

Effects of Sandplay Therapy on the Emotional Clarity and Brain Indexes Related to Self-Regulation of Female Delinquent Juveniles

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This study was conducted to verify the effects of sandplay therapy on the emotional clarity and brainwave indexes related to self-regulation in female juvenile delinquents. Ten female juvenile delinquents in a juvenile reformatory who were 15 to 19 years old were selected as the experimental group. For control group, ten female juvenile delinquents in OO Women's High School recommended by their teacher were selected. The sandplay therapy program was performed for about 60 minutes once every week for 10 sessions in total. Tests were conducted with the Trait Meta-Mood Scale (TMMS) before and after the intervention of the sandplay therapy program. To check the changes in brainwave indexes after each session, the brainwaves were measured before and after each session. The findings from this study can be summed up as follows: First, the emotional clarity of the experimental group significantly increased after the sandplay therapy. Second, the brainwave indexes related to self-regulation of the experimental group significantly increased after the sandplay therapy as well. Consequently, this study verified that the sandplay therapy was effective in preventing the relapse of the female juvenile delinquents by improving their emotional clarity and changing their brainwave indexes, thereby improving their adaptability to reality through self growth.

Keywords Female juvenile delinquents, Emotional clarity, Sandplay, Brainwave

INTRODUCTION

Need and Purpose of Study

German philosopher Johann Gottlieb Fichte said "If you want to see the future of a country, look at the juveniles of that country," meaning that the juveniles determine the fate of a country in the future.

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Nowadays, many adolescents are searching for refuges from their life in drugs, gambling, sex, and games. Their delinquent behaviors are becoming generalized (Generalized here means that the delinquencies from general households of the middle class where they have both father and mother are increasing [Gwang-Joo Ji, Crimes and Juvenile Delinquencies, K&B, 2001]), repetitive, collectivized, and younger. In South Korea, after the enactment of the Juvenile Act in 1958, adolescent delinquents are being treated differently from adult criminals. For adolescent crimes, the term delinquency is used, thus distinguishing them from adult crimes (Pyo, 2000). These adolescent delinquency issues have been mostly focused on male adolescents due to the severity of the delinquencies and the numerical superiority. Recently, however, the delinquency patterns of female adolescents are changing from non-violent delinquencies, simple thefts, and sexual delinquencies to more violent and various delinquencies that are not much different from those of male juveniles (Min & Kim, 1999). Furthermore, the number of female juvenile delin-

Table 1. Status of juvenile delinquencies by sex

Year	Total	Male		Female	
	No. of people	No. of people	Percent	No. of people	Percent
2007	88,104	74,174	84.2	13,930	15.8
2008	134,992	108,482	80.4	26,510	19.6
2009	113,022	93,509	82.7	19,513	17.3
2010	89,776	72,461	80.8	17,315	19.2
2011	83,068	68,742	82.8	14,326	17.2

Source: Ministry of Gender Equality & Family (2012). White Paper on Adolescents.

quencies is also increasing. When you look at the male and female ratio in the juvenile crimes in 2012, the percentage of males (82.8%) is over 4 times higher than that of females (17.2%). However, the ratio of male and female adolescents has been fluctuating each year since 2007, and the crime rate of male adolescents has been steadily decreasing while that of female adolescents has been increasing (Table 1).

When the delinquencies of female adolescents become more serious, they do not stop at violence and runaway, but develop into sexual crimes and prostitution. The problem of pregnancy resulting from this not only causes the physical and mental pains of the girls themselves, but also lead to such social issues of single mothers and adoption (Kim & Cho, 2004).

When we classify the factors that are directly or indirectly associated with problematic behaviors including the juvenile delinquencies, the first group of factors include peer relations, school life and study, environment of the residential areas, and public media. The second group of factors are related to family environment, including the socioeconomic status of the family, broken homes, ties among the family members (parent-children and parent-parent relationships in particular), and child-rearing methods. Lastly, there are personal and psychological factors. It has been revealed that IQ, which is a cognitive aspect, inadequate inference method (Graham, Hudley, & Williams, 1992), low ethical inference level (Gibbs, 1987) and self-respect (Goldsmith, 1987), lack of interpersonal skills and social problem solving abilities (Straus, 1994) were associated with juvenile delinquencies.

In addition, emotion is being regarded as an important element in describing the problem behaviors of juveniles these days (Mun, 2005; Vorbach & Foster, 2003). Emotion refers to the feelings of joy, sadness, anger, anxiety, and love in daily living. The types and intensities of emotions that individuals feel and experience differ from individual to individual. In other words, some people clearly recognize the type of emotion that they feel, but others do not know what they are feeling. Even with the same incident, some people experience their emotion very intensely, whereas other people experience their emotion weakly (Cho &

Oh, 2007).

Gohm & Clore (2002) proposed emotional clarity as one of the determinants of emotional experience, and reported that people with lower emotional clarity became depressed more easily (Flett, Blankstein & Obertinsky, 1996; Lim & Oh, 2010; Swinkles & Guiliano, 1995). According to Mayer & Stevens (1994), individuals who clearly recognize their emotion are autonomous, has a good boundary of self, and psychologically healthy. Thus, in order for individuals to function and adapt properly, it is important for them to clearly recognize their emotion and experience an appropriate size of emotion (Gohm, 2003).

Furthermore, according to a recent study on delinquent juveniles, they experienced difficulty in communicating emotional elements in interpersonal relations (Cohen & Strayer, 1996). It was also reported that when they lack capacity to perceive the emotions of others in social situations, they tend to apprehend the intention of others as hostile and this may increase their destructive and aggressive behaviors (Lemerise & Arsenio, 2000). Besides, if they cannot accurately recognize the facial expression of others in pain, they cannot control their aggressiveness and commit more criminal behaviors (Blair, 1995; Kwon, 2011).

In South Korea, too, there are active discussions on the relationships between the emotions and delinquencies of delinquent juveniles among many researchers. Byeon (2012) reported that juveniles who committed delinquencies did not clearly recognize their emotion, but the intensity of their reactions was strong. Lim (2010) compared the sensitivity of emotional recognition of facial expressions between delinquent and general juveniles and found that the delinquent group required higher intensity of emotion to accurately recognize the emotion on facial expression than the general group did. In other words, the delinquent juvenile group had lower ability to recognize emotions on facial expressions compared to the general juvenile group, and this can cause delinquent behaviors. As discussed above, many researchers emphasized that it is important to accurately recognize the emotions of others as well as their own. Moreover, we need to make multilateral, systematic efforts from educational, psychological, and medical perspectives so as to improve the emotional perception capacity of delinquent juveniles who lack this capacity so that they can adapt to the society and prevent the recommitment of delinquencies. In particular, many psychological approaches are being attempted, which deal with various feelings arising in human mind. Most psychotherapy programs use art therapy and music therapy to improve the emotional stability of delinquent juveniles and allow them to experience positive self (Choi & Cha, 2007; Kang & Yum, 2008; Kim, 2007). Others focus on behavior modification through the training of concrete skills to change the behavior of delinquent juveniles (Ku, Moon, & Oh, 2007; Lee, Cheon & Kim, 2001). On the other hand, the study by Seo (2013) was the only effort to improve their capacity

to recognize emotion. He carried out a dancing/motion psychotherapy program for juveniles in probation offices to help them recognize and express emotions, which had positive effects on their empathy.

As described above, there are many previous studies on the effects of various psychotherapies on delinquent juveniles, but there are not many studies on delinquent juveniles in reformatories. Especially the research on the improvement of their emotional recognition is still in its infancy. Furthermore, despite the fact that female delinquent juveniles are steadily increasing compared to the male delinquent juveniles, there are not many prior studies on female delinquent juveniles.

Female delinquent juveniles who have difficulty in understanding the emotions and mental state of others or in properly recognizing and expressing their own emotions should first learn how to correctly recognize and express their own emotion before they can express their repressed emotions appropriately. They can develop this ability by experiencing unconditional acceptance, empathy and support through the therapeutic encounter with another individual rather than in a group.

Brainwaves are electric potentials that autonomously occur on the scalp. The electric changes accompanying the activities of the brain cells are measured in a noninvasive method through the electrodes attached to the surface of the head.

Thus, as a way to identify the variations in brain activities by time and space, the waveforms of brainwaves are analyzed and quantified, so that the degree of tension or comfort when the subject receives a certain stimulus can be interpreted with the dominant brainwaves. In this way we can evaluate the differences in emotional reaction (Lee, 2006).

The quantifiable value of brainwaves used in this study was self-regulation quotient (SRQ) which is mainly related to the emotional recognition and related responses. The autonomous regulation capacity is evaluated with the quantified values of the measurements for three basic states, which are attention (SMR wave), concentration (low β wave) and rest (α wave). The SRQ is based on the fact that the brain controls activity rhythms by self-regulating the three states of rest, attention, and concentration in awakened condition. This quotient is divided into basic state, rest state, and attention state. The basic state is closely associated with the individual's personality, psychological state, attitude to life, learning abilities, and work abilities. The rest state evaluates the resting capacity which is associated with the psychological and emotional stability, composure, endurance for continuous activities, and mental fatigue. The attention state is associated with capacity to relate with surroundings, such as the ability to observe surroundings, sociability for making friends, sociality for adapting to the society, attention, and presentation ability for speaking in front of people. The concentration state is the capacity to be absorbed in one thing, which is associated with the abil-

ity to concentrate on a task, initiative for driving a task, ability to complete a task, accuracy, mental activity, and activeness.

Therefore, the SRQ using brainwaves is associated with making appropriate interpersonal relationships by recognizing emotions and properly reacting to them (Lee, 2006).

Accordingly in this study, the subjects were allowed to freely express their internal world with acceptance and empathy through sandplay therapy so that they could recognize and discern their emotions and thoughts. For this purpose, sandplay therapy was applied to female delinquent juveniles in a reformatory, and its effects on emotional recognition and brainwave index related to self-regulation were measured.

Sandplay therapy is a psychotherapy technique that allows the subject to naturally integrate their unconscious psychological parts while touching sands or expressing various figures in the safe protected space of a sandtray, thereby leading to self-realization. Because sandplay therapy uses small figures, the subjects can make various attempts without any burden on failures or on the uncomfortable therapist-client relationship during the early stage of therapy. Furthermore, their resistance can be reduced because they can express through images their psychological parts that are not easily verbalized. Expressing the unconscious psychological contents in a concrete, observable manner has the effect of enabling the subject to be aware the things that have been suppressed or unknown (Kalff, 1980; Lee & Jang, 2012). The provision of this sandplay therapy to delinquent juveniles is expected to improve their emotional clarity that allows them to recognize and accurately perceive their mental and emotional states through raised awareness.

Research Problems

This study aims to apply sandplay therapy to delinquent juveniles and examine its effects on the improvement of their emotional clarity and the change of brainwave index in them so as to contribute to the correction and prevention of their relapse. The specific research problems are stated below.

Research problem 1. Can sandplay therapy improve the emotional clarity of female delinquent juveniles?

Research problem 2. Can sandplay therapy change the brainwave index related to the self-regulation of female delinquent juveniles?

STUDY METHOD

Subjects of Study

The subjects of this study were ten female delinquent juveniles aged between 15 and 19 who were at a juvenile reformatory - OO Women's Information Industry School - in A city after being ruled that they committed a delinquency by law. The subjects should be randomly assigned in principle, but for this study, the subjects

who were recommended by the reformatory staff and agreed to the participation in sandplay therapy were selected. In this way, ten female delinquent juveniles were finally selected. In addition, for the control group, ten female delinquent juveniles who were aged between 15 and 19 were chosen among those recommended by their teacher from the OO Women's High School in S city. The prior and posterior values of the emotional clarity and self-regulation brainwave index obtained through questionnaire survey and brainwave (EEG) measurements were compared. The mean ages of the experimental group and the control group were 18.04 and 17.18, respectively.

Measurement Tools

Measure of Emotional Clarity (Trait Meta-Mood Scales)

In this study, the Trait Meta-Mood Scales (TMMS) that was developed by Salovey, Mayer, Goldman, Turvey, and Palfai (1995), translated and validated by Lee and Lee (1997), and reorganized by Suh (2005) was used. TMMS is a measure of individual differences in continuous stable emotional recognition. The three major factors of this measure verified in the study on validation (Lee & Lee, 1997) were attention (5 questions), emotional clarity (11 questions), and repair (5 questions). Salovey (1997) claimed that emotional recognition that notices mood must presuppose the emotional attention process that pays attention to one's own mood. Therefore, Suh (2005) combined the two subareas of TMMS, attention and emotional clarity, into emotional integrity. The questionnaire used a 5-point scale (1 = Not at all, 5 = Very much so) based on the Likert scale. A higher score means a higher emotional clarity. The confidence level of this research tool was estimated by the internal consistency. The reliability by Cronbach's α was .871.

Brainwaves (Electroencephalogram)

In this study, the 2 channel system mobile brainwave meter (Neuro-Harmony) developed by Korea Mental Science Institute connected to a notebook computer was used. A headband with electrodes connected to it was wrapped around the frontal region of the subjects and their brainwaves were measured before and after sandplay therapy.

For arrangement of electrodes, a ground electrode (Fpz) was attached to the center of the frontal region with a headband, and then one electrode each was attached to the left and right at 2.5 cm interval. Thus, the brainwaves of the left brain frontal region (Fp1) and the right brain frontal region (Fp2) were measured simultaneously. For brainwave measurement, the subjects closed their eyes for the first 30 sec and then opened their eyes for the next 30 sec. Next, the three basic states, rest (α wave), attention (SMR), and concentration (low β wave) were measured for 60 sec each. For the measured brainwaves, not only the original brainwaves were captured, but fast Fourier transform was performed

Table 2. Self-Regulation Quotient Standard

Highest	High	Average	Low	Lowest
100 or higher	80-100	60-80	40-60	40 or lower

as well to see the change of brainwave forms over time. Furthermore, two-dimensional and three-dimensional graphs and mean values per band were obtained in real time. Because you can see the original brainwaves as well as the brainwaves divided by frequency, even laymen can analyze the brainwaves by type (Han, Chae, Park, & Park, 2008) (Table 2).

Study Design and Procedure

In this study, in order to investigate the effects of sandplay therapy on the female delinquent juveniles, emotional clarity test and brainwave test were performed before and after the therapy. The sandplay therapy program was applied once per week, 60 min per session for 10 sessions in total from October 2012 to December 2012. To perform the sandplay therapy, a sandplay therapy room was prepared in the juvenile reformatory, and the sandtray, sands, and figures (props) were set. We explained the sandplay therapy method to the subjects and received prior consent about the counseling from them. The sandplay therapy is a non-directive therapy and the subjects were allowed to freely feel and perceive. The prior and posterior tests were conducted with the emotional clarity test at the first session before the start of the sandplay therapy and at the 12th session after the program. To determine the changes in the brainwave index in each session, the brainwaves were measured before and after sessions 1, 3, 5, 7, and 10.

Before the brainwave measurement, the content and sequence of brainwave measurement was explained to the subjects.

The subjects sat in a comfortable posture in a quiet atmosphere, minimized their movements, and did not touch metals during the measurement of brainwaves. The electrodes attached to the headband of the brainwave meter were used. The brainwaves from the left and right frontal lobes were measured through the solid-state electrodes FP1 and FP2 which were fixed at 4 cm intervals, and the left earlobe was used as the ground electrode. The process of the brainwave measurement was: Measurement with open eyes → Measurement with closed eyes → Measurement with open eyes → Test in resting state (α waves) → Attention test (SMR waves) → Concentration test (low β).

Data Analysis Method

In this study, to investigate the effects of the sandplay therapy on the emotional clarity and brainwaves of female delinquent juveniles, the emotional clarity test and brainwave test were performed before and after the therapy for the experimental group and the control group. For statistical analysis of the collected data, Statistical Package for Social Science (SPSS) 18.0 was used. To

Table 3. Verification of differences between prior and posterior scores for emotional clarity

Div	Item		Experimental group				Control group			
			N	Mean	Standard deviation	Z	N	Mean	Standard deviation	Z
Total	Emotional clarity	Prior	10	1.45	3.17	-2.89**	10	0.05	3.27	-0.23
		Post	10	5.65	3.02		10	1.31	0.66	
Sub factors	Emotional recognition	Prior	10	0.50	5.68	-2.25*	10	1.01	2.97	-1.36
		Post	10	6.10	4.61		10	0.80	1.26	
	Attention	Prior	10	2.40	0.97	-2.81**	10	1.98	1.03	-0.23
		Post	10	5.20	2.39		10	1.83	0.72	

* $p < .05$, ** $p < .01$.

Table 4. Verification of the difference between the mean scores before and after the program

Item		Experimental group				Control group			
		N	Mean	Standard deviation	Z	N	Mean	Standard deviation	Z
Self-regulation coefficient	Before	10	41.34	16.19	-3.70***	10	61.07	11.51	-0.30
	After	10	82.56	14.18		10	63.34	7.71	

*** $p < .001$.

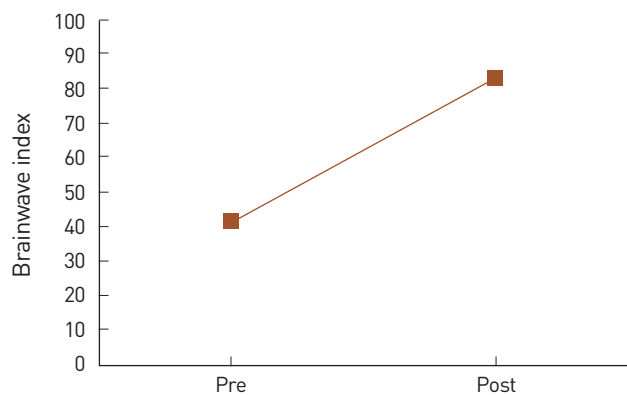


Figure 1. Graph comparing the mean scores for brainwave index of all participants before and after the program.

verify the reliability of the questionnaire for investigation in this study, Cronbach's α was calculated.

STUDY RESULTS

Change of Emotional Clarity after Sandplay Therapy Program

The mean score of emotional clarity of the experimental group increased from 1.45 before the program to 5.65 after the program. Furthermore, the mean score of emotional recognition in the sub factors of emotional clarity increased from 0.50 before the program to 6.10 after the program. The mean score of attention increased from 2.40 before the program to 5.20 after the program. All these differences were statistically significant. However, the change in the emotional clarity of the control group was

Table 5. Verification of the difference between mean scores before and after each session

Item		Experimental group			
		N	Mean	Standard deviation	Z
Self-regulation quotient	Before	10	53.34	12.43	-2.04*
	After	10	69.17	13.09	

* $p < .05$.

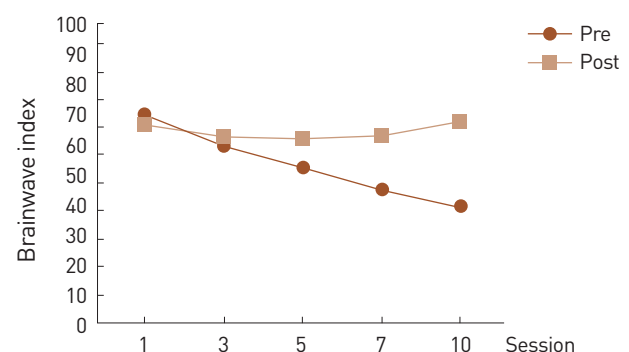


Figure 2. Graph comparing the mean SRQ scores of all participants before and after each session.

not significant. This result shows that the intervention of this program is effective on emotional clarity (Table 3).

Change of Brainwave Index after Sandplay Therapy Program

The SRQ of the experimental group increased from 41.34 before the sandplay therapy program and this difference was significant. On the other hand, no significant difference was

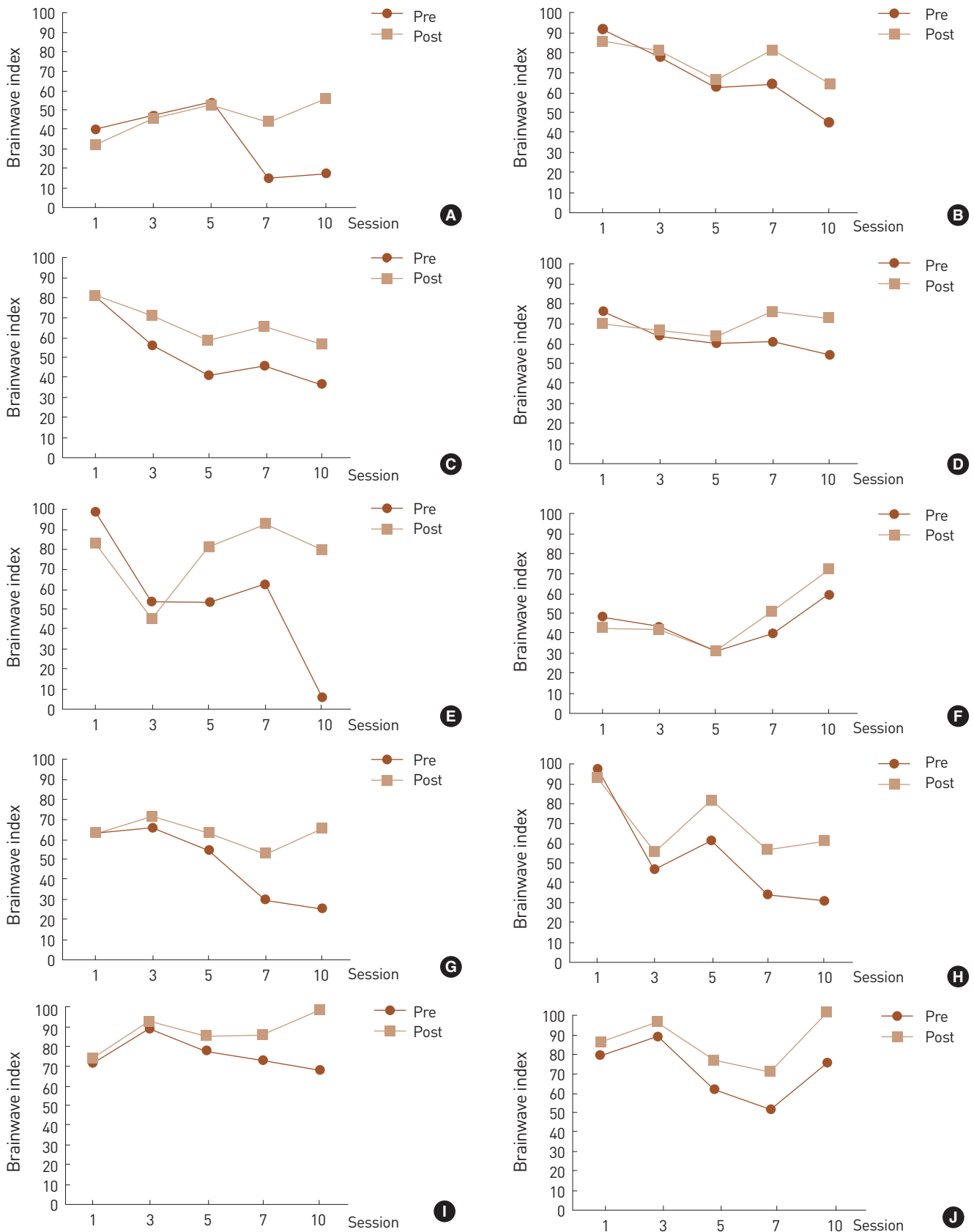


Figure 3. Graph showing the change of the SRQ scores after each session for participants A-J.

found in the SRQ of the control group (Table 4, Figure 1).

Change of Brainwave Index after Each Session of Sandplay Therapy Program

The difference between the mean SRQ of the experimental group before and after each session were verified. It increased from 53.34 before to 69.17 after each session, and this difference was significant at the confidence level $p < .05$. On the other hand, the SRQ of the control group showed no significant difference. This proves that the intervention of the therapy program was effective in SRQ among the brain indexes (Table 5).

The following graphs show the change of SRQ after each session (Figures 2, 3).

The differences between individual SRQ scores of participants before and after sessions 1, 3, 5, 7, and 10 show that in six out of ten participants, the SRQ score increased after the session compared to prior to the session.

SUMMARY AND DISCUSSION

This study was conducted to find out whether the sandplay therapy can give a positive impact on the emotional clarity and the self-regulation quotient among brainwave indexes of female delinquent juveniles in a reformatory. The subjects of this study were ten female delinquent juveniles aged between 15 and 19 at a juvenile reformatory - OO Women's Information Industry School - in A city who were recommended by the reformatory staff and consented to the participation in the sandplay therapy. The total program consisted of one session of 60 min per week for 10 sessions in total. To find out the effects of this program, the emotional clarity and brainwaves of the subjects were measured before and after the program and the changes were verified.

The findings of this study can be summarized as follows. First, the emotional clarity of the experimental group significantly increased after the sandplay therapy. This implies that the sandplay therapy can effectively improve the emotional clarity of female delinquent juveniles. Second, the self-regulation quotient of the brain indexes of the female delinquent juveniles significantly increased after the sandplay therapy. This also suggests that the sandplay therapy activates the brainwaves related to the emotional clarity of the female delinquent juveniles. The self-regulation quotient is the most basic measure of brain health and activity. The SRQ evaluates the self-regulation capacity of the brain in three basic states - rest, attention, and concentration. It is associated with the personality, attitude of life, learning abilities, psychological and emotional stability, composure, sociality, attention, and concentration. These findings agree with the results of the study by Kim & Jang (2012) who measured the effects of sandplay therapy through brainwave measurements.

Some subjects did not show consistent changes in individual brainwaves. This suggests that cases of serious emotional problems such as severe emotional fluctuations due to a deep-seated trauma require a long-term therapy rather than a short-term intervention (Schore, 2012) and they may have physical or organic problems. Therefore, more accurate identification of cause and long-term intervention are needed for them.

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