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Psychological Benefits of Equine-Facilitated Activities for Children Diagnosed with Cerebral Palsy

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Abstract

Equine-facilitated activities (EFA) are generally considered to be an alternative treatment method by using the natural body form, gait and behavior of horses. EFA have been used for many years to treat and to improve the living conditions of people with disorders or disabilities such as autism, cerebral palsy (CP), arthritis, multiple sclerosis, stroke, spinal cord injury, behavioral and psychiatric disorders. This study aims to examine the effects of adaptive riding (AR), which is a subdiscipline under EFA, on anxiety, empathy, aggression, and emotional regulation of children diagnosed with cerebral palsy. Maternal depression and anxiety level measurements were also included in the study. Twenty children with CP, between 7 and 10 years old and their mothers participated in the study. They were randomly assigned to one of two groups (intervention and control) consisting of 10 participants. Pre and post measurements were implemented at the beginning and at the end of 8 weeks of AR intervention. The Screen for Anxiety Related Emotional Disorders, Bryant Index of Empathy Measurement for Children and Adolescents, Buss-Perry Aggression Questionnaire, Beck Depression Inventory, The State-Trait Anxiety Inventory were used to measure the psychological and emotional status of the participants and depression, anxiety levels of mothers. Aggression, anxiety, and maternal depression decreased; empathy and emotional regulation improved in the intervention group. No significant differences found in the control group. This study provides strong evidence that an 8-week AR intervention has positive effects on children with cerebral palsy. Significant improvements regarding both maternal and children's psychological and emotional aspects showed how an alternative therapy with animals can be constructive.

Keywords: aggression, cerebral palsy, emotional regulation, empathy, equine-facilitated activities, maternal anxiety, maternal depression

Introduction

Cerebral palsy (CP), with the incidence of 2–3/1000 newborns, is a neurologic disorder, which leads to chronic neurologic and developmental abnormalities, and children diagnosed with CP usually need special education and therapy (Kim et al., 2005). CP may cause severe movement and postural problems. Treatment methods aiming to increase the physical fitness levels and promote the psychological development of individuals with CP include applications that increase sensory input and motor

functions. Equine Facilitated Activities (EFA), which include many physical and cognitive activities and support sensory and emotional development, are widely used today for the treatment of individuals with CP. Adaptive Riding (AR), which is a form of EFA, defined as recreational horseback riding lessons adapted for people with disabilities and it is one of the widely preferred methods for treatment of CP. Physical and functional improvements such as gait speed, rhythm, width, and bilateral symmetry as well as improved gross motor functions and balance parameters are



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seen after EFA (Manikowska et al., 2013). However, EFA and related treatments lack a scientific basis regarding psychosocial effects. McGibbon et al. (1998) reported EFA treatments twice a week for 8 weeks in children with CP increased social activities and reduced energy expenditure during walking. Casady and Nichols-Larsen (2004) reported that EFA treatments once a week for 10 weeks improve self-esteem and motivation and increase participation in the activities in children with CP. However, their study was not based on objective results but on the participants' verbal expression.

In EFL and AR, horses come into contact with medically or socially disadvantaged humans or those having specific needs. These activities provide new stimulus related to gait and help balance and postural control in children with CP because the pelvic movements of a horse rider are similar to that of the pelvis during gait (Glasow, 1986). EFA is a good strategy to increase functioning in children with CP who need continued, varied, and repetitive treatment.

Children diagnosed with CP usually need long term rehabilitation, which may restrict social interactions with peers and may cause social isolation (Reddihough et al., 2013). Empathy is the capacity to share and understand another's state of mind or emotion. It is often characterized as the ability to put oneself into another's place, or in some way experience the outlook or emotions of another being within oneself. Empathy is a powerful communication skill that is often misunderstood and underestimated. Children can develop their empathy skills through social interaction with each other. In case of a lack of communication, these skills may not be developed at the desired level (Coutinho, Silva, & Decety, 2014). Socially isolated children (such as those with disabilities) are more anxious and aggressive. With the decrease in the social status of children facing social exclusion, these children are deprived of the protective function provided by friendship (Bourke & Burgman, 2010). Children with physical and/or developmental disabilities (like CP) are disproportionately bullied at high rates and that may cause anxiety, aggression, non-empathic attitudes (Asher & Gazelle, 1999). Children with a chronic disorder are almost three times as likely as healthy peers to suffer social exclusion, lower levels of friendship and peer support. For this reason, it is necessary to provide opportunities for disabled children, who are among the disadvantaged groups, to increase their social interactions.

The primary caregivers of children with disabled children have been found to experience increased stress, health problems, and a greater sense of restriction compared to parents who do not have disabled children. Mothers specifically experience a heavy sense of guilt, inferiority and a decrease in their personal well-being, which can lead to depression and anxiety disorder (Ribeiro, Porto, & Vandenbergh, 2013). Maternal anxiety and depression may also cause children's aggression problems, anxiety and empathy deficits. EFA, in which positive psychological effects were shown on disabled children and people who have mental disorders (Brandt, 2013) may improve empathy skills and decrease aggression and anxiety in children diagnosed with CP. Thus, in the present study, we aimed to evaluate the benefits and effectiveness of EFA in the areas of anxiety, aggression, empathy, emotion regulation for children diagnosed with CP. Maternal depression and anxiety levels were also evaluated before and after EFA.

Method

Participants

A total of 20 children and their mothers participated in the

study, and the participants were divided into two groups of 10 by random selection method to be included in the intervention and control groups. The intervention group consisted of three male and seven female children with CP ($M_{age} : 8.2 \pm 0.8$). The control group consisted of the same number of children with CP ($M_{age} : 8.3 \pm 0.5$) with the same gender distribution. Five of the participants in the experimental group had spastic paraplegia, four had spastic hemiplegia, and one had spastic triplegia, while five of the participants in the control group had spastic paraplegia and the remaining six had spastic hemiplegia. Participants were classified between levels 1-4 using Gross Motor Function Classification System. The participants were selected from the children who visited Nevşehir City Hospital Physiotherapy Clinic due to their condition. Children who can sit with limited or no assistance and have no previous EFA experience included in the study. Since EFA have been carried out using AR principles, activities on horseback were mainly used. Therefore, unable to maintain the head position due to gravity and horse movements, feeling unbearable pain, having a limited joint range of motion that prevents riding, having a deformation in the spine and lower extremities that cannot be treated by adaptive riding, having uncontrollable epilepsy, having a fracture risk due to severe osteoporosis were accepted as exclusion criteria.

The mean age of the mothers participating in the study was 33.3 ± 3.6 for the intervention group and 32.6 ± 3.43 for the control group. All mothers were married, the average daily childcare of the mothers time was 18 hours. None of the mothers had a history of using psychotropic drugs such as antidepressants and there were no significant differences in maternal ages, education and working status between the groups. Mothers signed the informed consent forms required for both themselves and their children to participate in the study at the beginning of the study. The study carried on in accordance with the Declaration of Helsinki as amended by the World Medical Association Declaration of Helsinki and the study was approved by the Ethics Committee of Erciyes University.

Measurements

The Screen for Anxiety Related Emotional Disorders (SCARED) instrument: The SCARED is an instrument used to screen for childhood anxiety disorders including, general anxiety disorder, separation anxiety disorder, panic disorder and social phobia. It comes in two versions; one asks questions to parents about their child and the other asks these same questions to the child directly. Respondents may select from the options of "Not True or Hardly Ever True", "Somewhat True or Sometimes True", and "Very True or Often True" (Birmaher et al., 1997). SCARED Turkish forms' validity and reliability were made by Cakmakci (2004). Both child and parent's instruments were used to measure the above-mentioned variables.

Bryant Index of Empathy Scales for Children and Adolescents: The scale was developed by Bryant in 1982 used to measure the empathy skills of children and adolescents aged between 8-14 years. The Turkish validity and reliability study of the scale was done by Gurtunca (2013). The original form consisted of 22 items. One item was removed in the Turkish adaptation and validity reliability study, thus the scale included 21 items. The response format was changed from the original two-stage (yes vs. no responses) format that Bryant used, to a scale of one "I strongly agree" to five "I strongly disagree" (Bryant, 1982).

Buss and Perry (1992) Aggression Questionnaire: The scale, adapted from the Buss-Durkee Hostility Inventory, is a 5 point

likert type scale consisting of 29 items. It aims to measure four different dimensions of aggression: physical aggression, verbal aggression, hostility and anger. Physical aggression subscale, 9 questions about physically harming others; verbal aggression subscale, 5 questions about verbally hurting others; anger subscale, 7 questions aiming to measure the emotional dimension of aggression; hostility subscale contains 8 questions aiming to measure the cognitive dimension of aggression (Buss & Perry, 1992). The Turkish adaptation, validity and reliability study of the inventory was carried out by Demirtaş (2012). In this study, only the sub-dimension of the inventory measuring anger was used.

Beck Depression Inventory (BDI): Developed by Beck, Ward, Mendelson and Erbaugh (1961), the scale is used to determine the risk of depression and measure the level of depression symptoms and the change in severity on a 4-point scale ranging from 0 to 3. It is a scale containing 21 self-evaluation sentences. The score range varies between 0 and 63, a high score indicates a high severity of depression. The validity and reliability of the Turkish form were made by Hisli (1989).

The State-Trait Anxiety Inventory (STAI): The scale was developed by Spielberger et al. in 1964 to determine the state and trait anxiety levels of individuals (Spielberger, 1970). Its translation into Turkish, reliability and validity studies were carried out by Öner and Le Compte (1983). The scale, which is a type of self-evaluation, includes 40 items consisting of short expressions. The scale consists of two parts: the "state anxiety form" with 20 items, which was created to determine what is felt at the moment, and the "trait anxiety form" of 20 items, which was created to determine what has been felt for the last seven days (Öner & Le Compte, 1983). In this study, STAI was used only to measure the anxiety levels of mothers.

Adaptive Riding Procedure

The contents in this section have been mentioned in the work previously published by Ozyurt et al. (2020). An occupational therapist, a physical therapist, and a pediatrician were present during all sessions. During the 8-week adaptive riding activities, the participants took a part in the activities for 1 hour each week. A maximum of 2 participants took part in the same session. The content of the sessions was organized in a way that all activities met children's goals and objectives, also their capabilities are taken into consideration. Before the sessions started, the children and their families were given a tour of the equestrian center and informed about the gener-

al layout and rules. Professional Association of Therapeutic Horsemanship International guidelines were administered during all AR sessions. In accordance with the guidelines, there was a trained volunteer leading the horse and two volunteers walking along either side of the horse (side-walkers) to ensure the rider's safety in all sessions. In addition, it was ensured that protective helmets and vests were worn by all participants in all sessions. A certified instructor who specialized in therapeutic horsemanship led all sessions. The certified instructor chose the horses for each rider considering the size and ability of the riders. The sessions included grooming and feeding, walking with the horse, and riding activities (Akpınar, Özcan, Özyurt, & Dinseven, 2016). Additionally, skills such as speech and socialization were also addressed during sessions.

Statistical Analysis

SPSS ver. 19.0 software (IBM, USA) was used for the statistical analyses. Five instruments were used to determine psychological, psychosocial, and emotional parameters. A two-way mixed-model Repeated Measures ANOVA was used for each dependent variable. Prior to each statistical analysis, assumptions for mixed-model Repeated Measures ANOVA were tested. The group (intervention and control) was treated as a between factor, and the test (pre and post-tests) was treated as a within factor. The statistical significance level was set as $p < .05$ for all analyses.

Results

The Screen for Anxiety Related Emotional Disorders (SCARED)

The mean values for the SCARED questionnaires filled by the children and filled by the parents are shown in Figure 1a and Figure 1b. The statistical analysis for the SCARED questionnaire filled by the children displayed a significant two-way interaction (groups*tests), $F_{(1,18)}=10.66$, $p < .05$, $\eta^2=.37$. Post-hoc analysis showed that the control group's scores did not change from pre to post-tests ($M=38.8 \pm 2.56$ and $M=39.4 \pm 1.84$, $p > .05$, respectively). However, a significant decrease was observed in the intervention group from pre- to post-tests ($M=37.8 \pm 2.55$ and $M=30 \pm 1.73$, $p < .05$, respectively). Both group's SCARED scores were not significantly different at the pre-test ($p > .05$). However, the intervention group's score was significantly lesser than the control group at the post-test ($p < .05$).

The statistical analysis for the SCARED questionnaire

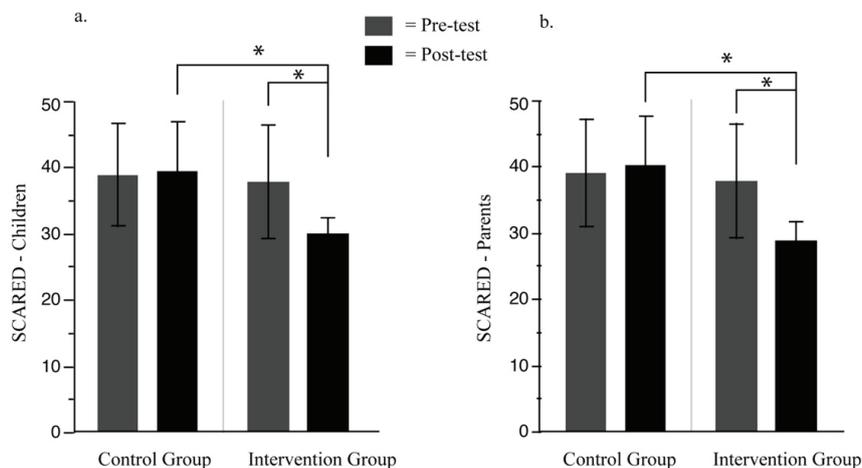


FIGURE 1a and 1b. The average values for the SCARED questionnaires filled by the children (1a) and filled by the parents (1b) for both groups from pre- to post-test

filled by the parents also displayed a significant two-way interaction (groups*tests), $F_{(1,18)}=14.03$, $p<.05$, $\eta^2=.44$. Post-hoc analysis showed that control group's scores did not change from pre to post-tests ($M=39\pm2.66$ and $M=40.2\pm1.75$, $p>.05$, respectively). However, a significant drop was observed in the intervention group from pre- to post-tests ($M=37.8\pm2.66$ and $M=28\pm1.75$, $p<.05$, respectively). Both groups SCARED scores were not statistically significant at the pre-test ($p>.05$). However, the intervention group's SCARED score was significantly lesser than the control group at the post-test ($p<.05$). According to these results, the anxiety levels of the parents and children in the intervention groups significantly decreased after adaptive riding sessions.

Bryant index of empathy

The mean empathy scores for both groups between pre and post-tests are shown in Figure 2. The statistical analysis for Bryant Empathy Scale displayed a significant two-way interaction (groups*tests), $F_{(1,18)}=24.71$, $p<.05$, $\eta^2=.44$. Post-hoc analysis showed that the control group's empathy scores did not change from pre to post-tests ($M=11.5\pm.51$ and $M=11.6\pm.44$, $p>.05$, respectively). However, a significant increase was observed in the intervention group from pre to post-tests ($M=11.3\pm.50$ and $M=13.2\pm.43$, $p<.05$, respectively). Both groups' empathy scores were not significantly different at the pre-test ($p>.05$). We can infer from these results that empathy skills increased in the intervention group after adaptive riding sessions.

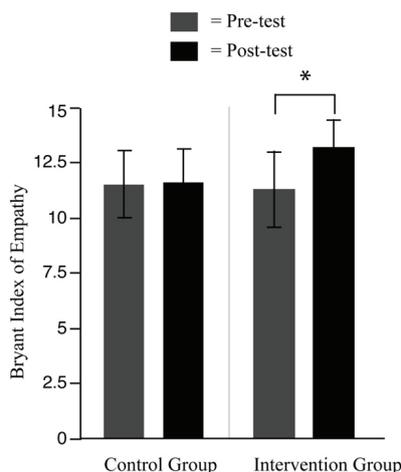


FIGURE 2. The average values for empathy scores for both groups between pre- and post-tests

Buss and Perry Aggression Questionnaire

The mean scores of Buss and Perry Aggression Questionnaire for both groups between pre and post-tests are shown in Figure 3. The statistical analysis for Buss and Perry Aggression Questionnaire displayed a significant two-way interaction (groups*tests), $F_{(1,18)}=34.29$, $p<.05$, $\eta^2=.66$. Post-hoc analysis showed that control group's aggression scores did not change from pre to post-tests ($M=71.5\pm3.5$ and $M=72.9\pm3.6$,

$p>.05$, respectively). However, a significant decrease was observed for the intervention group from pre to post-tests ($M=72\pm3.51$ and $M=56.6\pm3.6$, $p<.05$, respectively). Both groups' aggression scores were not statistically significant at the pre-test ($p>.05$). However, the intervention group's aggression score was significantly lesser than the control group at the post-test ($p<.05$). This result implies that participating in adaptive riding decreased the aggression level in children with CP.

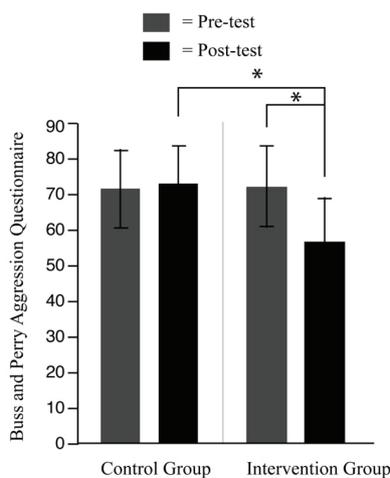


FIGURE 3. The average values for Buss and Perry Aggression Questionnaire for both groups between pre and post-tests

Beck Depression Inventory (BDI)

The mean scores from BDI for both groups between pre and post-tests are shown in Figure 4. The statistical analysis for BDI displayed a significant two-way interac-

tion (groups*tests), $F_{(1,18)}=9.74$, $p<.05$, $\eta^2=.35$. Post-hoc analysis showed that the control group's depression scores did not change from pre to post-tests ($M=13.1\pm1.25$ and $M=14\pm0.84$, $p>.05$, respectively). However, a significant

decrease was observed in the intervention group from pre to post-tests ($M=13.5\pm 1.25$ and $M=10.7\pm 0.8$, $p<.05$, respectively). Both groups' depression scores were not significantly different at the pre-test ($p>.05$). However, the intervention

group's depression score was significantly lesser than the control group at the post-test ($p<.05$). Similar to aggression level, participating in adaptive riding decreased the depression level in children with CP.

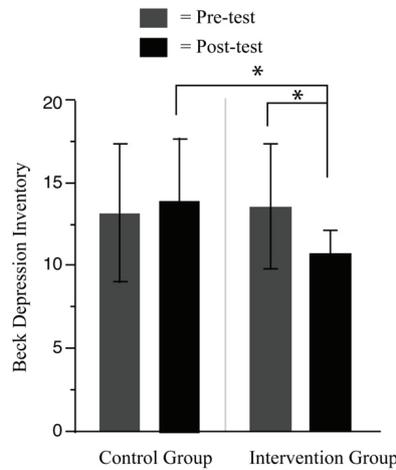


FIGURE 4. The average values for Beck Depression Inventory (BDI) for both groups between pre and post-tests

The State-Trait Anxiety Inventory (STAI)

The mean scores from state and trait anxiety inventory for both groups between pre and post-tests is shown in Figure 5a and Figure 5b. The statistical analysis for state anxiety level among parents displayed a non-significant two-way interaction (group*tests), $F_{(1,18)}=3.32$, $p>.05$, $\eta^2=.15$, a non-significant test main effect, $F_{(1,18)}=.29$, $p>.05$, $\eta^2=.01$, and a non-significant group main effect, $F_{(1,18)}=3.02$, $p>.05$, $\eta^2=.14$.

The statistical analysis for trait anxiety level among parents displayed a significant two-way interaction (group*tests), $F_{(1,18)}=10.27$, $p<.05$, $\eta^2=.36$. Post-hoc analysis showed that the control

group's trait anxiety scores did not change from pre to post-tests ($M=45\pm 1.12$ and $M=43.8\pm 1.26$, $p>.05$, respectively). However, a significant decrease was observed in the intervention group from pre to post-tests ($M=44.4\pm 1.11$ and $M=38.3\pm 1.26$, $p<.05$, respectively). Both groups' trait anxiety scores were not significantly different at the pre-test ($p>.05$). However, the intervention group trait anxiety score was significantly less than that of the control group at the post-test ($p<.05$). Unlike state anxiety level, parents of children in the intervention group had a lower level of trait anxiety after adaptive riding sessions, which was not observed in parents of children in the control group.

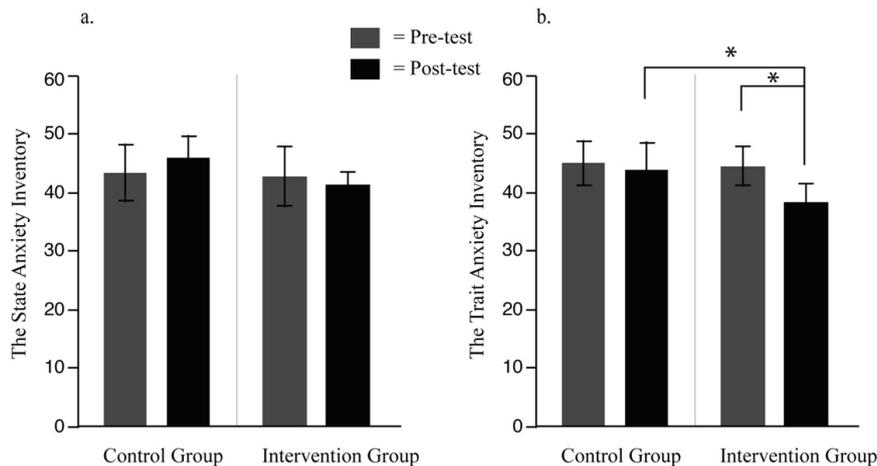


FIGURE 5a and 5b. The average values for the state (5a) and trait anxiety (5b) inventory for both groups from pre- to post-test

Discussion

This study is among the pioneering studies examining how children with cerebral palsy, as well as their mothers, are affected by adaptive riding (AR), one of the equine facilitated activities (EFA). The results of the study showed that the children participants have an increase in their empathy and emotion regulation skills and a decrease in their aggression and anxiety levels. Recent studies on EFA and children with cerebral palsy describe the effects of activities on motor function and balance ability (Shurtleff & Engsborg, 2010). Although

there are several published articles, the psycho-social effects of EFA in children with cerebral palsy have not been fully explained. EFA was found to be beneficial for behavioral and mental health problems among children (Schultz, Remick-Barlow, & Robbins, 2007).

In the present study, we found significant improvements in the psychological parameters; anxiety, empathy, emotional regulation and aggression. Due to these results, it was considered that AR improved emotional regulation and facilitated the ability to overcome emotional difficulties through inter-

actions between the horse and child, the special experience in a natural environment with peers and trainees, entertaining activities, and participation in the sports activity. Pre-tests of the current study showed that children with cerebral palsy experienced difficulties in empathy and emotional regulation skills, aggression, and anxiety. Empathy deficit and aggression may be caused by the lack of friends and social exclusion. After AR, they gained improvement in emotional regulation and empathy. The positive effects of such activities can be related to human-animal interaction theory which posits that many people seek contact with animals due to their calming nature and ability to act as a non-judgmental source of support and facilitator of social interaction (Kruger & Serpell, 2010). Therapeutic riding sessions include the interaction between the horse and child, and during this interaction, children can develop positive social behaviors, empathy skills and improve self-confidence, self-regulation, and self-respect. In particular, the feeling of riding a horse by themselves can positively improve the self-confidence of children diagnosed with CP and aggressive behavior may decrease. As the children accomplish the riding task by themselves, this makes them motivated and less anxious. Increasing empathy skills and decreasing aggression may facilitate emotional regulation. All of those attempts can reduce the anxiety and aggression of children.

Cultural factors were crucial in family relationships and parenting styles (Feldman, Ortega, Koinis-Mitchell, Kuo, & Canino, 2010). Considering the role of women in Turkish culture, taking care of children with CP or any other chronic disease is mostly the responsibility of the mother. Thus, the aggression of a disabled child is usually on his/her mother. Mothers are at the centre of children's lives and therapies (Cho et al., 2008). Previous research indicated that parents who raise children having disabilities reported greater emotional distress than other parents. Most parents of disabled children show depressive symptoms (Smith et al., 1993) and this

is consistently shown in studies targeting children with CP (Ones et al., 2005). Similar to the previous studies, mothers of children with cerebral palsy were found to have higher levels of depression and anxiety in this study. It was very important for this study to see how the psychology of mothers changed during their children's participation in activities.

Improvements in the mental health of children also affect maternal mental health. The results for the maternal depression and anxiety showed positive improvement from the pre- to post-test for the experimental group. Specifically, the anxiety levels of mothers who were in the experimental group decreased from pre- to post-test. However, the control group did not display any enhancement for those variables. Caregiving to a child diagnosed with disabled children and managing problem behaviors, as well as focusing on caregiving rather than working may cause stress (Hastings, 2002; Hauser-Cram et al., 2001) and mental health problems (Morgan, 1988) for parents, especially for mothers.

Stressors that occur with taking care of a family member with CP or any developmental disorder can have a significant negative effect on families, and in some cases may be a reason for burdens in mothers (Weiss & Lunsky, 2011). This may cause maternal anxiety and depression. Participating AR sessions with children and interact with other families and health professionals, sharing some problems together may affect maternal mental health. Therefore, maternal wellbeing must be targeted in the treatment of children with CP. Less is known about which treatments affect parental wellbeing positively. However, the present study investigated the benefits of AR on maternal depression and anxiety and found the beneficial effect of AR on both mothers' and their children's mental health who are diagnosed with CP. Overall, even though we found psychological or emotional improvements in mothers of children with CP after 8 weeks of AR, a more intensive and longer duration of AR could be applied to target continuing effects in children and their mothers.

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Conflict of interest

The authors declare that there are no conflicts of interest.

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