



COVID-19 AND TELE-HEALTH, EFFECTIVENESS OF INTERNET-DELIVERED PARENT-CHILD INTERACTION THERAPY ON IMPULSIVITY INDEX IN CHILDREN WITH NON-METASTATIC CANCER PARENTS: A PILOT RANDOMIZED CONTROLLED TRIAL

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Abstract – Objective: COVID-19 pandemic has had devastating effects on the psychological state of society and has made the importance of planning evidence-based interventions even more apparent. Despite advances in telecommunication technologies to facilitate access to psychological care, the use of this technology in psychology has been limited and few studies have been conducted in this field. The present study is the first controlled trial of applying video-teleconferencing to use parent-child interaction therapy in Iranian society.

Patients and Methods: In a pilot randomized controlled trial, during May to November 2020 and from families with a mother with non-metastatic cancer, 42 parents and children with oppositional defiant disorder (ODD) were selected through purposive sampling method and were assigned into two groups of internet-delivered parent-child interaction therapy (I-PCIT) and waiting list (WL). After three weeks of baseline evaluation, twelve weekly I-PCIT sessions were presented to the experimental group in the form of video-teleconferencing based on Landers and Bratton model. The data were analyzed by semi-parametric test of Generalized Estimation Equation (GEE).

Results: The primary outcome showed that I-PCIT had a significant effect on all three motor, cognitive and non-planning impulsiveness components of children (all's $p < 0.05$). The secondary outcome showed that changes in the three components of impulsivity persisted until the follow-up stage (all's $p < 0.05$).

Conclusions: Given the cost-effectiveness and easy access to the Internet model of this treatment, the application of new technology in teaching parent-child interaction in Pandemic of COVID-19 seems to have a promising and growing role.

KEYWORDS: Impulsivity, Child behavioral disorders, Cancer, Parent-child interaction therapy, COVID-19.



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INTRODUCTION

As of March 11, 2020, the World Health Organization (WHO) has raised the risk of COVID-19 to “very high” and later announced the pandemic of COVID-19¹. Governments quickly realized the impact of COVID-19 on health services and the global economy^{2,3}. COVID-19 has had devastating effects on the psychological state of societies⁴ and has had significant psychosocial consequences⁵. However, most attention in children has been paid to clinical manifestations⁶.

One of the etiologies of ODD is the damage to learning the process of independence from parents. During the COVID-19 pandemic, the child’s independence from parents was seriously challenged. Lockdown, isolation, quarantine and social distancing and increased attachment to parents can damage a child’s independence and reinforce ODD syndrome⁷. On the other hand, the use of negative reinforcement has increased during the pandemic, which is one of the aggravating factors of ODD syndrome. In addition, increased perceived anxiety leads to an increase in ODD syndrome⁷.

This has made the importance of planning appropriate and evidence-based interventions even more apparent. Tele-health, or more specifically telemental health (TMH) service, is a practical, accessible and appropriate system for supporting patients, patients’ families and providing health services during this pandemic. Tele-health can also help diagnose the disease through video consultation with health professionals. Tele-health is currently used remotely in the care of COVID-19 patients in the United States.

There are numerous examples and evidence to support the effectiveness of telemental-health, especially in the context of depression, anxiety and post-traumatic stress disorder⁸. Telephone and text messaging have been shown to be useful communication methods for providing mental health services⁹.

According to the definition of WHO, palliative care is a set of measures aimed at improving the lives of patients and their families in order to eliminate the problems and difficulties caused by incurable and life-threatening diseases by eliminating their pains. Palliative care can be helpful in improving parent-child interactions.

Despite the increasing number of families with children in need of psychological services, evidence-based therapies are often not available, and withdrawal rates in families entering the process of psychological intervention are 40% to 60%¹⁰. Therefore, the mere existence of evidence-based therapies does not improve general health. Future interventions need to be available. The use of modern tech-

nology such as Internet and remote technologies can be a good option to increase access to psychological therapies¹¹. In recent years, the use of digital technologies such as online parent education and telephone coaching has become a promising strategy in the treatment of children’s mental health problems¹². One of the advantages of Internet-based interventions is that they are usually tailored to the needs, motivations, and resources of families in need of treatment. Internet-based interventions can be the first step for families with children who suffer from internalized and externalized disorders, while face-to-face parent education programs are recognized as the second and third steps. Parental education programs for behavioral disorders for delivery through Internet have been supported¹⁰. In this regard, a number of interventions based on parental education have been identified as evidence-based therapy. Among the developed educational models, Oregon Parent Management Training Model, Incredible Years, Triple Positive Parenting Programs, Family Checkup, and Parent-Child Interaction Therapy (PCIT) could be mentioned¹⁰.

PCIT is an evidence-based, short-term therapy based on the theory of attachment and social learning that is used in children aged between 2 to 8 years with a history of destructive behaviors. The theoretical underpinning of this approach is based on the belief that since young children lack sufficient cognitive potential to change problem behaviors, interaction therapy focuses on changing the early context of the initial environment and parent-child interactions rather than directly engaging the child with problems. Studies show that positive interaction patterns such as active listening, eye contact, empathy, clarification and summarizing can be effective in promoting parent-child interaction rather than criticizing and interrupting other speech¹³. In fact, parents’ communication skills are known as a communication mediator between primary risk factors and progressive risk factors such as behavioral problems, substance abuse and academic failure¹⁴. The results of previous studies indicate the effectiveness of clinic-based interactive therapy on extrinsic^{15,16} and internalized¹⁷ disorders in children. However, studies on the effectiveness of Internet parent-child interaction therapy are very limited. For example, the findings of the study by Comer et al¹¹ showed that Internet-based parent-child interaction therapy has a significant effect on reducing children’s behavioral problems compared to clinic-based parent-child interaction therapy.

Based on the findings of previous studies and research literature, communication plays an important role in the dynamics of family behavior and behavioral and emotional outputs. Interpersonal

interactions are especially important in families with members with cancer¹⁸. Despite examining the effectiveness of a large number of parent-based interventions to prevent or treat children's behavioral problems in the form of systematic studies and Meta-analyses, the findings on the effectiveness of therapies are contradictory and there is a large gap in evidence-based therapies for children with behavioral problems¹⁰.

Considering the importance of using remote technologies in facilitating access to psychological care, including evidence-based therapies, and strong research background of this treatment in previous studies¹⁹⁻²², the present study was conducted aimed to investigate the effectiveness of internet-delivered parent-child interaction therapy (I-PCIT) on impulsivity index in children with non-metastatic cancer parents under palliative care with opioids.

PATIENTS AND METHODS

Patients

The present study was a pilot randomized controlled trial. The data were collected from May to November 2020. Purposive sampling method was used to select the study sample. Participants were 40 mothers and children living in Tehran, and mother received a diagnosis of cancer and had been in palliative care with one type of opioid for at least the past six months. All children were diagnosed with confrontational disobedience criteria based on structured clinical interview (SCID). Participants were assigned into two groups of I-PCIT (N=18) and waiting list (WL, N=22) through block randomization (BR)²³.

Inclusion criteria were: 1) age range of 4-7 years in children; 2) Diagnosis of oppositional defiant disorder (ODD) in the child based on DSM-4 and diagnosis of one type of cancers in the mother based on ICD-11 classification criteria; 3) Age range of 20-45 years for mothers, 4) Continuous Internet access (without communication problems) and having a computer equipped with a camera and microphone, 5) A history of at least three months of palliative care with one of the opioid agonists methadone, opium Tincture or buprenorphine by the mother with the presumed dose, and 6) living in Tehran and its suburbs with a deviation of 30 square kilometers from the center. Also, the exclusion criteria for mothers and children were: 1) lack of natural intelligence with a criterion of less than 70; 2) use of psychiatric drugs for more than three months due to the possibility of affecting psychological symptoms, and 3) absence in treatment sessions for more than two sessions.

Methods

I-PCIT was performed in two general phases of direct interaction with the child (to improve communication) and direct interaction with the parent (to practice interactive order) in fifteen sessions. The parent-child interaction therapy group was provided with a computer package equipped with a camera and microphone.

Data were collected in this study in the form of using available information, interviewing subjects, and using the Bartt's impulsivity questionnaire.

Demographic checklist

This checklist was prepared and used by the researcher to collect personal information such as age of the parent and the child, education level, number of the children of the family and income level²⁴.

Bartt's Impulsivity Scale (BIS 11)

In this study, Bartt's 11 Impulsivity Scale was used, it consists of 30 items that are scored on a 4-point Likert scale. This tool evaluates three components of impulsivity including motor impulsivity, cognitive impulsivity, and unplanned impulsivity. The validity and reliability of this scale have been reported to be desirable in the Thai sample²⁵.

Missing items was not possible because the data in the Internet group was collected by a secure online system. Also, the instructors did not interfere in the data analysis and the data analysis process was performed by a psychometric. All interviews were digitally recorded, transcribed, and coded. All stages of the study were carried out after obtaining the informed consent of the parents and in accordance with the latest version of the Declaration of Helsinki (DoH)²⁶. In order to comply with ethical standards, the subjects on the waiting list received 8 sessions of I-PCIT after the end of the study.

Statistical analysis

The distribution of impulsivity scores was evaluated by Kolmogorov-Smirnov test and the results showed that the distribution was not normal. Therefore, in order to analyze the collected data during three weeks of baseline and twelve weeks of treatment, the semi-parametric test of the generalized estimation equation (GEE) was used, and the data were analyzed in the software environment of SPSS and significance criteria were considered as 0.05.

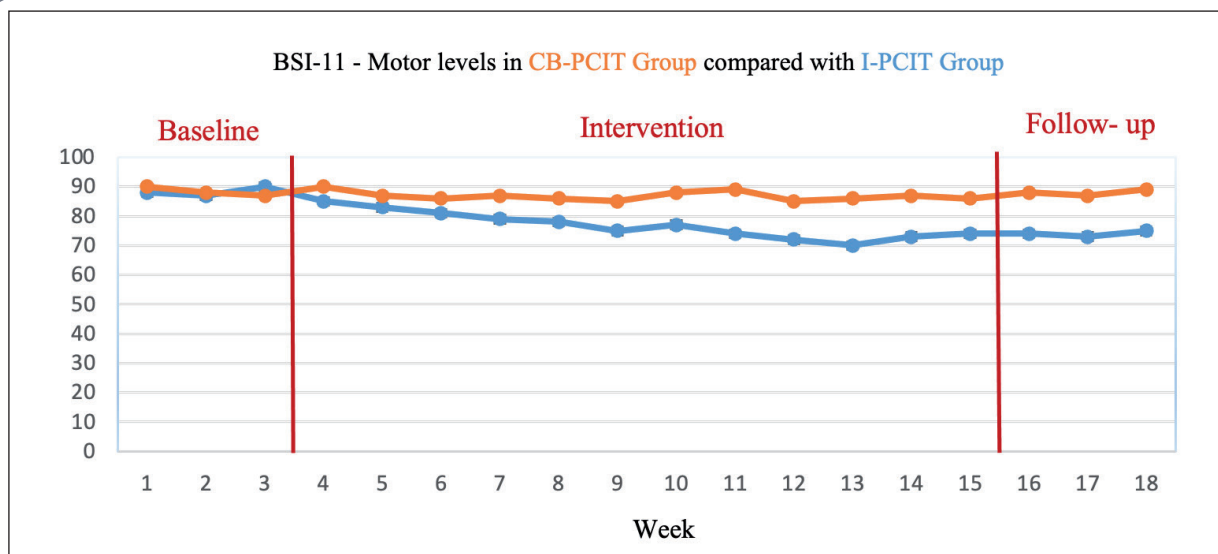
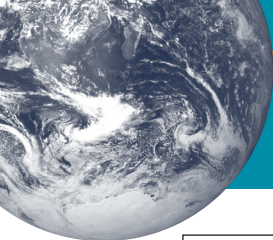


Fig. 1. Distribution of scores of impulsive motor component of children during eighteen weeks of evaluation.

RESULTS

Demographic findings showed that the average distribution of the age index of children is 5.24 years with a deviation of 1.56 and the parent is 28.32 with a deviation of 4.13. Thirty nine percent of caregivers have a diploma's degree or lower, 31% have bachelor's degree, 21% have master's degree and 9% have Ph.D degree. In terms of number of children, 34% have only one child, 52% of families have between 2-3 children and 14% have between 4-6 children. Monthly income of 58% of the families is below 30 million Rials, 39% between 30 and 50 million Rials and 9% more than 50 million Rials. Thirty eight percent of mothers had breast cancer, 27% had co-

lon cancer, 12% had gastric cancer, 12% had ovarian cancer, 4% had thyroid cancer, 3% had lymphatic cancer, 2% had leukemia and 2% had brain cancer. The distribution of children's impulsivity scores in the motor component is shown in Figure 1.

As the findings of Figure 1 show, the scores of the children's impulsivity motor component in the I-PCIT group showed a significant decrease compared to the clinic-based parent-child interaction therapy group ($p < 0.05$). The distribution of cognitive impulsivity component scores of children is presented in Figure 2.

As the findings of Figure 2 show, the scores of cognitive impulsivity component in the I-PCIT group showed a significant decrease compared to

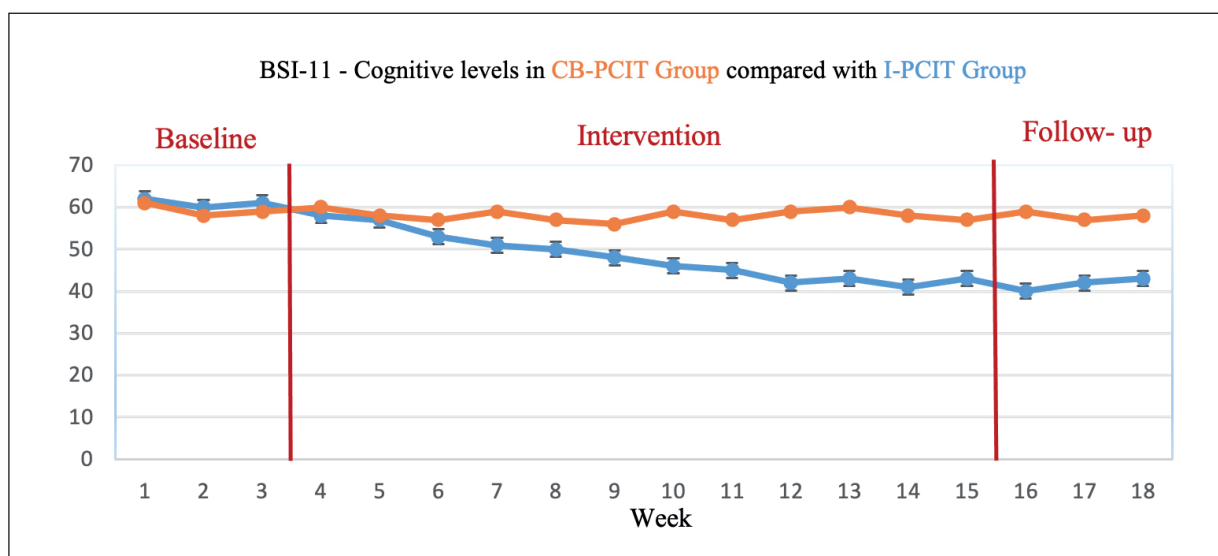


Fig. 2. Distribution of cognitive impulsivity component scores of children during eighteen weeks of evaluation.

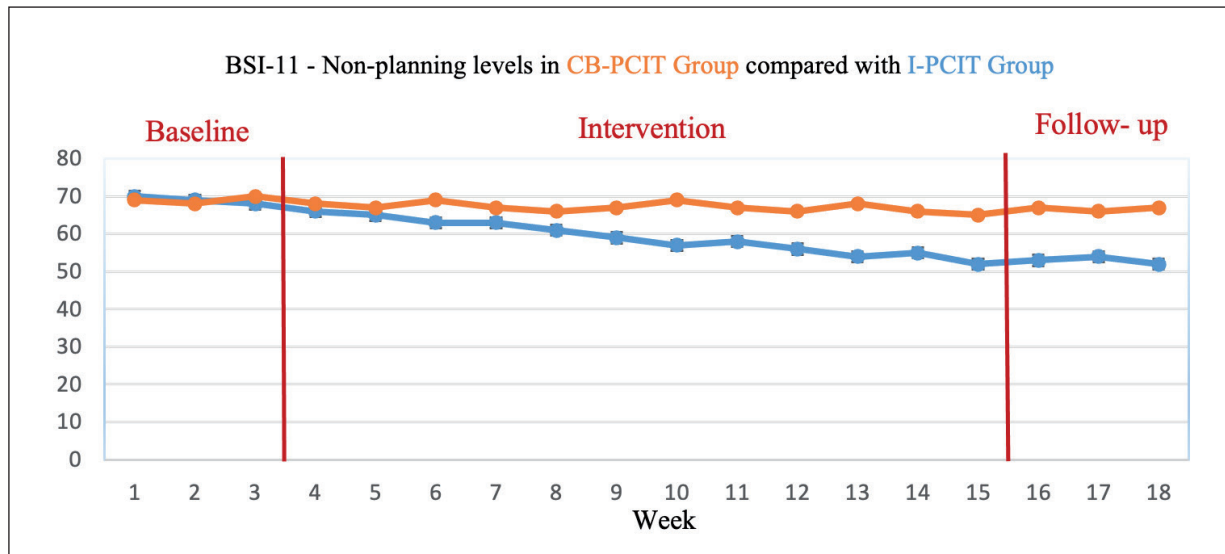


Fig. 3. Distribution of unplanned impulsivity component scores of children during eighteen weeks of evaluation.

the WL group ($p < 0.05$). The distribution of unplanned impulsivity component scores of children is presented in Figure 3.

As the findings of Figure 3 show, the scores of unplanned impulsivity component in the I-PCIT showed a significant decrease compared to the WL group ($p < 0.05$).

DISCUSSION

This study aimed at comparing the effectiveness of I-PCIT with a clinic-based format on the impulsivity index of children with non-metastatic cancer parents. Preliminary results showed that I-PCIT had a significant effect on all three components of impulsivity in children. In addition, the secondary results showed that changes in all three components of impulsivity remained stable until the 3-month follow-up stage. In this regard, and in line with our findings, the results of the study by Comer et al¹¹ showed that I-PCIT in comparison with the clinic-based parent-child interaction therapy had a significant effect on reducing the externalized problems of children. Also, in confirming the effectiveness of remote programming, the findings of the study by Danaher et al¹⁴ showed that the use of the online family check-up program has been more effective in solving educational barriers in comparison with the traditional school-based mental health program. In this regard, the findings of a systematic review by Baumel et al²⁷ showed that the use of digital parent education programs is an evidence-based therapy in reducing destructive behaviors in children and adolescents. Also, the results

of a systematic review of clinical trials showed that the use of digital parent education programs has a significant effect on improving child behavior, parenting and parental trust²⁸. Also in this regard, the results of the study by Pirnia et al²⁹ showed that the parent-child interaction therapy has been associated with a reduction in child aggression as a manifestation of extrinsic behavior in both overt and relationship components. Our findings, consistent with the research background, indicate the priority of using Internet-based interventions in children with externalized problems and showed that clinic-based therapies are used as the second and third steps in external problems¹⁰.

Parts of the findings of the present study showed that the effectiveness of the I-PCIT on the three components of aggression was maintained until the follow-up stage. Consistent with our findings, in the study of Graziano et al³⁰, the effectiveness of parent-child interaction therapy was maintained in 6-9 months follow-up. Although the research background shows that patients with cancer experience significant fluctuations in emotional and psychological indicators³¹, the stability of the effectiveness of this therapy indicates significant effects on cognitive and behavioral foundations.

The present study had some limitations. The most important was the limitation in controlling children's attention on video-teleconferencing based communication. Another limitation of this study is the parents' assessment from children's behavioral and psychological characteristics, judgments that can be biased. Therefore, it is suggested that biomarkers be used in future studies to evaluate psychological indices.



CONCLUSIONS

The use of remote technologies can be a good option to increase access to psychological therapies. Online parent education, the use of smartphones and video-teleconferencing services is a promising strategy in the treatment of children's mental health problems. Given the adaptation of remote technologies to the needs and facilities of families in need of psychological services, a promising prospect of these interventions can be imagined.

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AUTHOR CONTRIBUTION:

PS designed the study, wrote the protocol and managed the literature searches, collected data, and wrote the first draft of the manuscript. FR performed the statistical analysis. GM and ZK provided advice for the study design and helped in writing the manuscript. MG, ZN and MD provided advice for the study design and helped in writing the manuscript. All authors read and approved the final draft of the manuscript.

CONFLICT OF INTEREST:

The authors declare that they have no conflict of interests.

REFERENCES

1. Fan J, Liu X, Pan W, Douglas MW, Bao S. Epidemiology of Coronavirus Disease in Gansu Province, China, 2020. *EID* 2020; 26: 1257-1265.
2. Pirnia B, Dezhakam H, Pirnia K, Malekanmehr P, Soleimani AA, Zahiroddin A, Sadeghi P. COVID-19 pandemic and addiction: current problems in Iran. *Asian J Psychiatr* 2020; 54: 102313.
3. Pirnia B, Pirnia K, Malekanmehr P, Zahiroddin A. Challenges of differential diagnosis, symptoms of Coronavirus Disease 2019 (COVID-19) or Cannabinoid Hyperemesis Syndrome (CHS)? A rare case report. *Iran J Public Health* 2020; 49: 109-111.
4. Pirnia B, Dezhakam H, Pirnia K, Malekanmehr P, Rezaei M. Grief of COVID-19 is a mental contagion, first family suicide in Iran. *Asian J Psychiatr* 2020; 54: 102340.
5. Pirnia B, Pirnia F, Pirnia K. Honour killings and violence against women in Iran during the COVID-19 pandemic. *Lancet Psychiatry* 2020; 7: e60.
6. Guarneri C, Rullo EV, Pavone P, Berretta M, Ceccarelli M, Natale A, Nunnari G. Silent COVID-19: what your skin can reveal. *Lancet Infect Dis* 2021; 21: 24-25.
7. Mallik CI, Radwan RB. Impact of lockdown due to COVID-19 pandemic in changes of prevalence of predictive psychiatric disorders among children and adolescents in Bangladesh. *Asian J Psychiatr* 2021; 56: 102554.
8. Zhou X, Snoswell CL, Harding LE, Bambling M, Ediripulige S, Bai X, Smith AC. The Role of Telehealth in Reducing the Mental Health Burden from COVID-19. *Telemed J E Health* 2020; 26: 377-379.
9. Kerst A, Zielasek J, Gaebel W. Smartphone applications for depression: a systematic literature review and a survey of health care professionals' attitudes towards their use in clinical practice. *Eur Arch Psychiatry Clin Neurosci* 2020; 270: 139-152.
10. Ghaderi A, Kadesjö C, Björnsdotter A, Enebrink P. Randomized effectiveness Trial of the Family Check-Up versus Internet-delivered Parent Training (iComet) for Families of Children with Conduct Problems. *Sci Rep* 2018; 8: 11486.
11. Comer JS, Furr JM, Miguel EM, Cooper-Vince CE, Carpenter AL, Elkins RM, Kerns CE, Cornacchio D, Chou T, Cox S, DeSerisy M, Sanchez AL, Golik A, Martin J, Myers KM, Chase R. Remotely delivering real-time parent training to the home: An initial randomized trial of Internet-delivered parent-child interaction therapy (I-PCIT). *J Consult Clin Psychol* 2017; 85: 909-917.
12. Sourander A, McGrath PJ, Ristkari T, Cunningham C, Huttunen J, Lingley-Pottie P, Hinkka-Yli-Salomäki S, Kinnunen M, Vuorio J, Sinokki A, Fossum S, Unruh A. Internet-Assisted Parent Training Intervention for Disruptive Behavior in 4-Year-Old Children: A Randomized Clinical Trial. *JAMA Psychiatry* 2016; 73: 378-387.
13. McCabe KM, Sakamoto M, Rosas YG, Kehoe K, La R, Zerr A, Yeh M. Keeping an "I" on PRIDE: Measuring Imitation in Parent-Child Interaction Therapy. *Behav Ther* 2021; 52: 28-38.
14. Danaher BG, Seeley JR, Stormshak EA, Tyler MS, Caruthers AS, Moore KJ, Cardenas L. The Family Check-Up Online Program for Parents of Middle School Students: Protocol for a Randomized Controlled Trial. *JMIR Res Protoc* 2018; 7: e11106.
15. Graziano PA, Ros R, Hart KC, Slavec J. Summer Treatment Program for Preschoolers with Externalizing Behavior Problems: a preliminary examination of parenting outcomes. *J Abnorm Child Psychol* 2018; 46: 1253-1265.
16. Thomas R, Abell B, Webb HJ, Avdagic E, Zimmer-Gembeck MJ. Parent-child interaction therapy: a meta-analysis. *Pediatrics* 2017; 140: e20170352.
17. Mattheß J, Eckert M, Richter K, Koch G, Reinhold T, Vienhues P, Berghöfer A, Roll S, Keil T, Schlensog-Schuster F, von Klitzing K, Ludwig-Körner C, Kuchinke L. Efficacy of Parent-Infant-Psychotherapy with mothers with postpartum mental disorder: study protocol of the randomized controlled trial as part of the SKKIPPI project. *Trials* 2020; 21: 490.
18. Keim MC, Lehmann V, Shultz EL, Winning AM, Rausch JR, Barrera M, Gilmer MJ, Murphy LK, Vannatta KA, Compas BE, Gerhardt CA. Parent-Child Communication and Adjustment Among Children With Advanced and Non-Advanced Cancer in the First Year Following Diagnosis or Relapse. *J Pediatr Psychol* 2017; 42: 871-881.
19. Pirnia B, Pirnia K, Ershad Sarabi R, Malekanmehr P, Soltani L, Zahiroddin A. A double-blind randomized controlled trial in effectiveness of parent-child interaction therapy on psychological indicator and cortisol level in children of caregiver with cancer. *Int J Cancer Manag* 2019; 12: e85572.
20. Pirnia B, Najafi E, Lashkari A, Saber Majidi G. Evaluation of parent-child interaction therapy on anxiety level in pre-elementary school children: a randomized controlled trial. *PCP* 2017; 5: 167-176.
21. Pirnia B, Rasoulzadeh Tabatabaei SK, Pirkhaefi A, Soleimani A. Comparison of the effectiveness of two cognitive-behavioral and mother-child interactive therapies on anxiety of children with under-methadone treatment mother. *IJPCP* 2017; 23: 136-147.

22. Pirnia B, Kashani Khatib T, Nazari S, Haghiri S, Madadi Varzeghani S, Faryammanesh M. The effectiveness of parent-child interaction therapy on the improvement of affective index in children. *JSSU* 2019; 27: 1164-1174.
23. Pirnia B, Masoudi R, Sefidrood M, Zarghami E, Pirnia K, Malekanmehr P. Effect of metformin on cigarette withdrawal syndrome and abstinence in lung cancer patients; a double-blind placebo-controlled trial. *Int J Cancer Manag* 2021; 14: e110775.
24. Pirnia B, Masoudi R, Pirnia K, Jalali M, Eslami MR, Malekanmehr P, Pirnia F, Ajori L. Effect of magnesium sulfate added to tincture of opium and buprenorphine on pain and quality of life in women with dysmenorrhea: a prospective, randomized, double-blind, placebo-controlled trial. *Addict Health* 2020; 12: 259-268.
25. Juneja R, Chaiwong W, Siripool P, Mahapol K, Wiriya T, Shannon JS, Petchkrua W, Kunanusont C, Marriott LK. Thai adaptation and reliability of three versions of the Barratt Impulsiveness Scale (BIS-11, BIS-15, and BIS-Brief). *Psychiatry Res* 2019; 272: 744-755.
26. Pirnia B, Pirnia K, Teimouri M, Kolahi P. Acupuncture for back pain in colon cancer: a case report. *Int J Cancer Manag* 2017; 10: e15087.
27. Baumel A, Pawar A, Kane JM, Correll CU. Digital parent training for children with disruptive behaviors: systematic review and meta-analysis of randomized trials. *J Child Adolesc Psychopharmacol* 2016; 26: 740-749.
28. Baumel A, Pawar A, Mathur N, Kane JM, Correll CU. Technology-assisted parent training programs for children and adolescents with disruptive behaviors. *J Clin Psychiatry* 2017; 78: e957-e969.
29. Pirnia B, Mohamadi M, Abbasi I, Kord-Ahmadi T, Foroughi F. Is parent-child interaction therapy effective on aggression and biological indices in pre-school children with parents who use high-potency cannabis? A double-blind randomized controlled trial study in an Iranian sample. *Chron Dis J* 2020; 8: 152-155.
30. Graziano PA, Ros R, Hart KC, Slavec J. Summer treatment program for preschoolers with externalizing behavior problems: a preliminary examination of parenting outcomes. *J Abnorm Child Psychol* 2017; 46: 1253-1265.
31. Hoyt MA, Wang AW, Ryan SJ, Breen EC, Cheavens JS, Nelson CJ. Goal-Focused Emotion-Regulation Therapy (GET) for young adult survivors of testicular cancer: a pilot randomized controlled trial of a biobehavioral intervention protocol. *Trials* 2020; 21: 325.