elsevier.
- Park, Y.-J. and Kim, E.J. (2019) “Effects of therapeutic interventions for children with attention deficit hyperactivity disorder : A systematic review,” *Journal of Korean Society of Sensory Integration Therapists*, 17(1), pp. 43–53. Available at: <https://doi.org/10.18064/jkasi.2019.17.1.043>.
- Sújar, A. et al. (2022) “Developing serious video games to treat attention deficit hyperactivity disorder: Tutorial guide,” *JMIR Serious Games*, 10(3). Available at: <https://doi.org/10.2196/33884>.
- Yu, J.L. (2018) *Effective Learning Design of Game-Based 3D Virtual Language Learning Environments for Special Education Students*, jstor. Available at: <https://www.jstor.org/stable/pdf/26458519.pdf> (Accessed: July 15, 2018).
- Amador, S. (2018) *Teaching social skills through sketch comedy and improv games: A Social Theatre Approach for kids and teens including those with ASD, ADHD, and anxiety*. London, UK: Jessica Kingsley Publishers.
- Chen, W. et al. (2017) “Long-term experience of Chinese calligraphic handwriting is associated with better executive functions and stronger resting-state functional connectivity in related brain regions,” *PLOS ONE*, 12(1). Available at: <https://doi.org/10.1371/journal.pone.0170660>.
- Kao, H.S. (2006) “Shufa: Chinese calligraphic handwriting (CCH) for Health and Behavioural therapy,” *International Journal of Psychology*, 41(4), pp. 282–286. Available at: <https://doi.org/10.1080/00207590544000059>.
- Kao, H.S., Xu, M. and Kao, T.T. (2021) “Calligraphy, psychology and the Confucian literati personality,” *Psychology and Developing Societies*, 33(1), pp. 54–72. Available at: <https://doi.org/10.1177/0971333621990449>.
- Kao, H.S.R. et al. (2012) “Cognitive effects of English brush handwriting: The case of visual–spatial aptitude,” *Asia Pacific Journal of Counselling and Psychotherapy*, 3(2), pp. 190–201. Available at: <https://doi.org/10.1080/21507686.2012.703443>.
- Li, C.-H. et al. (2018) “The validity of Computerized Visual Motor Integration Assessment using Chinese basic strokes,” *Interactive Learning Environments*, 26(8), pp. 1074–1089. Available at: <https://doi.org/10.1080/10494820.2018.1442867>.

- Li, R. et al. (2022) “Reconfiguration of the brain during aesthetic experience on Chinese calligraphy—using Brain Complex Networks,” *Visual Informatics*, 6(1), pp. 35–46. Available at: <https://doi.org/10.1016/j.visinf.2022.02.002>.
- M, S., G Cholli, N. and Nayak, S. (2019) “Classification of attention deficit hyperactivity disorder (ADHD) considering diagnosis and treatment,” *International Journal of Modern Education and Computer Science*, 11(6), pp. 26–42. Available at: <https://doi.org/10.5815/ijmeecs.2019.06.04>.
- Smagorinsky, P., Cameron, T. and O'Donnell-Allen, C. (2007) “Achtung maybe: A case study of the role of personal connection and art in the literary engagement of students with attentional difficulties,” *Reading & Writing Quarterly*, 23(4), pp. 333–358. Available at: <https://doi.org/10.1080/10573560701501552>.
- Valentino, T. (2021) The efficacy of art and movement treatment modalities on an individual with autism spectrum disorder, ScholarWorks at University of Montana. Available at: <https://scholarworks.umt.edu/etd/11792/> (Accessed: June 3, 2021).