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The effect of Psychodrama on Post-traumatic Stress Symptoms in Abused Adolescents: A Single Case Study

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Abstract
This study aims to verify the effectiveness of psychodrama therapy on the post-traumatic stress symptoms experienced by adolescents of child abuse. In this single case study, the participants were separated from their families, were living in a shelter, and complained of post-traumatic stress symptoms such as headache, dizziness, and sleep problems. The cases were analyzed through quantitative analysis based on pre- and post-comparative analysis using post-traumatic stress and anxiety scales, and qualitative analysis was done through behavioral observation and interview analysis. As a result, the post-traumatic stress scale score of adolescents who had experienced child abuse decreased from 39 points to 5 points, and the anxiety scale score declined from 27 points to 13 points. In behavioral observation, the participant first became aware of the emotions and body reactions caused by the triggers, so that cognition, emotion, and body sensation were integrated. Second, when a physical reaction occurred during a traumatic scenario, the range of emotional tolerance expanded through grounding, centering, and training, and the physical symptoms were reduced. Third, physical symptoms were not evident in the triggers related to trauma in daily life, and self-control was enhanced by accurately expressing desires and emotions. This is significant in providing practical data about the use of the psychodrama technique in relieving the post-traumatic stress symptoms in adolescents who has experienced some form of child abuse

Keywords: Single case study, psychodrama, child abuse, adolescent, post-traumatic stress

1. INTRODUCTION

The prevalence of post-traumatic Stress Disorder (PTSD) is now a growing concern in South Korea due to exposure to traumatic events such as sexual assault, domestic violence, child abuse, and other catastrophes like natural disasters, pandemics, or economic uncertainties as well as accidents. In particular, PTSD is increasing due to incidents of child abuse, as child abuse is reportedly increasing in South Korea. According to Korea's 2021 Ministry of Health and Welfare survey, the year-on-year increase in child abuse was 2.9%, along with the steadily increasing abuse cases. Most often, perpetrators of child abuse were parents (25,380; 82.1%), and children aged 13 to 15 comprised the largest proportion of victims [1].

Child abuse refers to "acts of physical, psychological, or sexual violence or cruel treatments committed by an adult, including a guardian, that may harm a child's health or well-being or impede his or her normal development, as well as lead to neglect or abandonment of the child by a guardian [1]. Abuse is categorized into three main types. Physical abuse refers to all acts by adults that endanger a child, including physical violence that results in bodily harm. Neglect is the failure to provide a child basic necessities, such as food, clothing, and shelter, and a safe, clean, and hygienic environment. Neglect includes physical, educational, and medical negligence, and failure to provide emotional support through love, care, and support also constitutes neglect. Sexual abuse is any sexual activity directed at a child and includes sexual contact or conduct between a child and an adult. Emotional abuse is the act of verbal violence and rejection that is threatening to the extent of causing fear [2, 3].

Children develop trusting behavior with others and the world through parents and grow holistically. However, persistent abuse from an early age has a negative impact on children's early development and

interferes with their healthy growth. For instance, when children experience fear or dread due to the threat of abuse, their autonomic nervous system (ANS) activates and causes symptoms such as tension, atrophy, and immobility. The persistence of such a condition has a continuous negative effect on the autoimmune system, which can cause health problems, including chronic headaches, abdominal pain, fibromyalgia, allergic diseases, asthma, arthritis, and hypertension [4]. The unavoidable abuse also leads to the experience of negative emotions such as chronic anxiety, helplessness, lethargy, depression, and shame [5, 6]. Furthermore, child abuse has a negative impact on brain development, decreasing intellectual abilities, creativity, and problem-solving skills, as well as impeding the development of neural circuits that regulate emotions, resulting in chronic difficulties in emotion control and various psychopathologies[7]. A review of the related studies is as follows.

Children who were abused fail to form a stable relationship with their parents and more likely develop negative self-awareness and distrust others [8]. Bae and Choi's [9] study on the peer relationships of children with abuse experiences by showed that such children formed negative representations of both themselves and others and did not accept and respect themselves, resulting in low self-esteem. Consequently, such children experienced severe anxiety and fear in interpersonal relationships, became wary of contact with others, and avoided school life and interpersonal relationships due to difficulties in social adjustments [10, 11]. In particular, the earlier the abuse experience occurred in childhood, children become more dissociated from the intimidating and frightening situations, blocking the stimuli and senses to the brain, which impairs the formation of self-identity and the development of a continuous sense of self [12]. This further damaged the self-system, internalized shame, and lowered self-esteem [13]. In addition, the sympathetic nervous system gets activated in alarming situations, increasing physiological arousal, and excessively accumulating energy [14]. When the accumulated physiological energy is not released and remains in the body, it continuously affects the ANS, resulting in somatic symptoms such as panic disorder [15], headache, dizziness, abdominal pain, nausea, indigestion, muscle pain[16], eating disorders [17], fatigue, and insomnia [18, 19]. Furthermore, persistent and frequent experiences of abuse internalize anger, depression, anxiety [20], and cause self-harm and suicidal ideation through self-blame and self-punitive behaviors [10].

The adverse effects of abuse not only occur during childhood and adolescence but also persist into adulthood. Children who experienced abuse are more likely to develop a mental health condition called borderline personality disorder [21], or other psychopathologies such as PTSD, bipolar disorder, and panic disorder in adulthood [2]. They are also likely to commit violence against children and spouses [22], leading to a vicious cycle of abuse [23].

Child abuse is classified as a trauma and has a negative impact on emotions resulting in extreme fear, helplessness, and dread in the mind and body [24]. Trauma not only includes events such as natural disasters, accidents, and injuries but also the psychological distress an individual experiences [25]. Particularly, trauma caused by a caregiver has been shown to have the most grievous consequences [26]. Relational trauma caused by relationships damages the integrated self, and a damaged self-system increases shame and lowers self-esteem [26, 27]. Experiences of trauma can lead to post-traumatic stress symptoms, and experiences of childhood trauma showed higher severity and occurrence rate of PTSD [28].

Notably, PTSD refers to the emergence of various symptoms of psychological maladjustment after experiencing a traumatic event [24]. In other words, PTSD is a disorder in which physical and psychological functions become impaired after exposure to a threatening situation. In the recently revised *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (*DSM-5) features some of the symptoms of re-experiencing the traumatic event due to intrusive thoughts, avoidance of stimuli associated with the traumatic event, persistent hyper aroused state such as insomnia, and negative alternations in cognition and mood [24].

The four main categories of PTSD symptoms are intrusion, avoidance, alterations in cognition and mood and arousal and reactivity [24]. Intrusion is an involuntary recall of the incident, and memories related to the traumatic experience appear in forms such as nightmares, recollection of stressful incidents, and flashbacks. These symptoms make the individual feel as if the traumatic events will recur vividly. Avoidance is the effort to avoid people, places, activities, objects, and situations that trigger the traumatic memory to prevent recalling the distress. Alterations in cognition and mood include memory loss of the suffering and associated people and situations, distorted thoughts about the cause of the traumatic event, and experiencing emotions such as persistent fear, guilt, shame, and alienation. Alterations in arousal and reactivity refer to being overly alert and

wary of others and the surroundings, sleep disturbances due to becoming excessively alert, having angry outbursts, and engaging in self-destructive behaviors [24].

Experience of abuse during childhood and adolescence has a significant impact on PTSD [29]. Supporting studies show that the higher the frequency of childhood experiences of physical and emotional abuse and neglect, the more severe will be the symptoms of post-traumatic stress [30]; the higher the post-traumatic stress, the lower will be the victim’s resilience [31]; and the stronger the level of pain at the time of the traumatic event, the lower the level of post-traumatic growth [32]. In fact, PTSD also causes a severe dysfunctional phenomenon known as maladaptive emotion regulation strategies that are experienced due to the negative emotions that are experienced in the aftermath of the traumatic event [33]. Thus, anger, hostility, fear, and sadness, which are emotions that occur at the time of the stressful experience and have not been expressed or resolved externally, cause severe physical symptoms, including nausea, dizziness, muscular pain, and loss of consciousness [14]. Furthermore, after suffering a traumatic incident, a person may show dissociative symptoms such as loss of memory, derealization, and depersonalization because he or she separates the situations and emotions that are beyond coping behavior due to avoidance and psychological paralysis from reality [34].

Various approaches to PTSD treatment have been validated for their effectiveness. Examples include pharmacotherapy for treating hyperarousal and anxiety [35], cognitive behavioral therapy for managing irrational thoughts [36], and eye movement desensitization and reprocessing therapy, which integrates the left and right cortices by moving the pupils. In recent years, there have been an increasing number of attempts to view PTSD from the perspective of ANS and neurology, inducing an integrative approach to perception, emotion, and cognition rather than each feeling individually. As part of such attempts, psychodrama is reportedly an effective treatment for PTSD [37, 38].

Jacob Levy Moreno (1889– 1974), a Romanian psychiatrist, developed the psychodrama therapy. It is a therapeutic practice that allows a person to spontaneously and improvise and express one's conflicts and problems during a particular stage in a safe therapeutic environment. In other words, psychodrama is a technique to treat psychological problems by constructing roles and situations in drama form so that the patient can express repressed emotions and conflicts while performing freely [39]. Psychodrama alleviates symptoms of post-traumatic stress by helping patients to overcome their traumatic experiences by theatricalizing the traumatic experience [39]. It also has the function of newly integrating and restructuring one's perceptions, emotions, and behaviors, while the person recreates and re-experiences traumatic events and allows those who have experienced trauma to restore a healthy sense of self [37, 38].

The impact of psychodrama on patients with post-traumatic stress has been demonstrated in research. Oh [39] verified that psychodrama had a therapeutic effect on traumatic symptoms in 24 undergraduates who experienced relational trauma, specifically interpersonal and attachment stress. Oh [40] also reported that psychodrama eliminated trauma symptoms caused by school violence in a case study on three undergraduates who had experienced school violence. When Choi and Sim [41] conducted a group psychodrama program, a reduction in post-traumatic stress was observed among women with experience in sex work. These studies recreated the scenes of trauma during psychodrama and provided an opportunity to express emotions and desires that could not be conveyed during the traumatic situations, and the authors suggested that the process of comforting traumatized patients' inner wounds allowed them to positively embrace their negative appearances, thereby forming a positive self-image.

The effectiveness of psychodrama was recognized not only in patients with trauma but also among individuals with other pathologies. When Kim and Lee [42] conducted a psychodrama session with married individuals with alcohol dependence, the participants gained emotional cleansing and insights and positively changed their damaged self-system. Oh and Lee [43] reported that six graduate students altered their state of self and attitude positively toward life through corrective emotional experience. According to Yoo and Hong [44], psychodrama is effective in reducing anxiety and improving interpersonal relationships, while Go [45] reported that psychodrama is an effective treatment for improving mental health.

Psychodrama helps clients who experienced post-traumatic stress, but related research conducted mainly on adult participants shows that studies on the impact of psychodrama on children and adolescents are insufficient. Adolescents have low self-awareness and insight, are less skilled in verbalizing their inner feelings and desires, and show symptoms of dissociation and loss of memory after trauma. Therefore, therapeutic

methods that allow to express all perceptions, emotions, and thoughts in an integrated manner would be effective in handling PTSD in adolescents [37, 38].

This study attempts to develop a psychodrama program and verify its efficacy in alleviating the symptoms of PTSD in adolescents who experienced childhood abuse. The program is to promote psychological stability and strengthen resilience against trauma in abused adolescents experiencing maladjustment due to hypervigilance and intrusive symptoms. Another objective is to examine the impact and techniques of psychodrama on adolescents who experienced child abuse to derive the therapeutic significance of psychodrama on PTSD symptoms of adolescents who suffer abuse trauma. To this end, in this single case study, we developed a psychodrama program to effectively treat trauma, and the program's impact on post-traumatic stress symptoms in adolescents were verified.

According to the purpose of this study, the research questions are as follows.

First, is psychodrama effective in alleviating post-traumatic stress symptoms in adolescents who experienced child abuse?

Second, how does psychodrama change post-traumatic stress symptoms in adolescents who experienced child abuse?

2. METHODS

2.1. Participants

A 15-year-old female student participated in this study. Due to her father's abuse that began when the participant was in the third grade of elementary school, she was separated from her family and has been living in a facility for abuse victims. The father committed physical violence on the participant at least once a week and inflicted habitual physical violence on her mother. The participant reported that she experienced symptoms of immobility when the father became physically violent toward her mother. Since her third grade, the participant has been experiencing difficulty in sleeping due to nightmares. The participant reported the emergence of somatic symptoms such as tinnitus, headache, dizziness, heart palpitations, and crying whenever she saw a male of similar age or appearance as her father, which led to frequent absenteeism from school. The participant reported to the authorities about her father and was separated from him, but she continued to fear that her father would visit her current place of residence and inflict physical violence on her. The participant also reported continued sleep disturbances and headaches.

During the initial interview with the researcher, the participant made appropriate eye contact and spoke with a consistent tone and speed. She spoke logically regarding her current condition and emotions. However, when talking about her father, the participant showed little change in facial expression and had a relatively callous attitude. The participant’s speech softened, and she showed tearful eyes and signs of suppressing emotions when speaking about her mother.

To evaluate the participant's post-traumatic stress symptoms, she was asked to complete the Trauma Symptom Checklist for Children (TSCC) and the Revised Children's Manifest Anxiety Scale (RCMAS). The participant scored 39 on TSCC and 27 on the RCMAS, which are higher than the standard range.

2.2. Instruments

2.2.1. Experience of Trauma

A self-report questionnaire developed by Lee [50] was used to measure the trauma experience. The questionnaire includes a total of 10 items: accident, physical violence, health issues, death, family problems, interpersonal relationships, financial issues, academics, and other stressful (negative) events. The questionnaire presents a list of traumatic events, and the respondents indicate if they had experienced each event on the list and write the most painful event among the ones they had experienced. There are four items to be rated on a seven-point Likert scale regarding the timing of a traumatic event, the impact of the traumatic event, and the severity of pain experienced. The higher the score, the more traumatic the experience.

2.2.2. Post-traumatic Stress Scale

The Post-traumatic Diagnostic Scale (PDS) developed by Foa, Cashman, Jaycox, and Perry [47], translated and adapted by Hyemi Lee [46], was used to identify the post-traumatic stress symptoms. The PDS comprises a total of 17 items, and the respondents are required to rate the degree of symptoms they had

experienced over the past month on a four-point Likert scale for each item. A composite score of 10 or lower is considered as mild, 11 to 20 moderate, and 20 and above as severe, implying that the higher the score, the higher the post-traumatic stress. The reliability of the scale measured in Cronbach's α was .89 in the current study.

2.2.3. Anxiety Scale

The RCMAS, developed by Reynolds and Richmon [48], was used to measure the level of anxiety. Totally, there are 37 items across the subscales, namely excessive worry (6 items), oversensitivity (5 items), sleep problems (7 items), and self-esteem or unhappiness (10 items). A composite score of 25 or less is normal, a score of 26 to 33 signifies mild to moderate anxiety, and a score of 34 and higher indicates suspected anxiety disorder; the higher the composite score, the higher is anxiety. Cronbach's α of the anxiety scale in the current study was .80.

3. PROCEDURES

3.1. Research Process

For this single case study, the participant gave written consent when the study objectives and ethical issues were explained. Ethical issues such as personal information and video and audio recording were explained in detail. Quantitative and qualitative analysis were used simultaneously to verify the program's effectiveness. For the quantitative analysis, the PDS and RCMAS were conducted one week before and one week after the psychodrama program was implemented. For the qualitative analysis, five sessions of psychodrama were video recorded based on the triangulation method of Yin [49]. Totally, six interviews were conducted, including the initial interview prior to the start of the program and five interviews at the end of each psychodrama session. The interviews focused on the experience of psychodrama, changes in trauma symptoms, and changes in daily life. Each interview was audio recorded and transcribed for analysis. Two experts verified the validity of the developed psychodrama program.

The psychodrama program comprised a total of five sessions, two hours a week for five weeks. The program was led by a researcher who received specialized education on psychodrama during the doctorate program and had more than 100 hours of experience in conducting psychodrama. Graduate students who were enrolled in counseling or doctorate programs in psychology received specialized education on psychodrama and participated as assistants. Experts on psychodrama and trauma provided feedback on the video recordings every week and ensured the content validity of the program.

3.2. Program Structure

The psychodrama program was developed based on Tian Dayton's *Psychodrama and Experiential Therapy* [50] and Bessel van der Kolk's *The Body Keeps the Score* [37] to verify the effectiveness of psychodrama in alleviating PTSD symptoms in abused adolescents.

Van der Kolk (born 1943), a psychiatrist, argued that recovery from trauma requires stages of stabilization, restructuring, and integration. Stabilization refers to gaining psychological stability by alleviating the trauma-activated ANS and diminishing somatic symptoms caused by overactivation of the ANS. Restructuring is the reorganization of perceptions and memories that are distorted and dissociated by trauma, and the expression of the reorganized concepts using language. Integration refers to restoring self-control by reintegrating perceptions, emotions, and memories [37]. This study's psychodrama program comprised stabilization, restructuring, and integration stages based on van der Kolk's theory. In particular, the program focused on the stabilization stage because the participant's chief complaint was symptoms of hypervigilance caused by the activation of the ANS. Grounding and centering were used as stabilization techniques. Grounding is the state of being connected to and grounded on earth and feeling settled somewhere. It is a technique that helps the body to feel stable by sensing the weight of the body where it touches the ground [52]. Centering is recognizing the body as standing straight with the spine at its center and against the force of gravity [52]. When grounding and centering are achieved, one can move the body with a sense of stability, resulting in the ability to move with strength [52].

A psychodrama session focuses on the protagonist who actualizes his or her story, an auxiliary ego is the protagonist's inner voice, a director leads the psychodrama, an assistant acts as another character, and an

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audience. There are three phases in psychodrama: warm-up, action, and sharing. The warm-up is an activity that motivates clients to perform and helps them participate voluntarily with a sense of stability. During the action phase, the protagonist enacts a scene in which his or her inner reality is structured and actualized on stage. During the sharing stage, the protagonist experiences support, and the protagonist and other participants gain emotional cleaning and reintegration. Therefore, each session of the program has an objective, and the three activities (warm-up, action, and sharing) are conducted in each session. Table 1 shows the session-specific goals and contents of the psychodrama program.

Table 1. The Psychodrama Program

Session	Objective	Program content
1	Stabilization phase: structuring and building rapport	■ Secure stability through introduction and structuring of counseling ■ Induce vulnerability by establishing a sense of closeness among the client and other group members
2	Stabilization phase: recognizing physical reactions and emotions caused by the trauma cues	■ Create a sense of trust and stability with others using the mirroring technique ■ Recognize physical sensations and emotions through body tracking and body mapping ■ Secure a sense of stability through grounding and centering
3	Stabilization phase: controlling the ANS using grounding and centering techniques	■ Perceive physical reactions and emotions by enacting a scene the client does not want to remember ■ Secure a sense of stability through grounding and centering, specifically in situations beyond the range of emotional tolerance ■ Relieve physical reactions and emotions through grounding and centering techniques
4	Restructuring phase: handling fear	■ Recreate scenes of trauma ■ Relieve physical reactions and emotions of fear in the traumatic scenes
5	Integration phase: improving self-control using internal resources	■ Control physical symptoms using internal resources in situations with trauma cues ■ Enhance self-control by practicing body control and symptoms in the traumatic scenes

3.3. Data Processing and Analysis

This study used quantitative and qualitative analysis to verify the effectiveness of the psychodrama program in treating abused adolescents. The quantitative analysis was performed by comparing the pre- and post-program changes in the post-traumatic stress scale and anxiety scale scores. The qualitative analysis was conducted by examining changes in participant's physical and psychological symptoms through behavioral observations during the psychodrama sessions and interviews after each session. A practicing expert in psychodrama and a professor of counseling psychology verified the content validity of the process of qualitative changes in the participant.

4. RESULTS

4.1. Post-traumatic Stress Scale

Pre- and post-tests were conducted to examine the impact of psychodrama on post-traumatic stress symptoms in abused adolescents, and the results are shown below in Table 2.

Table 2. Pre- to post-program score change on the post-traumatic stress scale

Pre-program	Post-program	Score change
39	5	-34

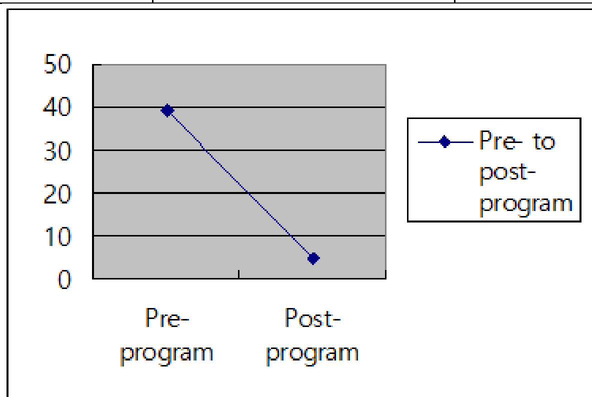

Figure 1. Pre- to post-program changes on the post-traumatic stress scale

The participant's score on the post-traumatic stress symptoms scale decreased by 34 points, from 39 on the pre-test to 5 on the post-test. The result implies that psychodrama reduces post-traumatic stress in abused adolescents.

4.2. Anxiety Scale

Pre- and post-tests were also performed to examine the impact of psychodrama on the anxiety levels of abused adolescents, and the results are shown in Table 3.

Table 3. Pre- to post-program score change on the anxiety scale

Pre-program	Post-program	Score change
27	13	-14

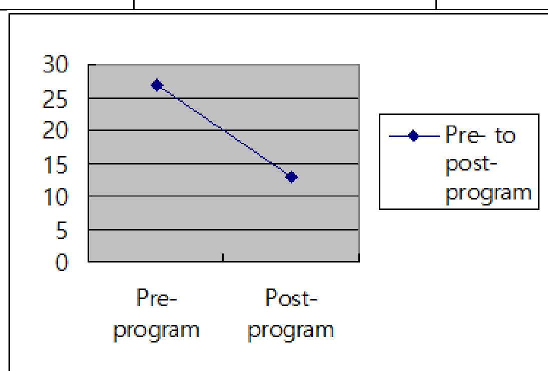

Figure 2. Pre- to post-program change on the anxiety scale

The participant's score on the anxiety scale decreased by 14 points, from 27 on the pre-test to 13 on the post-test. The result implies that psychodrama reduces anxiety in abused adolescents.

4.3. Process of Change in Abused Adolescents Through Psychodrama

Behavioral observations and interviews were used to assess the qualitative changes in post-traumatic stress symptoms. The results revealed that the participant experienced changes in **<decrease in somatic symptoms caused by ANS overactivation>, <dissociation to integration>, and <restoration of impaired self-control>.**

<Decrease in Somatic Symptoms Caused by ANS overactivation>

During the preliminary interview with the researcher, the participant was overly nervous, avoided eye contact, and provided short answers when speaking about her father. In particular, her eyes became dazed, answers were slow, and she provided irrelevant answers. Such behaviors signified that the traumatic events had

terrified the participant, and even simply recalling the traumatic events caused overactivation of the ANS and subsequent dissociation in the participant.

During the first psychodrama session, the participant was nervous, could not turn her eyes away from a male assistant, and repeated the following questions: (i) Is there a male teacher? (ii)Will he participate in the program? (iii) What is his role? (iv) What is his personality like? The participant seemed to be overly cautious toward the male assistant. It appeared that the participant was projecting her abusive father from her childhood onto the male assistant. In particular, the participant showed involuntary behavior, such as being startled and jerking her shoulders up and down each time the male assistant spoke.

The participant avoided eye contact and asked the following questions each time other participating assistants used words such as *anger*, *aggression*, and *fight*: (i) Are you scared when angry?(ii) What do you do when you are angry? (iii) When do you get angry? The participant was cautious towards assistants who had loud voices and showed signs of body stiffness when she heard loud voices. This reaction can be considered as a conditioned response to fear, the primary emotion after a traumatic event, based on Pavlov's classical conditioning [28]. Specifically, the appearance of male assistants was associated with events and experiences related to abuse, which triggered fear responses in the participant even without the presence of direct threats. Additionally, the terms loud voices, anger, attack, and fight were also fear-conditioned, and the use of the words by others resulted in hypervigilance by the participant, thereby causing symptoms such as immobility, tension, avoidance of eye contact, and voice tremor. Such reactions indicated that fear and dread compromised the social participation system [53].

Traumatized individuals often experience fear conditioning and an impaired social participation system, which makes it challenging for them to respond to even small stimuli or to calm their ANS independently. These individuals sometimes resort to extreme measures such as self-destructive or addictive behaviors as emotional regulation strategies [54].

The study researchers instructed the participant to stabilize herself by using grounding and centering techniques whenever her ANS was overactivated and removed conditioned fear responses to enable the participant to express her fears verbally. The researchers also activated the participant's social participation system by inducing a sense of stability by providing receptive and supportive responses, such as a warm gaze, low voice, and relaxed expressions.

During the fifth psychodrama session, the participant stated that "The tremble in the body has subsided" and "I can make eye contact with the teacher." Additionally, the participant no longer displayed strained behaviors due to hypervigilance and tension in the presence of triggers of fear. In other words, the ability to control the ANS, which could not have been controlled earlier due to trauma, enabled the participant to control the trauma-related somatic symptoms.

<Dissociation to Integration>

During the first psychodrama session, the participant showed somatic symptoms such as immobility and could not make eye contact with the male assistant who played her father’s role. The voice of the male assistant triggered symptoms of extreme fear and dissociation in the participant.

“It really felt like my dad was yelling when the male teacher yelled, and I became so scared. My heart pounded, my hands and my body trembled, then they froze, and I couldn't move. My mind became blank all of a sudden, and I couldn’t think of anything." (Psychodrama session 1)

Experience of trauma activates the ANS, specifically activation of the sympathetic nervous system that stimulates fight-or-flight response, or activation of the dorsal vagus of the parasympathetic nervous system that leads the person to a dissociative state and begins to show trauma symptoms such as "spacing out" and "inability to remember." Dissociation refers to a state of being disconnected from one's thoughts, unable to act or make decisions, and emotional paralysis in severe cases. It is a state of being unable to perceive, think, or feel anything [55].

The participant frequently and repeatedly exhibited hyper- and hypo vigilance symptoms during the psychodrama sessions. This observation suggests that the participant's ANS was vulnerable to either overactivation, under activation, or both; the participant's emotions frequently fluctuated between the extremes of her emotional tolerance range [56].

Trauma disrupts not only the foundation of stability and basic trust but also certain biological control functions [26]. Therefore, it is crucial to recognize the body’s sensations by engaging in physical activities and

securing a sense of safety through the body. Accordingly, the study researchers identified images, sounds, and scents perceived by the participant, actions that the participant had failed to perform at the time of the traumatic event, and helped the participant recognize them. The researchers also provided a cozy environment for the participant to feel safe and responded sensitively to the participant while observing at which level she showed physical and emotional dissociation [57]. Through this process, the participant began to recognize and integrate her senses, emotions, and memories that were dissociated from the traumatic event.

At the beginning of the fourth session of the psychodrama, the participant spent less time on stabilization using grounding and centering techniques when symptoms of physical rigidity appeared during some traumatic scenes related to her father, she relieved physical reactions and emotions satisfactorily, and increased her emotional expressions. In other words, the participant experienced catharsis by re-experiencing emotions related to her past traumatic events and recalibrated her memories by participating in the psychodrama session [61].

"I can hear the male teacher talking. And I can see the expression. It is still scary, but I remember what I wanted to say to my father then." (During the interview after psychodrama session 4)

"Teacher, I slept well this week without any nightmares. Particularly, I used to always wake up at least once early morning, but I fell asleep at night and woke up in the morning. For the first time, I didn't wake up from sleep, and it was fascinating. I take at least one painkiller per day, and I always carry it in my bag, but now my head doesn't hurt even if I don't take it. I haven't missed school, and I go to school every day now. I meet with my friends and talk a lot every day, and school is fun. I don't feel dizzy or scared when I see a man who looks like my dad while walking down the road." (During the sharing stage of psychodrama session 4)

<Restoration of Impaired Self-Control>

The participant recognized the reactions of fear and dissociation caused by triggering cues on her own and began to use the stabilization techniques when her emotions surpassed her tolerance range. She became self-aware and achieved self-understanding by becoming aware of her emotions and physical reactions during the psychodrama sessions. The participant expressed her needs and emotions loudly to the participant who played the role of her father. These behaviors demonstrate that the participant regained both the initiative and self-control that were impaired due to the traumatic events she had experienced during childhood.

Herman [58] stated that recovery in adolescents with traumatic experiences requires strengthening of psychological functions, such as trust, initiative, capability, identity, and intimacy, which had been impaired and altered. In other words, she stated the importance of restoring both initiative and self-control that were damaged during traumatic experiences.

During the fifth psychodrama session, the participant showed no physical symptoms resulting from hypervigilance while reenacting the traumatic events and showed an increased ability to accurately express her needs and emotions to her father, such as shouting "Don't do it" and "Don't hit." The participant appeared to have gained the courage to control traumatic situations in a new way through participating in a psychodrama program [59].

“It would be scary to see my dad, but I don't think my body will freeze as it used to. In everyday life, when teachers simply gave me advice, I got scared, my body would freeze badly, and I couldn't say anything. Now, my heart pounds a bit, but my body doesn't stiffen, and my mind doesn't go completely blank. Now, when my body starts trembling, I even tell my teacher that I’m scared." (During the sharing stage of psychodrama session 5)

5. DISCUSSIONS AND CONCLUSIONS

The impact of psychodrama on post-traumatic stress symptoms in abused adolescents have been analyzed in this study by examining the process of quantitative and qualitative changes. The implications of the results are as follows.

First, the participant's score on the post-traumatic stress scale was lowered after participating in the psychodrama program. The result indicates that psychodrama effectively reduces post-traumatic stress symptoms in abused adolescents. This result is consistent with the findings of O, who reported that psychodrama is effective in treating trauma symptoms in undergraduates [39] and reducing trauma symptoms in students who are victims of school violence [40]. It was also consistent with the findings of Shim, who reported an effective reduction in the trauma symptoms experienced by female sex workers [41].

Before participating in psychodrama, the participant's ANS was overactivated due to persistent abuse, which had led to nightmares and sleep disturbances. The participant's usual somatic symptoms included tinnitus, headache, and dizziness. The participant was overly cautious and tense, and suddenly cried when encountering an adult male. Such behaviors seemed to have been caused by intrusive thoughts and hypervigilance among post-traumatic stress symptoms. When trauma cues appeared, the participant's ANS was overactivated, and symptoms of dissociation emerged in severe cases. However, the post-program score on the post-traumatic stress scale and qualitative changes confirmed a reduction in symptoms during ANS hyperactivation. This result suggests that stabilizing the overactivated ANS in individuals with symptoms of PTSD is effective in alleviating somatic symptoms such as sleep disturbances, nightmares, headaches, tinnitus, and dizziness. Stabilization techniques, such as grounding and centering, helped to stabilize the overactivated ANS.

Second, the participant's score on the anxiety scale decreased after participating in psychodrama sessions, demonstrating the effectiveness of psychodrama therapy in reducing anxiety in abused adolescents. This result was consistent with the findings of Yoo and Hong [44], who reported that psychodrama effectively reduced anxiety. Abused individuals generally experience anxiety after a traumatic event and display avoidance behavior, which is among the major symptoms of PTSD, to avoid predicted anxiety [60]. In severe instances, the participant became immobilized, dissociated, cried, and sank down on streets when she encountered adult males who evoked images of her father. Subsequently, the participant exhibited avoidance behaviors toward environments or objects that triggered memories of her father. However, the participant's evasive behaviors toward situations and objects that evoked memories of her father decreased after participating in psychodrama. Avoidance is one of the symptoms of PTSD and a coping behavior for preventing the experience of fear and dread by avoiding predicted traumatic events. Avoidance may not seem to directly affect patients with PTSD, but it has an indirect impact on their social behavior—as in social anxiety disorders—when avoidance behavior intensifies toward traumatic situations. Behavioral changes observed in the participant show that psychodrama effectively reduces anxiety in individuals suffering post-traumatic stress symptoms, thereby reducing avoidance behaviors.

Psychodrama produced not only quantitative changes in the symptoms of trauma stress experienced by abused adolescents but also qualitative changes such as <decrease in somatic symptoms caused by ANS overactivation>, <dissociation to integration>, and <restoration of impaired self-control>.

The study participant showed various somatic symptoms due to excessive activation of the ANS, even in response to a minor trauma cue. The participant's social participation system was also compromised, and she displayed severe tension and anxiety in interpersonal relationships. However, grounding and centering techniques restored the participant’s sense of stability, and this stability reduced the symptoms of immobility and dissociation caused by trauma cues. This stability also resulted in the integration of perception, emotion, and cognition. Such a change connotes that the participant has endured the stabilization phase and is in the process of recovery in the integration phase, as in van der Kolk's argument.

Trauma protects the victim from pain by disconnecting cognition, emotion, and perception, depending on the severity of the trauma. Therefore, an individual who has experienced severe trauma cannot remember or coherently recount the event [34]. Accordingly, the principle of trauma treatment includes the importance of reintegrating the brain [37]. In this study, psychodrama integrated perceptions and emotions into the participant's memories, allowing her to cogently describe the events she had experienced. It appears that post-traumatic stress symptoms decreased by reexperiencing traumatic events within the range of emotional tolerance, and reintegrating and restructuring the participant's perceptions, emotions, and behaviors [37, 38].

Additionally, reconstruction of scenes in the psychodrama session, similar to the traumatic event, allowed the participant to enact behaviors, which could not be expressed in the event of trauma, in various ways. This is called completing the unfinished behavior of trauma, a technique in trauma treatment [61]. The completion of unfinished behavior is shown to affect the restructuring of the implicit memory by safely facing the trauma in the here and now and re-experiencing the traumatic event without the fear of failure or punishment [62]. It helped the participant to develop the ability to act by behaviorally expressing all issues, such as the frustrations related to her father and the desire for self-realization, and positively restructuring the implicit memory of the traumatic experience [61]. This suggests that physical activity in psychodrama has the effect of completing unsolved behaviors that were not attempted at the time of the traumatic event [61]. In other words, psychodrama promotes the ability to self-heal and attempt new behaviors, provides a greater sense of safety in

abused adolescents, and enables adolescents to create coping behaviors by expressing their actual wants, and encourage them to solve problems by themselves through spontaneity [63].

Third, the participant regained her proactive behavior and restored her impaired self-control, she no longer showed physical symptoms during the traumatic scenes involving her father, and accurately expressed her desires and emotions. This result indicates that the participant's inner strength and control to overcome trauma were restored through the process of comforting her inner self outside the influence of others [37, 52]. In other words, psychodrama restored the participant's inner strength, reduced by the abuse behavior of her father, and helped her to take charge of her life rather than living as a victim [63].

The final objective of trauma treatment is to ensure that the client recognizes herself as a trauma survivor and not a victim, discover her innate resources from the trauma experience, and take the initiative to restore her own life [63]. Consistent with such an objective, psychodrama is an effective therapy for adolescents who faced abusive experiences to recognize themselves as survivors rather than victims, discover their resources from experience, and strengthen the resilience to lead their lives proactively.

The present study shows that psychodrama is effective in expanding emotional tolerance and restoring impaired self-control in adolescents with post-traumatic stress symptoms by developing self-regulation abilities through the stabilization of the ANS. This study is also significant in that it has proven that the attempts to integrate perception, emotion, and cognition from the ANS and neurological perspectives, as well as the existing interventions that rely on the use of language, are effective in treating PTSD.

Despite the implications and significance, as a single case study, this analysis has the limitation of generalizing the identified effects to adolescents who experience abuse or PTSD patients, who suffer various post-traumatic stress symptoms. Therefore, follow-up studies with participants belonging to various age groups and symptoms are necessary. Another limitation is that the intervention focused on symptoms related to hypervigilance and intrusive thoughts among various PTSD symptoms, as the short-term program comprised only five sessions. Patients with PTSD display several symptoms, along with hypervigilance and intrusive thoughts. Therefore, it is necessary to develop a program focused on the various symptoms patients with PTSD experience and verify its effectiveness.

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Authors' contributions

All authors contributed toward data analysis, drafting and revising the paper and agreed to be responsible for all the aspects of this work.

Declaration of Conflicts of Interests

Authors declare that they have no conflict of interest.

Declarations

Author(s) declare that all works are original and this manuscript has not been published in any other journal.

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