INTRODUCTION

According to the white paper on youth by the Ministry of Gender Equality and Family in the Republic of Korea, male adolescents who committed a crime accounted for 82.8% of the total, four times as high as the rate of their female counterparts who made up 17.2% of the total (MOGEF, 2012). Due to such predominance in the rate of male juvenile delinquents over that of female juvenile delinquents, delinquency by female adolescents draws relatively lesser attention and therefore there is relatively less intervention for them (Kim & Choi, 2004). However, not only are the number of female juvenile delinquencies increasing but also the aspect of their delinquency is changing from non-violent delinquencies such as mere theft or sexual delinquency into more violent, diverse delinquencies not differentiated from those of male adolescents (Min & Kim, 1999). In addition, females start their delinquency at an earlier age and continue it for a longer time than their male counterparts (Kwak, 2007).

Among the causes of juvenile delinquency, aggression (Dryfoos, 1989) is a psychological characteristic that is common among juvenile delinquents, although the aspects of expressing it are various. Despite an assertion that environmental systems such as family are a major factor affecting their delinquency both directly and indirectly, aggression, an internal factor of each individual, was verified to be most related to juvenile delinquency (Park & Kim, 1997). A previous study as well explained high aggression as a major psychological trait of juvenile delinquents (Jang, 2001).

There are diverse perspectives on defining aggressive behaviors, but generally aggressive behavior is behavior which triggers injury or pain in others and implies anti-social intention (Jeong, Yoon, Shin, Kim, & Jang, 2012; Tedeschi, Lindskold, & Rosofeld, 1985). Juvenile delinquents fail to suppress their impulses when satisfaction of diverse desires is required, and when they are frustrated with unsatisfied desires, they express such frustration with aggressive behavior, which leads to delinquent behavior. Moreover, they come to have depression and animosity due to emotional instability like anger, and do not control such emotions and exhibit aggressive behavior (Park, 2002). They are ac-

Effects of Sandplay Therapy on Aggression and Brain Waves of Female Juvenile Delinquents

Eun-young Sim¹, Mikyung Jang²

¹Sandplay therapist & Psychotherapist, Haesol Psychiatric Clinic, Incheon; ²Department of Child Welfare, Namseoul University, Cheonan, Korea

In order to decrease the aggression of female juvenile delinquents put into juvenile reformatory and verify changes in their brain waves related to emotions, this study assigned nine adolescents to an experimental group with the help of a juvenile reformatory located in Gyeonggi-do and conducted sandplay therapy with them. Another nine adolescents were assigned to a control group. The female adolescents in the experimental group received individual sandplay therapy once per week, sixty minutes per each time, for a total of ten sessions. Prior to and after the sandplay therapy, the subjects self-reported the Buss & Durkee Hostility Inventory (BDHI) and their brain waves were tested. The experimental group’s brain waves were tested bi-weekly prior to and after each section and their process of changes was traced. The result showed that sandplay therapy was effective in reducing the aggression of female juvenile delinquents and positively raising the attention index related to aggression.

Keywords Aggression, Brain waves, Female juvenile delinquents, Sandplay therapy
customed to fighting and causing damage, but they are not skillful in pro-social behavior like controlling themselves, counseling with others, seeking others’ permission, avoiding conflict with others, understanding others’ emotions, and properly coping with others’ anger. In other words, juvenile delinquents have difficulty in recognizing their emotions or desires and properly expressing them (Kim, 2010).

Female juvenile delinquents are emotionally unstable and lacking in ability to control and adjust themselves, and therefore express their desires wildly and aggressively. Repetitive negative experiences, frustration, and conflicts lead them to committing delinquency and second offenses. Most juvenile delinquents have experienced severe rejection from their parents at an early period of their life or trauma like the loss of their parents or those important to them. As a result, they try not to form meaningful relationships with others and scarcely expect care and consideration from others (Hunt & Weiner, 1982). Female juvenile delinquents do not appropriately express themselves relative to normal adolescents, feel anxious because they fail to properly respond to small stresses in their ordinary routines, are impulsive, and are highly aggressive, and behave with irrational ways of thinking (Jang, 2001).

Brain waves, which are detected from the brain, result from tension and relaxation of stimulus memory; they are an objective indicator to show physical changes related to consciousness, changes in psychological and mental state, and brain functions and activities (Goo, 2009), and interpretation of emotional states are possible by reading brain waves (Laxtha, 2008). In other words, measuring brain waves is a method to measure the functional conditions of the brain, different frequencies appear according to one’s mental or physical state, and the state of the brain may be interpreted using brain waves which appear predominantly (Goo, 2009; Laxtha, 2008; Seo, 2011).

This study intends to analyze the attention index which shows the degree of awakening of the brain. The degree of awakening of the brain may be examined by looking at the degree of activity of the θ wave and sensory motor rhythm (SMR) wave. When the θ wave is excessively activated, one is sensitive to diverse stimuli and therefore does not concentrate on one thing and is distracted, and one’s behavior becomes unstable (Park, 2005). Such brain waves are an indicator to measure mentality, reflect physiological and psychological brain functions, and display neural activities only and therefore are useful for evaluating the activities (Ryu, 2008).

Sandplay therapy helps juvenile delinquents to express their negative and unconscious emotions with sand boxes and symbols. They experience their emotional, unconscious stimuli being accommodated by a therapist’s therapeutic restriction and accommodation. In addition, by helping juvenile delinquents to connect with the Self, which is a mental structure that performs the function of containing and regulating emotional conflicts and impulses, sandplay therapy enables them to contain their negative emotions internally and endure them. As a result, the juvenile delinquents become accustomed to methods of self-regulation and proper self-expression through gradual emotional control (Kalff, 1966; Lee & Jang, 2012). Some previous studies have verified the effects of sandplay therapy on the reduction of aggression—aggression of infants (Hahm, 2003), aggression of physically harassed children (Seok, 2005), aggression of female family violence victims (Lee, 2012), and aggression of children facing the risk of family disintegration (Ban & Woo, 2013). However, most of these studies verified the effectiveness of sandplay therapy with self-reporting responses from the subjects.

In this context, our study applied sandplay therapy to female juvenile delinquents in a juvenile reformatory and verified the reduction in their aggression and changes in brain waves related to aggression.

METHODS

Subjects
This study selected eighteen female juvenile delinquents with the help of a juvenile reformatory located in Gyeonggi-do and allocated them equally to an experimental group and a control group. Written consent to participate in this study was obtained from all of the subjects and they were notified of the principle of confidentiality according to the counselors’ code of ethics. Sandplay therapy was applied to the nine female adolescents assigned to the experimental group once per week, sixty minutes per each session, for a total of ten sessions. The average age of the experimental group and the control group was 17.9 years old.

Measurement Tools
Aggression Scale (BDHI)
The measurement tool to measure the aggression of the subjects in this study was a scale revised by Han (2007) based on the Buss-Durkee Hostility Inventory (BDHI) made by Buss and Durkee (1957), consisting of 76 questions. This scale is comprised of four sub-areas—physical aggression, hostility, verbal aggression, and anger. Its number of questions is 21 and it was made using Likert’s five score scale (1: strongly disagree, 2: disagree, 3: neutral, 4: agree, and 5: strongly agree). The higher the score, the higher the level of aggression is. Before the application of the questionnaire, prior reliability analysis was conducted in order to measure the reliability of the questions. In all the variables, Cronbach’s Alpha value was higher than 0.60.

Brain Wave Test
This study employed a movable two-channel system electro-encephalogram (Korea Institute of Mind Science). The brain waves
of the subjects were measured prior to and after the sandplay therapy after putting the hair band around the forehead area. On the center of the forehead the ground electrode (Fpz) was attached using the hair band and two electrodes were attached on the left and the right sides at an interval of 2.5 centimeters. The brain waves of the anterior frontal lobe of the left brain (Fp1) and the forehead area in front of the right brain (Fp2) were measured simultaneously. The brain waves were measured with the eyes open for the first thirty seconds, the eyes closed for the next thirty seconds, and the eyes open again for another thirty seconds. Each of three basic states—at rest (α wave), attention (SMR wave), and concentration (lowβ wave)—were measured for sixty seconds (Han, 2008).

The fixed quantity values of the brain waves used in this study were attention quotients (ATQs). ATQs are largely related to θ and SMR waves and represent the degree of awakening of the brain and resistance to stress or disease. The higher this index, the more clearly the brain is awake, with high learning ability and immune function. When this index is low, it means that attention and resistance are weak and also distraction, degraded memory, and aging of the brain are suspected. The lower the index, the higher the level of tension, possibly with high distraction and aggressive behavior. The degree of tension means the degree of physical tension and anxiety, and the degree of distraction refers to the degree of mental anxiety, tension, and distraction (Neuro Harmony, 2004) (Table 1).

**RESULTS**

**The Effects of Sandplay Therapy on the Aggression of Female Juvenile Delinquents put into Juvenile Reformatory**

In order to verify the effects of sandplay therapy on the aggression of female juvenile delinquents put into juvenile reformatory, the differences in aggression scores prior to and after the experiment in the experimental group and the control group were examined using the Wilcoxon rank-sum test. As shown in Table 2, there were significant differences in hostility, sub-variables of verbal aggression, and the total score of aggression except for physical aggression. Average scores of physical aggression variables decreased but such changes were not statistically significant. Such results suggest that sandplay therapy decreased the aggression of female juvenile delinquents put into juvenile reformatory.

**The Effects of Sandplay Therapy on Female Juvenile Delinquents’ Attention Index**

As displayed in Table 3, the effects of sandplay therapy on female juvenile delinquents’ attention index were verified and there were statistically significant differences in both the left brain and the right brain. In other words, sandplay therapy effectively improved the subjects’ brain wave index related to attention.

In addition, as the graphs in Figures 1 and 2 show, as the session progressed, the attention indexes of both the left and right brains increased and such increases were maintained.

**SUMMARY AND CONCLUSION**

This study assigned nine adolescents to an experimental group and a control group with the help of a juvenile reformatory located in Gyeonngi-do. The nine female adolescents allocated to the experimental group received sandplay therapy once per week, sixty minutes per each session, for a total of ten sessions. Both pre- and post-tests were conducted during the first and the tenth sessions using the BDHI with self-reporting characteristics and the brain waves were measured in order to examine changes in

---

**Table 1. Criteria of attention index**

<table>
<thead>
<tr>
<th>Item</th>
<th>Score</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>The best</td>
<td>Higher than 80</td>
<td>Attention is very good. The brain is clearly awake and is equipped with high memory and learning ability. Resistance to disease and stress is high and therefore it is a very healthy condition. Those belonging to this category do not come down with a disease easily.</td>
</tr>
<tr>
<td>Awake</td>
<td>60 to 80</td>
<td>The level of attention is average. Those who belong to this category have an average level of memory and learning ability. Their ability to resist disease and stress is average and they may easily maintain their health with self-management.</td>
</tr>
<tr>
<td>Medial</td>
<td>40 to 60</td>
<td>Those who belong to this category are distracted. The brain is not clear and therefore memory and learning ability are low. The brain is aging or underdeveloped. Resistance to disease is low and therefore those who belong to this category should pay attention to health management.</td>
</tr>
<tr>
<td>Distracted</td>
<td>20 to 40</td>
<td>Those who belong to this category are distracted and have considerably low learning ability. In some cases, dementia, considerable memory loss, aging, developmental immaturity, pseudo autism, or mental retardation are suspected. Those who belong to this category have low level of resistance to disease and have a high possibility of contracting a disease.</td>
</tr>
<tr>
<td>Extremely distracted</td>
<td>Lower than 20</td>
<td>Those who belong to this category are very distracted and may accompany a violent behavioral disorder. Their learning ability is considerably low. Mental retardation, dementia, loss of memory resulting from aging, developmental immaturity, hyperactivity disorder, or autism are suspected. Their resistance to disease is very low and the possibility for them to contract a disease is very high.</td>
</tr>
</tbody>
</table>
Table 2. Verification of differences in average scores of aggression of all the subjects in the experimental group and the control group between prior to and after the experiment (N=9)

<table>
<thead>
<tr>
<th>Item</th>
<th>Experimental group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average</td>
<td>Standard</td>
</tr>
<tr>
<td>Physical aggression</td>
<td></td>
<td>deviation</td>
</tr>
<tr>
<td>Prior to the experiment</td>
<td>25.33</td>
<td>4.4</td>
</tr>
<tr>
<td>After the experiment</td>
<td>21.00</td>
<td>5.93</td>
</tr>
<tr>
<td>Hostility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prior to the experiment</td>
<td>17.778</td>
<td>2.539</td>
</tr>
<tr>
<td>After the experiment</td>
<td>14.667</td>
<td>4.449</td>
</tr>
<tr>
<td>Verbal aggression</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prior to the experiment</td>
<td>21.22</td>
<td>4.12</td>
</tr>
<tr>
<td>After the experiment</td>
<td>16.22</td>
<td>3.60</td>
</tr>
<tr>
<td>Anger</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prior to the experiment</td>
<td>15.111</td>
<td>2.667</td>
</tr>
<tr>
<td>After the experiment</td>
<td>11.00</td>
<td>2.646</td>
</tr>
<tr>
<td>Total score of aggression</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prior to the experiment</td>
<td>19.861</td>
<td>1.039</td>
</tr>
<tr>
<td>After the experiment</td>
<td>15.722</td>
<td>1.513</td>
</tr>
</tbody>
</table>

*p < .05, **p < .01, ***p < .001.

Table 3. Verification of differences in brain wave indexes of all the subjects in the experimental group and the control group prior to and after the experiment (N=9)

<table>
<thead>
<tr>
<th>Item</th>
<th>Experimental group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average</td>
<td>Standard</td>
</tr>
<tr>
<td>Attention index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(the left brain)</td>
<td>Prior to the experiment</td>
<td>46.10</td>
</tr>
<tr>
<td></td>
<td>After the experiment</td>
<td>59.62</td>
</tr>
<tr>
<td>Attention index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(the right brain)</td>
<td>Prior to the experiment</td>
<td>46.29</td>
</tr>
<tr>
<td></td>
<td>After the experiment</td>
<td>58.26</td>
</tr>
</tbody>
</table>

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

Figure 1. Average values of the attention index of the left brain prior to and after the session.

Figure 2. Average values of the attention index of the right brain prior to and after the session.

the brain wave indexes by session before and after the first, third, fifth, seventh, and tenth sessions. As for the control group, both pre- and post-tests were conducted using the BDHI with self-reporting characteristics and the brain waves were measured before and after the experiment.

The results and conclusions of this study are as follows. First, the effectiveness of sandplay therapy in decreasing the aggression of female juvenile delinquents put into juvenile reformatory was examined and there were significant changes observed in all the variables except for physical aggression. Hostility, verbal aggression, and anger among the variables of aggression had significantly decreased. Considering that changes in the scores of physical aggression were not statistically significant but the scores had decreased, a longer-term intervention than this study is re-
garded as necessary for a significant decrease in physical aggression.

Sandplay therapy brought about a positive, significant increase in the attention index, a brain wave index related to aggression, of female juvenile delinquents in a juvenile reformatory. Such results indicate that sandplay therapy may positively change the brain waves of female juvenile delinquents put into juvenile reformatory. From the result that the attention indexes had positively increased, it may be inferred that juvenile delinquents put into juvenile reformatory have the problem of attention-deficit hyperactive disorder (ADHD) due to their emotional, environmental, and temperamental problems. Given the research results that ADHD in some children and adolescents is associated with aggression (Bae, 2011; Bae, Shin, & Lee, 2009), intervention in ADHD or relevant symptoms is necessary for a decrease in aggression and positive increase in the attention index. A review of the results of brain wave tests conducted before and after the first, third, fifth, seventh, and tenth sessions, showed that changes increased and were maintained after each session.

Third, female juvenile delinquents who participated in the sandplay therapy program perceived their changed features and emotions and reported satisfaction with them. The sandplay therapy provided free and safe spatial and temporal meanings to the female juvenile delinquents and they were able to express their suppressed aggression, anger, and desires in their sand boxes and thereby experienced expression and resolution while creating their own worlds. Aggression the subjects possessed was verbalized together with their expressions in the sand boxes, and conducting internal work on a more profound level, they attempted to deal with confrontation and fighting and make order in their sandtrays.

REFERENCES


and depression-anxiety of the entered girl juvenile delinquents. (Unpublished Master’s thesis). Kyonggi University, Suwon, Korea.


