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Article

Sand tray therapy for reducing post-traumatic stress disorder (ptsd) and enhancing well-being in children and adolescents

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ABSTRACT

Post-Traumatic Stress Disorder (PTSD) is a mental health issues that is commonly experienced by children and adolescents as a result of traumatic events such as natural disasters, social conflicts, and violence. The high prevalence of PTSD among children and adolescents requires further intervention due to the risk of long-term psychological impacts. This study aims to evaluate the effectiveness of Sand Tray Therapy in reducing PTSD symptoms and improving well-being in children and adolescents. The study uses an A-B-A-B experimental design, which is a variation of the single subject design (SSD), involving five subjects who were selected through a screening process and considered as representative of a population with PTSD and low psychological well-being. The research instruments used are the Posttraumatic Stress Disorder Checklist (PCL-5) and Ryff's Psychological Well-Being Scales (PWB). Data were analyzed using the Wilcoxon Signed-Rank Test to compare PTSD and well-being scores between phases, and Cohen's d was used to measure the effect size of changes between phases. The results of this study indicate that sand tray therapy has a clinically significant positive effect in reducing PTSD symptoms and improving psychological well-being. Thus, this method can be considered an alternative psychological intervention for children and adolescents who suffer from PTSD and require an improvement in psychological well-being.

Keywords:

Play therapy
Counseling
PTSD
Trauma
Non-verbal therapy
Well-being
Resilience

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Introduction

Natural and social disasters such as prolonged pandemics, social conflicts, and various individual issues like domestic violence, sexual abuse, and others are traumatic events that often lead to profound and long-lasting psychological problems, commonly referred to as post-traumatic stress disorder (PTSD) (Beaglehole et al., 2018; Fonagy et al., 2015; Rosellini et al., 2018). PTSD is a condition where an individual experiences a life-threatening traumatic event that elicits fear and helplessness (APA, 2013). Common symptoms of PTSD include severe anxiety, persistent negative emotions and thoughts, and even depression (Fried et al., 2018).

Each year, nearly millions of children and adolescents worldwide experience traumatic events (Smith et al., 2019). PTSD in children and adolescents warrants specific attention and intervention due to its potential to cause long-term psychological problems (Haan et al., 2019; Vibhakar et al.,

2019). Consequently, research on the mental health of trauma-exposed children and adolescents has focused on the development of PTSD interventions (Rezayat et al., 2020).

Sand tray therapy has been utilized in interventions across age groups, from children to adults, for various therapeutic goals (Narges & Keivani, 2018). In sand tray therapy, individuals can create representations that reflect their lives and provide opportunities to resolve conflicts, overcome difficulties, and achieve self-acceptance. This method encourages individuals to emotionally open up and share their deepest thoughts and feelings (Homeyer & Sweeney, 2016; Linzmayer, 2013). It is considered effective in reducing post-traumatic symptoms in children and adolescents because sand tray therapy is one of the most used trauma interventions in this population, facilitating adaptive behaviors and emotional healing through play-based therapy (Han et al., 2016; Herce et al., 2024).

Sand tray therapy differs significantly from other trauma recovery approaches. Unlike traditional verbal therapy, sand tray therapy is a non-verbal approach that provides space for clients to express unconscious emotions and experiences through carefully selected miniatures in a sand-filled tray, facilitating healing and strengthening internal resources (Roesler, 2019; Taylor, 2009). This method has been reported to enhance the sense of safety between clients and therapists, improve communication of traumatic experiences, and offer an empowering experience for clients, thus facilitating recovery from trauma (Claudia et al., 2016). Moreover, it has shown positive effects on the well-being of trauma survivors by reducing PTSD symptoms and improving various aspects of psychological well-being after therapy. It has been proven effective in helping individuals find new meaning in their traumatic experiences, which contributes to overall improvements in well-being (Monakes et al., 2011; Tornero & Capella, 2017).

Sand tray therapy has seen significant development over the last decade, particularly in addressing trauma, psychological distress, disabilities, and other complex issues that are challenging to address through conventional therapeutic methods (Roesler, 2019; Schoonover et al., 2024). However, research specifically evaluating the effectiveness of sand tray therapy in reducing PTSD symptoms and improving psychological well-being in children and adolescents remains limited. Therefore, this study aims to evaluate the effectiveness of sand tray therapy in reducing PTSD symptoms and improving psychological well-being in children and adolescents.

Methods

Research Design

This study employs an A-B-A-B experimental design (Muñoz et al., 2025), a variant of the single subject design (SSD). This design allows for the repeated evaluation of the impact of sand tray therapy on two primary variables: Post-Traumatic Stress Disorder (PTSD) symptoms and psychological well-being. The A phase represents the baseline, where no intervention is provided, while the B phase represents the intervention period where sand tray therapy is administered. The A-B-A-B design is utilized to assess the initial effects of the intervention (B1 phase), the effects of withdrawal of the intervention (A2 phase), and the effects of a second intervention (B2 phase) to determine whether the impact of the sand tray intervention can be replicated.

Research Subjects

Subjects were selected through an initial screening process using validated and reliable PTSD measurement instruments. Only subjects who met the following criteria were included in the study: (1) a significant PTSD score as measured by the Posttraumatic Stress Disorder Checklist (PCL-5), and (2) a low score on psychological well-being as assessed by Ryff's Psychological Well-Being Scales (PWB). Based on these criteria, five subjects were included in this study, with detailed descriptions of each subject provided in Table 1.

Based on the Table 1 these five subjects were selected for the study based on their PTSD and well-being scores for the following reasons: (1) all participants had high PTSD scores, indicating the presence of PTSD symptoms requiring intervention, (2) all participants had low psychological well-

being scores, and (3) participants exhibited similar levels of symptoms at the outset of the study, facilitating the measurement of changes following the intervention. The five selected subjects were considered representative of the population experiencing PTSD with low well-being levels and require psychological intervention.

Table 1. Subjects Description based on PTSD and well-being scores

Subject	Gender	Age	PTSD (baseline)	Well-being (baseline)
1	M	10	70	20
2	F	9	75	25
3	F	11	60	30
4	M	9	65	22
5	F	10	68	18

Intervention Protocol

The intervention in this study includes eight stages of sand tray therapy developed by Domenico. (De Domenico, 1987), That is: (1) The stage of introducing sand media. At this stage, the therapist shows the client the materials and media used during the therapy process; (2) the stage of free and spontaneous play. The client plays with the provided materials and media without intervention from the therapist; (3) the stage of Builder experiencing. The child builds their "world" in the sandbox. After finishing building "their world," the client can share associatively (using the chosen toy symbols in building their world) with the therapist; (4) the stage of client-therapist joint experiencing. At this stage, the therapist joins the client in front of the sand tray and asks to be included in the "world" created by the client. The therapist experiences the "world" from the client's perspective. The therapist asks the client to create an experience that includes the "World and its characters." During this stage, the therapist and the client develop and use a shared language of experience; (5) the reflection stage. At this stage, the client is asked questions about what they think and feel during the game (the construction of the world they have built); (6) the shooting stage. In each meeting session, after the client has built their world, the therapist and the client decide which "world" will be photographed. The purpose of this photography is to provide documentation, and the results can be used for the next sessions; (7) the dismantling stage. It is a stage aimed at helping clients recognize basic mistake. At this stage, the therapist discusses and confronts the client's faulty thinking related to the symptoms of depression they are experiencing; and (8) the stage of therapist reflection and recovery. This stage aims to provide a positive understanding to the client, which will also have a positive impact on the client's thoughts, attitudes, and behaviors. Therapy can help clients visualize alternative plans and goals for the future.

All participants were fully informed about the aims and procedures of the study and were given the right to withdraw from the study at any time without facing any negative consequences. Informed consent was obtained from all participants before the study commenced.

Research Instruments

The instruments used in this study include: (1) the 20-item PTSD Checklist for DSM-5 (PCL-5), which covers the four primary symptom clusters of PTSDS, including re-experiencing, avoidance, negative alterations in cognitions and mood, and hyperarousal. Each item is rated on a Likert scale from 0 (not at all) to 4 (extremely often), with total scores ranging from 0 to 80 (Wortmann et al., 2016), and (2) Ryff′s Psychological Well-Being Scales (PWB), which measure psychological well-being across six dimensions: self-acceptance, positive relations with others, autonomy, environmental mastery, purpose in life, and personal growth (Ryff & Keyes, 1995).

Data Analysis

Data were analyzed using the Wilcoxon Signed-Rank Test to compare PTSD and well-being scores across different phases: (1) A1 vs. B1 to measure differences between the initial baseline and intervention, (2) B1 vs. A2 to determine changes following the cessation of the intervention, and (3) A2 vs. B2 to assess the effects of the second intervention after the second baseline. Cohen's d was used to calculate the effect size of the changes across phases.

Results and Discussion

Results

All of five participants showed a significant reduction in PTSD scores during the first intervention phase (B1) compared to the initial baseline phase (A1). During the second baseline phase (A2), some participants exhibited a slight increase in PTSD scores; however, this increase was not statistically significant, and none of the participants' PTSD symptoms returned to the initial baseline levels observed in phase A1. In the second intervention phase (B2), all participants recorded PTSD scores similar to those in the first intervention phase (B1), suggesting that the sand tray therapy had a consistent and stable effect in reducing PTSD symptoms. Description of PTSD and well-being score are summarized in table 2.

Table 2. PTSD and well-being scores among phase A1, B1, A2, and B2

Subject	PTSD A1	Well-being A1	PTSD B1	Well-being B1	PTSD A2	Well-being A2	PTSD B2	Well-being B2
1	70	20	40	45	65	30	42	44
2	75	25	35	50	70	28	36	49
3	60	30	30	52	55	35	31	51
4	65	22	32	48	60	27	33	47
5	68	18	38	46	63	25	37	45

Regarding well-being, all five participants experienced an improvement in well-being scores during the first intervention phase (B1) when compared to the initial baseline phase (A1). A decline in well-being scores was observed in the second baseline phase (A2), though this decrease was not significant, and nearly none of the participants' well-being scores regressed to the initial baseline levels. During the second intervention phase (B2), all participants showed well-being scores nearly identical to those recorded in the first intervention phase (B1), indicating that the sand tray therapy had a consistent and stable effect in enhancing the participants well-being. The changes in PTSD and well-being scores across all phases of the A-B-A-B design for the five participants are illustrated in Figure 1.

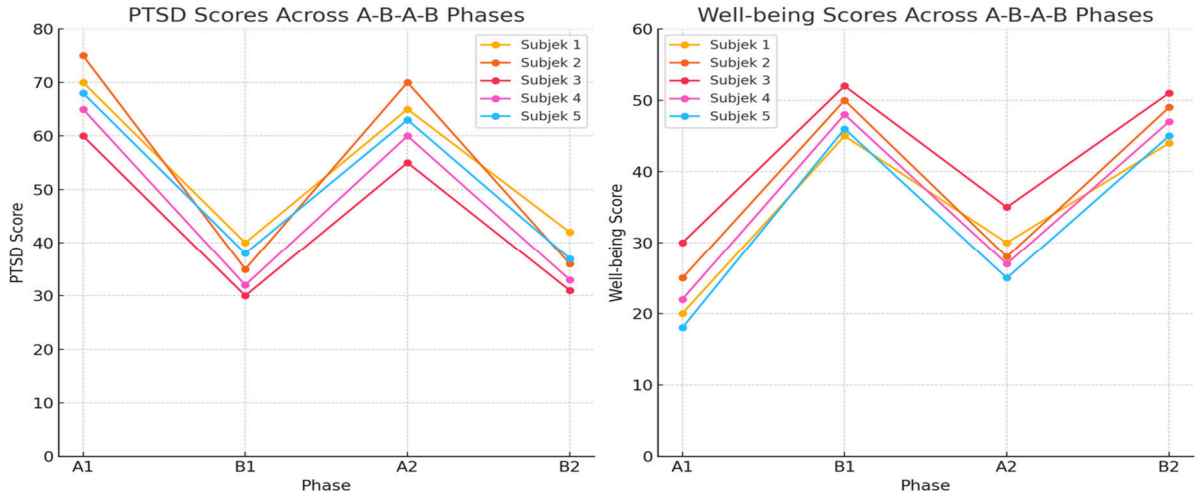

Figure 1 PTSD and well-being scores across all phases

Overall, the pattern of changes in PTSD and well-being scores across all phases indicates that the sand tray therapy intervention had a positive effect, both in reducing PTSD symptoms and enhancing well-being. The impact and effectiveness of the sand tray intervention on reducing PTSD symptoms and improving well-being were further tested using the Wilcoxon Signed-Rank Test, with Cohen's d applied to calculate effect sizes. The results of these analyses are presented in Table 3.

Table 3. Wilcoxon and Cohen s D Results

Comparison	W Statistic	p-value	Cohen's "d = 7.52
PTSD A1 vs B1	0	0.0625	7.52
PTSD B1 vs A2	0	0.0625	-6.37
PTSD A2 vs B2	0	0.0625	6.2
Well-being A1 vs B1	0	0.0625	-11.62
Well-being B1 vs A2	0	0.0625	6.33
Well-being A2 vs B2	0	0.0625	-6

The analysis comparing PTSD scores between the initial baseline phase (A1) and the first intervention phase (B1) indicating that all participants experienced a reduction in PTSD scores during the first intervention (B1) compared to the initial baseline (A1) (W = 0). The p-value of 0.06 suggests that this change was not statistically significant given the sample size. Comparing PTSD scores between the first intervention phase (B1) and the second baseline phase (A2) also produced a W value of 0, indicating that each participant experienced an increase in PTSD scores from B1 to A2. This suggests that PTSD symptoms tended to increase after the first intervention ceased, though the p-value (0.0625) shows that this difference was not statistically significant. In the comparison between the second baseline (A2) and the second intervention (B2), the W value again was 0, indicating a consistent reduction in PTSD scores for all participants during the second intervention. Although this pattern was evident, the p-value of 0.0625 still indicates that the change was not statistically significant.

For well-being, the comparison between the initial baseline (A1) and the first intervention phase (B1) showed a consistent improvement in well-being across all participants during the first intervention compared to the initial baseline (W = 0). However, the p-value of 0.0625 indicates that this improvement was not statistically significant. When comparing well-being between the first intervention phase (B1) and the second baseline (A2), the results indicated that well-being declined after the intervention was discontinued (W = 0). However, the p-value = 0.0625 showed that this decline was not statistically significant. Finally, in the comparison between the second baseline (A2) and the second intervention (B2), a W value of 0 was observed, showing that well-being improved for all participants following the second intervention. Similar to PTSD changes, this increase in well-being was not statistically significant (p-value = 0.0625), despite visible clinical improvement.

The Wilcoxon Signed-Rank Test results across all comparisons showed that each participant exhibited similar changes in both PTSD and well-being. Clinically, this is a positive indication that sand tray therapy produced consistent outcomes across all subjects. The p-value of 0.0625 suggests that the results did not reach statistical significance at the $p<0.05$ threshold, likely due to the small sample size, which limited the statistical power needed to detect significant differences.

Cohen′s d was subsequently used to assess the effect size of the changes between phases. For the comparison between the initial baseline (A1) and the first intervention (B1), results show a very large effect size for the reduction in PTSD symptoms during the first intervention compared to the initial baseline (d = 7.52). This reduction in PTSD symptoms was clinically significant, although not statistically significant. In the comparison between the first intervention (B1) and the second baseline (A2), the results indicating a substantial effect when participants returned to the second baseline (A2) after the cessation of the first intervention (d = −6.37). The negative value reflects a significant increase in PTSD symptoms, though it is important to note that the symptoms did not return to the initial baseline level (A1), suggesting residual benefits from the intervention. For well-being, the comparison between the initial baseline (A1) and the first intervention (B1) signifying a very large effect size and a clinically significant improvement in well-being during the first intervention (d = −11.62). In the comparison between the first intervention (B1) and the second baseline (A2), the results show a large effect size for the decline in well-being from the first intervention to the second baseline (d = 6.33), indicating that participants' well-being decreased after the intervention ceased. Despite this decline, well-being levels remained higher than the initial baseline. Similarly, a large increase in well-being was observed during the second intervention, demonstrating that the

intervention was not only effective in reducing PTSD symptoms but also in enhancing subjects' psychological well-being upon repetition.

While the Wilcoxon Signed-Rank Test results were not statistically significant, Cohen′s d values indicated that the changes between phases were clinically significant (d > 0.8). The very large effect sizes across all comparisons suggest that the changes in PTSD symptoms and well-being had a substantial impact on subjects′ lives. The reduction in PTSD symptoms during both the first (B1) and second interventions (B2) highlights the effectiveness of sand tray therapy in alleviating PTSD symptoms. This effect was not only large in the first intervention but was also well replicated in the second intervention. Additionally, the improvement in well-being during both the first (B1) and second interventions (B2) demonstrates that the intervention also contributed to enhancing subjects′ psychological well-being, which is a critical aspect of their overall recovery from PTSD symptoms.

Discussion

The findings of this study indicate that sand tray therapy has a clinically significant positive effect in reducing PTSD symptoms and enhancing psychological well-being. The large effect sizes support the conclusion that the observed changes were meaningful for the participants' lives. Significant changes between phases were evident through the reduction of PTSD symptoms and the improvement in well-being during the intervention phases, as well as the recurrence of PTSD symptoms and decline in well-being after the intervention was discontinued. This suggests that sand tray therapy is effective in alleviating PTSD symptoms and improving psychological well-being, with the effects being reproducible in the second intervention. Additionally, when it comes to effect sizes, we can compare the effect sizes of Sand Tray Therapy studies with other interventions, such as Trauma-Focused Cognitive Behavioral Therapy (TF-CBT), to see how effective each approach is in reducing trauma symptoms based on the literature. TF-CBT effect sizes are consistently large, with Cohen′s d ranging from 0.80 – 1.40 for reductions in PTSD, anxiety, and depression. TF-CBT′s strengths are its clear structure, evidence-based protocol, and extensive training available. Sand Tray Therapy Effect sizes vary, but are generally medium to large, with Cohen′s d often in the range of 0.50 – 0.80, depending on the population and implementation method. Sand Tray Therapy is more suitable for children who have difficulty expressing themselves verbally (e.g., post-traumatic or with language barriers). Therefore, Sand Tray is sometimes used can be considered as a complement or initial approach before TF-CBT, especially in populations with resistance to conventional therapy.

Although the changes were not statistically significant, the consistent patterns across phases demonstrate important clinical significance. In this study, clinical significance was not solely based on statistical metrics such as p-values, but rather on the real and practically meaningful changes experienced by the participants. This includes reductions in PTSD scores, improvements in well-being, and participants′ enhanced ability to function better in their daily lives. These outcomes underscore that sand tray therapy produced clinically relevant improvements in the participants' conditions.

The results suggest that sand tray therapy is a promising intervention for treating PTSD in children and adolescents. This is consistent with previous studies that recommend sand tray therapy as a suitable approach for young populations affected by trauma, offering a safe space for them to explore and express complex emotions and memories (Parker & Cade, 2018; Stone, 2024). Sand tray therapy has also proven effective for children who are victims of violence, significantly improving their psychological well-being after the intervention (Doyle & Magor-Blatch, 2017; Eberts & Homeyer, 2015; Fleet et al., 2023; Lytje & Holliday, 2022; Ramsey, 2014; Sangganjanavanich & Magnuson, 2011). Sand tray therapy provides a multifaceted approach, allowing children and adolescents with PTSD to express and process their emotions through a non-verbal, safe, and engaging medium that facilitates the exploration and reconstruction of their traumatic experiences (Knoetze, 2013; Tornero & Capella, 2017).

Sand tray therapy has been compared to various psychotherapeutic approaches, such as Cognitive Behavioral Therapy (CBT), trauma-focused CBT (TF-CBT), Eye Movement Desensitization and Reprocessing (EMDR), and play therapy, in the context of PTSD interventions for children and adolescents (Draper et al., 2003; Eberts & Homeyer, 2015; Grayson, 2023; Syakirin et al., 2019). While TF-CBT is considered the most effective and widely used method for treating PTSD in this population, sand tray therapy has also shown short-term effectiveness in reducing PTSD symptoms in children and adolescents (Gkintoni et al., 2024). Recent innovations in sand tray therapy, such as multi-touch table (MTT)-based sand trays, offer new ways to diagnose and treat participants, enhancing the therapeutic process (Lee & Son, 2018).

This study has certain limitations, notably the small sample size, which affected the statistical significance of the results and limited the generalizability of the findings. Additionally, the duration of each phase was relatively short, which may not have been sufficient to evaluate the long-term impact of sand tray therapy. Future research is recommended to replicate this study with a larger sample size and to incorporate follow-up phases to assess the long-term effects of sand tray therapy.

Conclusion

This study highlighted that sand tray therapy is an effective method for addressing trauma, particularly in children and adolescents with PTSD symptoms. The findings also noted the positive impact of art-based therapies, including sand tray therapy, on enhancing psychological well-being. However, while the results were not statistically significant, the consistent patterns observed suggest that sand tray therapy holds promise as an effective approach for trauma-exposed children and adolescents. Further research with more rigorous designs and larger sample sizes is needed to substantiate these findings.

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