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General

Contribution of a virtual magic camp to enhancing self-esteem in children with ADHD: A pilot study

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Background

Children with attention-deficit/hyperactivity disorder (ADHD) have been reported to experience low self-esteem. Magic, a performing art, when used therapeutically, has been shown to enhance self-esteem in children with neurodevelopmental disorders. However, there is a paucity of evaluation studies using this intervention applied to children with ADHD.

Purpose

This single-group study aims to describe the effectiveness of a virtual summer magic camp program to enhance self-esteem in children and adolescents with ADHD.

Method

Six children with ADHD, age 8.6-14.3 years, who participated in a virtual magic camp program for children with disabilities, were included in this study. The camp met 3 days a week, about 45 min to an hour each session, over four consecutive weeks for a total of 9 to 12 hours. Participants completed the assessments before the beginning of the camp and post-camp. In addition, participants and their parents were individually interviewed to explore their camp experience at the post-camp data point.

Results

A Wilcoxon signed-rank test indicated that the median ranks of the self-esteem scores at post-magic camp, median=21.5, were significantly higher than the median ranks of the self-esteem scores at baseline, median=19.5, with z=2.23, p=.026. The effect size of the virtual magic camp on self-esteem was .64, which is considered moderate. Findings were validated by the participants describing gains in self-esteem after participation in the magic camp and by the parents' statements regarding the positive impact on their child's psychological well-being.

Discussion

This study supported the hypothesis that children with ADHD who participated in a four-week virtual magic camp experienced enhanced self-esteem. Future studies should investigate the holistic impact of magic camps on children and adolescents with ADHD and include measures that tap into other psychosocial attributes such as social functioning, social skills, and self-efficacy.

INTRODUCTION

Attention-deficit/hyperactivity disorder (ADHD), a common child and adolescent neurodevelopmental disorder, is characterized by deficits in attention skills, staying on task, or being organized, affecting academic performance in school and daily activities.[1] In addition to inattention and/or hyperactivity, children and adolescents with ADHD have been reported to have psychological well-being difficulties such as low self-esteem.[2,3] Considering the frequent academic challenges and failures, and adverse social feedback that children with ADHD encounter during their development, it is plausible that these experiences may contribute to their low self-esteem.[4] Research on ADHD identified deficits in self-esteem that could lead to maladaptive coping strategies such as deviant peer choices and substance abuse,[5] disruptive behaviors such as bullying and peer victimization,[6] and comorbid mental health disorders such as anxiety and de-

pression.[7]

Psychosocial interventions have been recommended to help children and adolescents with ADHD cope with difficulties and failures in school and everyday life and increase self-esteem.[8] There is growing evidence for using arts as an intervention medium to address psychological well-being issues among children and adolescents with ADHD in non-clinical settings. However, a paucity of evaluation studies of such intervention is reported.[9]

One therapeutic tool in arts that have demonstrated improvements in the psychological well-being of children with disabilities is magic.[10,11] Teaching magic tricks to children with hemiplegic cerebral palsy through in-person camp/club has been described.[12–14] In addition to having fun, social interaction, and support from campers with similar disabilities, children with hemiplegic cerebral palsy who participated in magic camp/club experienced enhanced self-esteem and confidence.[13–15]

Magic trick programs have also been reported to enhance the self-esteem of children with severe emotional disturbances,[16] and student cohorts with a diverse range of developmental disabilities such as communication difficulties, learning difficulties, (emotional) behavioral disorders, autism, and ADHD.[17,18] However, for studies including students with a diverse range of developmental disabilities, data analysis was performed on all students who participated in the magic tricks program, without separating them into specific condition/diagnosis.[17,18] As a result, it is unclear whether learning magic tricks would enhance self-esteem specifically in children and adolescents with ADHD.

Therefore, the purpose of this pilot study is to evaluate the immediate effect of a four-week virtual magic camp via Zoom videoconferencing on enhancing self-esteem in children and adolescents with ADHD. It was hypothesized that children with ADHD would show a gain in their self-esteem after participating in the virtual magic camp.

METHOD

RESEARCH DESIGN

This study employed a single group pretest-posttest design.

PARTICIPANTS

A virtual magic camp for children with disabilities held in the summer of 2020 was jointly hosted by the Department of Occupational Therapy in the University of Alabama at Birmingham (UAB), School of Health Professions, and UAB Arts in Medicine. Recruitment was conducted through various avenues of advertisement, which included posting the flyer on the website of community agencies that serve children with disabilities, and word of mouth on social media.

Forty-one children with disabilities attended the virtual magic summer camp. The requirements for attendance of the magic camp were: (1) aged between 8.5 and 18 years; (2) ability to follow at least 2-3 steps verbal instruction in English to complete a task; (3) ability to remember a simple sequence of actions to execute a task; (4) functional verbal communicators; and (5) attended regular school. The exclusion criteria were: (1) severe visual or hearing disorders that prevent learning and carrying out magic tricks; or (2) no access to the internet and a computer or a smartphone that can perform web browsing.

PROCEDURES

About a week before the first day of the camp, campers were invited to participate in an evaluation component of the magic camp, with informed consent and evaluation questionnaires mailed to the camper's home address and included as an e-mail attachment. Twenty-seven campers and parents/guardians signed the consent agreeing to complete the study assessments. Participants completed the questionnaires either in paper and pen and returned the paper copy to the research team or provided their verbal response during the Zoom meeting with the occupational therapy (OT) graduate student research associates. Participants completed the same questionnaires at post-camp evaluation and had no access to their responses provided at baseline. There is no monetary incentive for the campers to complete the study evaluation questionnaires.

Out of the 27 campers who provided consent, 14 completed the evaluation questionnaires before and after the magic camp, with 6 reported to have a diagnosis of ADHD, 3 developmental delay/Down syndrome, 3 autism, 1 hemiplegic cerebral palsy, and 1 Moyamoya disease resulting in hemiplegia. The present study included only the data of the six children with ADHD for analysis. The UAB Institutional Review Board approved the study, protocol number IRB-300001044.

THE SUMMER MAGIC CAMP PROGRAM

A week before the starting date of the magic camp, OT graduate students were trained by a professional magician in teaching magic tricks to campers via Zoom videoconferencing. During the virtual training session, the magician showed the students the magic tricks and how they work and revealed how to do the tricks. The training session lasted for about 2 hours and was recorded so that the students could review it afterward. In addition, training videos of the magic tricks were made available to the students. Pairs of OT students evaluated each other using a validated magic performance evaluation scale to ensure that they were competent in performing the magic tricks to teach the campers.[19] Completion of the peer performance evaluation by students was necessary as part of the course requirements.

A week before the camp, a magic kit with the following items (deck of cards, paper clips, rubber bands, length of rope, zig-zag rope kit, color vision kit, penetration frame kit, stiff rope kit, nails through coin kit, coin slide kit, magic wand) was mailed to the parents/guardians of the campers. The virtual magic camp coaching session was arranged between the OT students, campers, and parents/guardians. The coaching session typically lasted for 45 min to an hour. Campers attended the camp Monday, Wednesday, and Friday, for four consecutive weeks for a total of about 9 to 12 hours. During these sessions, OT students taught the campers the magic tricks.

The format of the camp involved intensive one-on-one individual coaching sessions provided by OT student pairs

Table 1. Name and description of the magic tricks.

1. Challenge Knot Using a 40" piece of rope, the performer demonstrates how to tie a knot in the middle of the rope without releasing either end of the rope.
2. Instant Knot Using a 40" piece of rope, the performer instantly ties a knot in one end of the rope using one hand with a simple magic maneuver.
3. Four Aces Using a normal deck of cards, the performer asks a volunteer to select a number between 10-25 randomly. The number of cards is counted out into four stacks. When the top card on each stack is turned over, one of the four aces is the top card.
4. Re-Appearing Dime The performer shows the audience two coins - a quarter and a dime - in the palm of their hand. The dime is removed and placed in their pocket while closing their hand around the quarter. With the snap of a finger, the dime magically appears inside the closed hand with the quarter.
5. Jumping Rubber Band A rubber band is placed on the first and second fingers of the performer's hand. The hand is closed and when the performer opens it, the rubber band is now on the third and fourth fingers.
6. Vanishing Rubber Band A rubber band is stretched between the index finger and thumb of the right and left hand. When the fingers are opened, the rubber band vanishes.
7. Linking Paper Clips Two paper clips are linked together on a dollar bill without ever touching the clips.
8. Rising Paper Clip A paper clip is caused to rise on a rubber band stretched between the finger and thumb of the performer.
9. Penetration Frame The performer shows a small frame made of plastic with a clear plastic sheet inside. The performer selects a playing card and places it on one side of the frame, covering the clear plastic sheet. The performer proceeds to push a pencil through the middle of the frame, penetrating the card and the sold plastic sheet! An audience volunteer taps the frame and plastic sheet with a pencil to reveal they are solid and impenetrable.
10. Coin Slide A coin is placed inside a small plastic box and closed. When it is opened, the coin is gone.
11. Floating Dollar Bill A dollar bill is folded in half and held between the thumb and index fingers of both hands. Fingers are slowly opened and moved away, leaving the bill floating in the air.
12. Stiff Rope A 3-foot length of rope is shown to the audience. The magician holds each end in their right and left hand. Stretching the rope fully, the magician "hypnotizes" it, causing it to become completely rigid. Slowly, the magician releases the rope in one hand, but it remains suspended in the air! Snapping the fingers causes the rope to "wake up" and fall limp.
13. Nails Through Coin A plastic coin or real quarter is placed flat inside a small, round container and covered by the lid. The lid has eight holes in it from which you can see the coin clearly inside the box. One at a time, eight spikes are pushed through the holes, through the solid coin, and out the bottom of the box! The spikes are removed, the lid is opened, and the coin is shown to be fully intact.

to ensure campers' mastery of each trick. Campers learned 3-4 specific magic tricks each week. Samples of magic tricks are described in Table 1. Campers were encouraged to continue practicing the taught magic trick after each scheduled coaching session. The OT students reviewed the camper's performance of the previously taught tricks in the following session. On Friday, OT students coordinated with other pairs to have a virtual group meeting. In addition to showing the magic tricks that they learned to each other during the meeting, campers participated in various social group activities organized by the OT students. After the four-week magic camp, participants and parents/guardians were interviewed to seek feedback regarding their perceptions of the magic camp and recommendations for improvement.

OUTCOME MEASURE

The level of self-esteem was measured using the Rosenberg Self-Esteem Scale,[20] a self-report instrument. The Rosenberg Self-Esteem Scale consists of 10 items quantifying participants' feelings about themselves on a 4-point scale (1=strongly agree; 4=strongly disagree). After recoding the five reversed scored items, responses were totaled to form the summation score, ranging from 10 to 40, with the higher scores indicating higher self-esteem.

DATA ANALYSIS

A two-sided, non-parametric Wilcoxon signed-rank test was performed to test the hypothesis that participants' self-esteem scores at baseline would be significantly different from those at post-camp. Statistical significance was set at α<.05. The effect size was calculated by dividing the z statistic by the square root of twice the sample size.[21]

RESULTS

The participants included two girls and four boys represent-

Table 2. Demographics of participants

Name[§]	Diagnosis	Co-morbidity	Gender	Race	Age (yr)	Grade
Alex	ADHD	slow learner	male	black	12.6	6th
Mark	ADHD	autism	male	white	11.7	5th
David	ADHD	autism	male	white	13.6	7th
John	ADHD	oppositional defiant disorder	male	white	10.6	5th
Julia	ADHD	Tourette's disorder, hydrocephalus	female	mixed	14.3	9th
Sara	ADHD	-------	female	white	8.6	3th

§ = pseudonym; ADHD = attention-deficit/hyperactivity disorder

ing four white, one black, and one mixed-race individual (see Table 2). The participants' mean and standard deviation (SD) age was 11.9 ± 2.1 years (range: 8.6-14.3 years). None of the six participants had any previous formal learning experiences with magic tricks. All six participants reported a higher score on the Rosenberg Self-Esteem Scale (ranging from 1-3 points) from their baseline score. A Wilcoxon signed-rank test indicated that the median ranks of the self-esteem scores at post-magic camp, median=21.5, were significantly higher than the median ranks of the self-esteem scores at baseline, median=19.5, with z = 2.23, p =.026. The effect size of the virtual magic camp on self-esteem was .64, which is considered moderate.[22]

DISCUSSION

This pilot study supported the hypothesis that children with ADHD who participated in a four-week virtual magic camp experienced enhanced self-esteem. Findings were validated by the participants' descriptions of gaining self-esteem through participation in the magic camp. During the exit interview, one participant stated, "*I feel better about myself than before the camp*" (John *[pseudonym]*, 10.5 yr old). In addition, two participants' mothers stated how the magic camp positively impacted their child's psychological well-being.

> "*I was pleased that John [pseudonym] learned new skills that improved his self-confidence when speaking and performing in front of a group, as well as self-esteem.*" (John's mother).

> "*… it was really fun to sit around in the evenings, and she would show us what tricks she did, and there were some we would go "huh, how did she do that?" that was awesome. It was great self-esteem for her to have all of us look at her and go, "Sara [pseudonym], that is so great." She would just glow when we would praise her.*" (Sara's mother)

Findings support that children with ADHD who participat in learning magic tricks may experience enhanced self-esteem; however, there are several components (or factors) integrated into the process of learning magic tricks that may contribute to the enhancement of the participants' self-esteem. These may include the intensive one-on-one interaction between the OT students and the participants, praise from the OT students and family members of the participants, and the group activity on Friday, which might play a vital role directly and indirectly in interacting with learning and performing magic tricks to enhance self-esteem. Future studies should be designed to investigate the contribution of these factors. Since simple magic tricks are not difficult to learn, health care providers and teachers can quickly learn some of these tricks and incorporate simple magic tricks and integrate them into the client's program or student's curriculum for psychosocial skills training in children and adolescents with ADHD.

Limitations of this pilot study included a small sample size without having a control group which would prevent a confirmation of the effectiveness of learning magic tricks to improve self-esteem for children with ADHD and limit the generalizability of the findings. With the encouraging results from the present study, a more vigorous investigation, including a randomized controlled trial with a control group and a 3-6 months follow-up on the impact of magic camp participation on enhancing self-esteem, are warranted. In addition to evaluating self-esteem enhancement, future studies should investigate the holistic impact of magic camps on children and adolescents with ADHD and include measures that tap into other psychosocial attributes such as social functioning, social skills, and self-efficacy.

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