

Effects of Sensory Integration Therapy with Sibling on Play Level and Time for Children with Disabilities

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Abstract

Purpose : There is a lack of research on this field in the Republic of Korea, especially those that have seen the effect of interaction between siblings through sensory integration therapy (SIT). Therefore, this study sought to find out the effectiveness of SIT with siblings through the Revised Knox Preschool Play Scale (RKPPS) and playtime.

Methods : The experimental group consisted of 10 disabled children, and 10 normal siblings of the disabilities joined the program as a helper. In addition, 10 children with disabilities conducted the intervention as a control group. The difference between the experimental group and the control group is whether they participate with their sibling or not during the intervention period. The present study was conducted a SIT for 40 minutes per week for the experimental and the control group and then had 10 minutes of an interview with the parents of children with disabilities. A total of 10 programs were implemented for 10 weeks.

Results : The experimental group showed statistically significant differences in space management, material management, pretense/symbolic, participation, and total scores. The control group showed significant differences between pre and post results in the participation and the total scores. The experimental group and the control group showed significant differences in the pre-post comparison results. The comparison of post-intervention between both groups of the RKPPS and playtime results showed a statistically significant increase in the experimental group.

Conclusion : The sibling SIT showed better play level and time than the individual therapy. However, comparisons before and after the intervention in the level of play showed significant results only in participation and total scores in the control group. Clinically, it is recommended to make good use of sibling relationships when applying SIT, and if that is not possible, continuous observation is needed that children who received treatment become familiar with the environment in which they can be treated.

Key Words : play level, playtime, revised knox preschool play scale, sensory integration therapy, sibling

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I. Introduction

The beginning of human relationships is born in the family, and it is the brotherhood that accounts for an important part. These siblings have affected both positive and negative effects on relationship building. Especially for children with disabilities, sibling relationships have a greater impact. For example, a self-reported study found that children with autism spectrum disorder (ASD) might suffer from sibling relationships, resulting in psychosocial difficulties (Toseeb et al., 2020). On the contrary, good sibling relationships have a positive effect on children's growth and social life.

Ayres' Sensory Integration Therapy (SIT) is the most frequently used treatment in pediatric occupational therapy (Schoen et al., 2019). One area in which this treatment is used is the ASD. According to one Internet survey, the approaching was the third most described treatment (Green et al., 2006; Iwanaga et al., 2014). SIT is a neurological process for sensory information, and when problems arise in this area, purposeful behaviors are hindered (Pfeiffer et al., 2011; Schaaf & Miller, 2005; Watling & Dietz, 2007).

Play is essential in preschool because it stimulates cognitive, emotional, language, physical, sensory, and social development (Lifter et al., 2011). To be more specific, it enables understanding and assimilation of culture. Furthermore, learning, and problem-solving from the play are making the integration of environmental information, the composition of mental expressions, and the flexibility of thinking. Playful activities connect and bond among participants even if this is only short time (Sposito et al., 2019). Through the play, the child can communicate anxiety, fear, gain control of the situation, and experience other emotions such as joy, success, and frustration; these are various experiences that will help the structure of the personality (Gariépy & Howe, 2003). This play prepares children for their future work by increasing attention, stimulating self-esteem, and helping them develop their

relationship of trust. It will have a more positive effect if children have a colleague when they participate in the play together.

As play is very important and relates to child development, it is possible to measure the stage of development of a child by applying a play assessment tool (Case-Smith & O'Brien, 2010). What this means is that if there are standardized tools for evaluating play, the most effective treatment can be selected or monitored for children. One of the best tools is the Revised Knox Preschool Play Scale (RKPPS). The RKPPS is highly reliable because it has been evaluated on a variety of children and modified based on the results (Howard, 1986; Kielhofner et al., 1983; Morrison et al., 1991; Restall & Magill-Evans, 1994). However, there is a lack of research on this field in the Republic of Korea, especially those that have seen the effect of interaction between siblings through SIT. Therefore, this study sought to find out the effectiveness of the sibling SIT through RKPPS and playtime.

II. Methods

1. Study participants and design

The study had a total of 20 participants. The experimental group consisted of 10 disabled children, and 10 normal siblings of the disabilities joined all the programs at the same SIT room as a helper. In addition, 10 children with disabilities conducted the intervention as a control group. The difference between the experimental group and the control group is whether they participate with their sibling or not during the intervention period. The criteria for selection of research subjects are as follows. First, all subjects were preschoolers, ages 3~7. Second, they were disabled children using a child development center for the treatment. Third, all participants in the study should

have their siblings. Fourth, the children involved in the study received parental consent. The general characteristics are as follows (Table 1). Prior to participation in the study, the purpose of the study and its process were explained to the child's primary caregiver and signed a consent form. Prior to starting the experiment, all research procedures were approved by the institutional review board of Woosong University (IRB No. 1041549-160412-SB-27).

Since the study subjects were selected, the experimental and the control groups were randomly allocated according to the order of study registration. RKPPS and playtime with sibling interaction were measured before and after intervention. Both the experimental and the control group conducted in situations where disabled children, and their non-disabled siblings were in the same place in order to equalize the measurement environment.

Table 1. General characteristics of the subjects

(n=20)

		Experimental (n=10)	Control (n=10)
Gender	Male	6	6
	Female	4	4
Age	Months	54.8±10.48	55.8±16.71
ASD		7	6
ADHD		1	0
Auditory disorder		1	2
Mental retardations		0	1
Other		1	1

ASD; autism spectrum disorder

2. Sensory integration therapy with sibling

The research place was a SIT room in a child development center. Present study was conducted a SIT for 40 minutes per week for the experimental and the control group and then had 10 minutes of an interview with the parents of children with disabilities. A total of 10 programs were implemented for 10 weeks. The intervention program provided a selection of plays according to the neurological needs of each child based upon the theory of SIT. The main sensory activities were vestibular-proprioceptive, proprioceptive-vestibular, tactile-proprioceptive-vestibular, and tactile-fine motor. Before and at the end of all programs, researchers wrote the RKPPS and checked playtime while all participants enjoyed the play without disturbance.

3. Measure tools and method

1) Revised knox preschool play scale; RKPPS

The RKPPS was used to evaluate the level of play in children. This tool has used a lot to evaluate play in the domestic occupational therapy field, and according to a prior research, 30 out of 32 therapists used the RKPPS and 2 used test of playfulness (Lee et al., 2018). The interrater ($r=.88$, $p=.0001$) and test-retest reliability ($r=.91$, $p=.0001$) of this measurement tool were very high (Harrison & Kielhofner, 1986). This assessment is evaluated by observing the play of children aged 0 to 6 in a natural environment. The scale is measured every six months from 0 to three years of age, and one-year intervals from three-six years of age, and is examined for four dimensions: space management, material management, pretense/symbolic, and participation.

Spatial management includes gross motor and interest as subtopics, seeing how children use the space and body that surrounds them. Material management includes items such as manipulation, construction, purpose, and attention to see if the materials in the surrounding environment are dealt with by a child and used for the intended purpose. The pretense/symbolic includes imitation and dramatization as sub-items, looking for the way children learn from the world through imitation and the ability to separate and understand reality through impersonation. Participation refers to the amount and manner of social interactions in children and includes type, cooperation, humor, and language as sub-categories. The overall age of play is calculated from the average of each dimension score, and the dimension score is determined by the average of each sub-item.

2) Playtime with sibling interaction

The place of measurement was a group therapy room in the children's development center, where various rides and mats for children's age were installed. All groups were evaluated at the same place. In this study, children with disabilities and non-disabled siblings were allowed to perform indoor free play activities for 50 minutes to measure playtime, and a researcher could measure the time when interactions were conducted and maintained during observation. One researcher observed all groups so that time could be measured in a consistent manner. A brief sketch, photography, and video shooting were performed by the researcher. The main situation and interaction between the brothers were recorded during the observation time.

The time measurement method used a 10-second partial interval recording method with an 8-second observation/2-second writing. The playtime was calculated when interactions were attempted to measure observations of sibling social interactions, positive response behaviors (i.e., response, laughter) appeared within 5 seconds of the start action, and the interactions that occurred in the

previous observation (10 seconds) persisted in the following observation interval (Lee & Lee, 2005). The definition of sibling interaction behavior has been revised and used in accordance with this study with some modifications referring to the Shin (2015).

4. Statistical analysis

This study used SPSS version 25.0 (Statistical Package for the Social Sciences; IBM Co., Armonk, NY, USA) for all data for statistical analysis. The general characteristics of the subjects in the study were calculated through descriptive statistics. The data in this study applied nonparametric statistical methods based on normality test results. Wilcoxon signed-rank test was conducted to determine the statistical significance of the RKPPS pre and post results of all subjects. The current study was performed Mann-Whitney U test for the analysis of differences (i.e., (post-pre) values) between the experimental and the control group after the intervention. Alpha value of the significance level was set to 0.05.

III. Results

1. An improvement in the level of play

The comparison results of pre and post of the RKPPS in the experimental group and the control group are as follows. The experimental group showed statistically significant differences in space management, material management, pretense/symbolic, participation, and total scores ($p < .05$). The control group showed significant differences between pre and post results in the participation and the total scores ($p < .05$). The comparison of post-intervention between both groups of all the RKPPS results showed a statistically significant increase in the experimental group ($p < .05$)(Table 2).

2. Playtime with the interaction

The results are as follows for measuring and comparing playtime with the interaction between experimental and control groups. The experimental group and the control

group showed significant differences in the pre-post comparison results ($p < .05$). The comparison of post-intervention between both groups of playtime results showed a statistically significant increase in the experimental group ($p < .05$) (Table 3).

Table 2. Comparison of the improvement of play levels in the experimental and the control groups ($n=20$)

Dimensions	Group	Pre Mean [#] (SD)	Post Mean (SD)	Pre-post difference [*]		Between groups differences ^{*,†}	
				Z	p	Z	p
Space management	Experimental	29.7 (14.63)	39.9 (15.45)	-2.673	.008 [*]	-2.320	.020 [*]
	Control	46.2 (17.41)	49.5 (15.94)	-1.524	.128		
Material management	Experimental	30.5 (18.22)	39.4 (13.53)	-2.842	.004 [*]	-3.100	.002 [*]
	Control	46.1 (17.71)	47.0 (16.79)	-1.134	.257		
Pretense/symbolic	Experimental	29.2 (18.47)	34.8 (15.37)	-2.561	.010 [*]	-2.188	.029 [*]
	Control	45.3 (16.63)	45.2 (16.19)	.000	1.000		
Participation	Experimental	24.0 (10.89)	35.9 (10.29)	-2.825	.005 [*]	-2.095	.036 [*]
	Control	33.2 (17.28)	39.9 (15.91)	-2.366	.018 [*]		
Total scores	Experimental	28.35 (15.09)	37.50 (13.34)	-2.820	.005 [*]	-3.455	.001 [*]
	Control	42.70 (16.01)	45.40 (15.72)	-2.176	.030 [*]		

* $p < .05$, [#]play age in month, ^{*}performed by Wilcoxon signed-rank test, ^{*}analyzed by Mann-Whitney U test, [†]comparison of differences (i.e., (post-pre) values) between both groups after the intervention, SD; standard deviation

Table 3. Comparison of the playtime improvement in the experimental and the control group ($n=20$)

Group	Pre Mean [#] (SD)	Post Mean (SD)	Pre-post difference [*]		Between groups differences ^{*,†}	
			Z	p	Z	p
Experimental	3.90 (2.95)	10.05 (5.07)	-2.668	.008 [*]	-2.153	.031 [*]
Control	3.60 (3.44)	5.10 (3.25)	-2.020	.043 [*]		

* $p < .05$, [#]second, ^{*}performed by Wilcoxon signed-rank test, ^{*}analyzed by Mann-Whitney U test, [†]comparison of differences (i.e., (post-pre) values) between both groups after the intervention, SD; standard deviation

IV. Discussion

After the intervention, we compared the changes to the

age of play development with the RKPPS and found that the experimental (sibling SIT) group was effective in terms of space management, material management, pretense/symbolic, participation and total scores. This is consistent with the

study by Hong and Kim (2009) that children could focus on more toys and play creatively during free play time after applying group SIT. It is also similar to the result that children who stayed at the level of play alone without interaction before applying the program could play parallel games, exchange toys, and play combined games or competitive games for a short time. A study conducted by Lee (2013) on the group SIT in children with autism showed similar results that this significantly improved in the area of post-intervention play behavior (single-active play behavior). Authors are assumed that the experimental group was effective compared to the control group in a relatively short period of time because the sibling group SIT was more productive than the individual therapy. This is because the experimental group showed statistically significant differences in more parts between pre and post comparisons. Specifically, the authors think that when they start SIT with peers who are not familiar with each other, they will have to spend more time adapting to treatment and getting used to play in the beginning because of their awkwardness. On the other hand, this study seems to have shown a significant intervention effect even though it was a short time, due to the brief time it took to adapt to the initial intervention by proceeding with the program with the familiar playmates, siblings.

The control (individual SIT) group showed improved results only in the participation area and the total scores. This is a different result from what the authors initially expected. The initial expectation was that it has significant effects in both groups in play, but more effective in the siblings group SIT. It is an interesting result that the experimental group showed a significant increase in all items in the comparison of differences (post-pre) in values of change after sibling SIT intervention, although the control showed significant effects only in two items. The authors still do not know the exact reason. The authors tried to infer the following reasons. First, the RKPPS scores of the experimental group were lower compared to the control group when viewed as a whole. We might infer that

better results from SIT at relatively low mean values could be more easily produced. Second, there is a difference in the composition of the experienced disease by the children in this study. Of course, the authors acknowledged that there were realistic limitations to recruiting subjects and that the difference could affect the outcome of this study. We recommend conducting research that corrects and complements the limitations of this study in future studies. Second, even if the original version of RKPPS has high reliability and validity, it seems necessary to investigate the Korean version's reliability and validity and cross-cultural adaptation. Previous research supports this point that 52 (45.6 %) in a study, involving total 105 occupational therapists for children mentioned the need for standardized play assessment tools, despite the presence of domestic use assessment tools. In addition, only 32 of the therapists used tools to evaluate the play, 30 of whom used the RKPPS. These results suggest that there is no other alternative to play evaluation in South Korea, and as a result, the frequency of use of play evaluation seems to be low (Lee et al., 2018; Lee & Park, 2017). However, authors think it is meaningful that the results of this study showed significant effects in four aspects such as space management, material management, pretense/symbolic, and participation. In addition, this study demonstrates that sibling SIT is more effective than individual therapy after the intervention.

Interactive playtime increased in the individual SIT group and sibling group, and the comparison of the variation between the two groups made it clearer that sibling SIT was more effective. This is similar to the fact that sibling-friendly group SIT and interviews with the primary caregiver showed positive changes in sibling, peer relationships and play skills (Ryu et al., 2021). We believe these results are meaningful in that the RKPPS values complement better understanding the positive effects of this study even though it had a limitation. The limitations of this study are as follows. First, the RKPPS is the most used tool for evaluating play in South Korea, but there is

something lacking to fully display the current situation. Therefore, more standardized play assessment tools need to be developed continuously. Second, it is necessary to check various indicators as well as play to determine the effectiveness of sibling SIT more accurately. Third, it is necessary to prove it through more samples because it is the result of research in one region of Republic of Korea.

V. Conclusion

The sibling SIT showed better play level and time than the individual therapy. However, comparisons before and after the intervention in the level of play showed significant results only in participation and total scores in the control group. Clinically, it is recommended to make good use of sibling relationships when applying SIT, and if that is not possible, continuous observation is needed that children who received treatment become familiar with the environment in which they can be treated. The authors recommend the research to the Korean version of RKPPS for reliability, validity, and cross-cultural adaptation. In addition, continuous interest and education in SIT are needed in other fields such as physical therapy as well as occupational therapy.

References

- Gariépy N, Howe N(2003). The therapeutic power of play: examining the play of young children with leukaemia. *Child Care Health Dev*, 29(6), 523-537. <https://doi.org/10.1046/j.1365-2214.2003.00372.x>.
- Green VA, Pituch KA, Itchon J, et al(2006). Internet survey of treatments used by parents of children with autism. *Res Dev Disabil*, 27(1), 70-84. <https://doi.org/10.1016/j.ridd.2004.12.002>.
- Harrison H, Kielhofner G(1986). Examining reliability and validity of the Preschool Play Scale with handicapped children. *Am J Occup Ther*, 40(3), 167-173. <https://doi.org/10.5014/ajot.40.3.167>.
- Hong EK, Kim KM(2009). The effect of group sensory integrative intervention for play skill and social interaction. *J Korean Acad Sensory Integr*, 7(1), 13-25.
- Howard AC(1986). Developmental play ages of physically abused and nonabused children. *Am J Occup Ther*, 40(10), 691-695. <https://doi.org/10.5014/ajot.40.10.691>.
- Iwanaga R, Honda S, Nakane H, et al(2014). Pilot study: efficacy of sensory integration therapy for Japanese children with high-functioning autism spectrum disorder. *Occup Ther Int*, 21(1), 4-11. <https://doi.org/10.1002/oti.1357>.
- Kielhofner G, Barris R, Bauer D, et al(1983). A comparison of play behavior in nonhospitalized and hospitalized children. *Am J Occup Ther*, 37(5), 305-312. <https://doi.org/10.5014/ajot.37.5.305>.
- Lee SH, Hong CR, Park HY(2018). Current trend in use of occupational therapy assessment tool by pediatric occupational therapist. *J Korean Acad Sensory Integr*, 16(3), 23-33. <https://doi.org/10.18064/JKASI.2018.16.3.023>.
- Lee SH, Park HY(2017). Occupational therapy intervention for improving play of children: a systematic review. *J Korean Acad Sensory Integr*, 15(2), 93-106. <https://doi.org/10.18064/JKASI.2017.15.2.093>.
- Lee SJ, Lee SH(2005). The effects of social initiation intervention using the activity-skill matrix on the interactions of young children with development delays with their peers. *J Emot Behav Disord*, 21(2), 213-237.
- Lee SY(2013). The impact of group sensory integrative intervention for motor skills and play behaviors of the children with autism spectrum disorder. Graduate school of Daegu University, Republic of Korea, Master's thesis.
- Lifter K, Foster-Sanda S, Arzamarski C, et al(2011). Overview of play: its uses and importance in early intervention/early childhood special education. *Infants & Young Children*, 24(3), 225-245. <https://doi.org/10.1097/IYC.0b013e31821e995c>.
- Morrison CD, Bundy AC, Fisher AG(1991). The contribution

- of motor skills and playfulness to the play performance of preschoolers. *Am J Occup Ther*, 45(8), 687-694. <https://doi.org/10.5014/ajot.45.8.687>.
- Pfeiffer BA, Koenig K, Kinnealey M, et al(2011). Effectiveness of sensory integration interventions in children with autism spectrum disorders: a pilot study. *Am J Occup Ther*, 65(1), 76-85. <https://doi.org/10.5014/ajot.2011.09205>.
- Restall G, Magill-Evans J(1994). Play and preschool children with autism. *Am J Occup Ther*, 48(2), 113-120. <https://doi.org/10.5014/ajot.48.2.113>.
- Case-Smith J, O'Brien JC(2010). Occupational therapy for children. 6th ed, St. Louise, Mosby, pp.216-243.
- Ryu JS, Kong MJ, Kim KJ(2021). Effects of sense integration therapy for siblings on children with disabilities: focusing on the observation of quality changes through interview with their primary caregiver. *Korean J Neuromuscul Rehabil*, 11(1), 1-7. <https://doi.org/10.37851/kjnr.2021.11.1.1>.
- Schaaf RC, Miller LJ(2005). Occupational therapy using a sensory integrative approach for children with developmental disabilities. *Ment Retard Dev Disabil Res Rev*, 11(2), 143-148. <https://doi.org/10.1002/mrdd.20067>.
- Schoen SA, Lane SJ, Mailloux Z, et al(2019). A systematic review of Ayres sensory integration intervention for children with autism. *Autism Res*, 12(1), 6-19. <https://doi.org/10.1002/aur.2046>.
- Shin JA(2015). A case study of art therapy by cooperational activities to improve interaction with siblings. Graduate school of Daegu University, Republic of Korea, Master's thesis.
- Sposito AMP, Santos JLF, Pfeifer LI(2019). Validation of the Revised Knox Preschool Play Scale for the Brazilian population. *Occup Ther Int*, Printed Online. <https://doi.org/10.1155/2019/6397425>.
- Toseeb U, McChesney G, Oldfield J, et al(2020). Sibling bullying in middle childhood is associated with psychosocial difficulties in early adolescence: the case of individuals with autism spectrum disorder. *J Autism Dev Disord*, 50(5), 1457-1469. <https://doi.org/10.1007/s10803-019-04116-8>.
- Watling RL, Dietz J(2007). Immediate effect of Ayres's sensory integration-based occupational therapy intervention on children with autism spectrum disorders. *Am J Occup Ther*, 61(5), 574-583. <https://doi.org/10.5014/ajot.61.5.574>.