

REVIEW ARTICLE

A Systematic Review On Effectiveness of Sensory Integration Intervention in Reducing Self-Injurious Behavior Among Children with Autism

Fatin Nur Afiqah Zulkifli, Masne Kadar, Akehsan Dahlan

Centre of Occupational Therapy Studies, Faculty of Health Sciences, Universiti Teknologi MARA (UiTM), Kampus Puncak Alam, 42300 Bandar Puncak Alam, Selangor, Malaysia

Abstract:

Children with Autism spectrum disorder (ASD) are common to have a self-injurious behavior compared to the other neurodevelopmental disabilities. These behaviors may cause the child to engage in a behavior that cause physical harms such as head banging or self-biting. Previous reviews examined the effects of sensory integration interventions comparing with other intervention such as behavior intervention. This systematic review examined the research evidence from 2009 to 2018. A total of 4 studies were reviewed: 2 examined the effects of sensory integration therapy compared to behavior intervention and other 2 are the effect of using sensory integration. Only 1 positive effects were found in reducing self-injurious behavior meanwhile the other three studies may show lack of evidence due to the limitation of the study itself such as use of single clinical site and small sample size.

Keywords: Autism, behavior, sensory integration

*Corresponding Author

Akhesan Dahlan, PhD
akhesan@uitm.edu.my

1. INTRODUCTION

Self-injurious behavior (SIB) include several repetitive and rhythmic behaviors, such as arm biting, head banging, and hair pulling, that may happen without any obvious intent of willful self-harm but may cause to the significant risk of harm to self. The causes of SIB are remained unknown, and most likely the results of the behavior are from interactions between biological (e.g. genetic and somatic conditions) and environmental factors (e.g. difficulty in communication and unable to interact with others). Furthermore, those with diagnosed of developmental disabilities such as Autism may serve different functions of the behavior, such as communication, social interaction, and self-regulation [15].

Children with Autism see the world differently from others due to difficulties on their sensory systems such as inadequate of the sensory processing and sensory modulation in their body. Previous studies supported on the behaviour problem are due to the sensory related behaviours that help them to cope with their sensory environment by either seeking or avoiding sensory stimuli from the environment around them. Among the behavioral disorders observed in child with Autism, self-injurious behavior is one of the most distressing [12]. Prevalence estimates for self-injury range 33% to 71% in autism spectrum disorder (ASD) [11]. The most common forms of these behaviors include: head-banging, hand-biting, and excessive self-rubbing and scratching, body rocking, jumping, running etc. Result of a survey conducted to the occupational therapist working with

children with ASD has reported that most of them are using sensory integration therapy while doing the session (Henderson, 2013). The focus of this systematic review is to review on the effectiveness of the sensory integration intervention in reducing self-injurious behavior among children with ASD.

2. METHODOLOGY

Several strategies were used to identify studies for this review. A computerized search of references publishes between 2009 until 2018 was conducted by using the following electronic databases. Literature was reviewed from multiple databases such as Google Scholar, PubMed, ScienceDirect and Wiley Online Library. The reference listed from identified articles, systematic reviews and practical guidelines for sensory integration were search in details to ensure that the article is relevant to be considered as in inclusion.

Various combinations of the following key words and search terms were used to identify specific article such as sensory integration, autism, self-injurious behavior, occupational therapy, challenging behavior. The inclusion criteria of this systematic review were as follows (a) participants who aged from 3 until 12 years old (b) address effectiveness of sensory integration on self-injurious behavior (c) diagnosed with Autism. A total of 1300 of references were identified during the first process. Based on the title and inclusion criteria,

1296 articles were excluded. Only 4 studies were selected for the full text review.

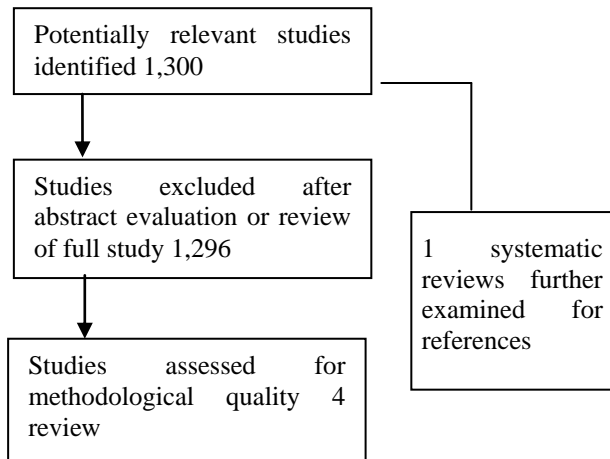


Figure 1 Flowchart of detailing stages of systematic

Study	Design	Population	Sample size
Sankar et al. (2015)	Randomized control trial	Students with Autism from special school in Chennai	10
Davis et al (2013)	Case report	Boy with Autism	1
Devlin et al (2011)	Single subject experimental study	Boys with Autism	4
Devlin et al (2009)	Single subject experimental study	Boy with Autism	1

Table 1: Description of the studies

Study	Intervention	Measures	Frequency of intervention	Outcomes
Sankar et al., (2015)	-Experiment group: Sensory integration intervention -Control group: tabletop activities	Short Sensory Profile (SSP)	Intervention program: 4 weeks, 5 days in a week in 30 minutes duration.	Sensory integration therapy activities is effective to reduce self-stimulating and self-injurious behaviors
Davis et al., (2013)	-Experiment: Weighted vest phases -Control: No vest	-10s partial-interval procedure -Inter observer agreement.	-4h of vest wear prior to beginning data collection. -Five sessions were conducted per day in 6 weeks	Use of a weighted vest does not lead to decreases in challenging behavior
Devlin et al., (2011)	-Sensory integration intervention -Behavioral intervention	-Daily Frequency of Challenging Behavior -Behavioral Function Measures -Stress Measure	-Sensory integration: 15 minutes (approx. 6 times a day) -Behavioral intervention: exposed to five conditions (demand, attention, access to tangible items, alone and play) each presented during 10 min sessions	The behavioral intervention was more effective in reducing levels of challenging behavior than the sensory integration therapy
Devlin et al., (2009)	-Sensory integration intervention -Behavioral intervention	-10s partial-interval recording system -Inter observer agreement	-Sensory integration: applied every 2h for a 30-min period -Behavioral intervention: exposed to five conditions (demand, attention, access to tangible item and play) each presented during 10 min sessions	The behavioral intervention was more effective in reducing levels of self-injury behavior than the sensory-based intervention.

3. RESULT

Findings from the article, the researcher found a total of four studies published since 2009 until 2018 that met the inclusion criteria. All the four studies examined the effectiveness of sensory integration on reducing self-injurious behavior among children with Autism. Findings from this systematic review of this studies were summarized as shown in Table 1 and 2. Description of all the studies is described on the Table 1, meanwhile result of the studies reviewed is on Table 2. Findings were produced in terms of type of intervention, measures and effects on targeted outcomes. Overall, all four studies were assessed from the same methodological quality, as all of his studies are quantitative research studies; only one is randomized control trial (RCT), one case report and others are single subject experimental study.

3.1. Sensory Integration Intervention

Only one studies using a randomized controlled trial (RCT), meanwhile others were case report and single subject experimental design. Two studies compared the effects of sensory-integration techniques and behavioral interventions, one studies compared sensory integration with table top activities, and one compared the effects of long-term wear of a weighted vest. All of the four studies used participants with ASD. RCT result from one studies that compared between sensory integration and tabletop activities suggest that sensory integration intervention shows a positive effect on reducing self-stimulating and self-injurious behavior among the children with Autism based on the teacher rating found in experimental group compared to control group. It shows that there was positive correlation between investigators observation of self-stimulating and self-injurious behavior and teacher rating. This study support that the sensory integration intervention was effective to be done in the school setting which may help the ASD student to function and participate in classroom activities. Sensory integration in a school based setting can be a feasible strategy if the person in charge from the school administrators are supportive and willingly to give space and resources for specialized equipment. However, occupational therapist is still needed to supervise the utilization of these resources (N Young & Furgal, 2016).

In the nonrandomized sensory integration trial conducted from Devlin et al, published on 2009 and 2011, children with ASD who addressed with self-injurious and self-stimulating behaviors received alternating SIT and behavioral intervention conditions. The study result shows that the behavioral intervention was more effective in reducing levels of challenging behavior than the sensory integration intervention for all the participants. All the participants are exposed to four items which were demand, attention, access to tangible item and play. The conditions were designed to look like real-life consequences that were provided following the incidence of the SIB [16]. The researcher added on another condition which was alone in his studies conducted on 2011 that make the condition were five. The study was conducted in the format of an alternating treatments design with initial baseline and final best treatment phase. Sensory integration intervention and the behavioral interventions were being done alternately during daily sessions. For the

latest study conducted on 2011, the researcher gathered all the saliva sample of the participants during the duration of the alternating treatment phase in order to measure the cortisol level that may indicate responsivity of the stress level during each of the conditions when being presented.

Case report study done, examining on the effects of long-term wear of a weighted vest on the aggressive and self-injurious behavior of a young boy with autism [2]. As supported by the previous studies, one of the popular sensory integration intervention is the use of weighted vests [9]. The percentage of intervals in which challenging behavior occurred while wearing the vest or not was calculated by dividing the number of intervals with challenging behavior by the total number of intervals and multiplied by 100 to report a percentage. Within each phase, alternating conditions of a functional analysis were conducted. The functional analysis was conducted in a manner similar to that described by Iwata [8]. The function was consisted of five conditions, attention, demand, tangible, play, and alone. Results suggest that the weighted vest had no effect on the challenging behaviors. This is also been supported and mentioned brushing, as one of sensory integration intervention did not have an effect on stereotypical behaviors [2].

4 CONCLUSION

The results of this systematic review were that sensory integration intervention had no consistently positive effect as a treatment for children with ASD. Although sensory experiences may be fun or motivating, the widespread use by occupational therapists of the approach to reduce self-injurious behavior is not strongly supported by evidence.

In order to reduce the self-injurious behavior, any intervention must be identifying the functions of the behavior [8]. Once the function of the behavior has been determined, the therapist will identify any possible strategies that may help the child to cope or prevent from the behavior from occurring. These functions are attention, demand, tangible, play, and alone. Early intervention is important in order to prevent from increasing damaging behavior that may occurred with child with ASD as SIB is one of the major concern for the population of children with ASD. Initial step in preventing the harmful behavior is by identify it functions. Functional behavior assessment and analysis must be done in order to determine function of SIB and to guide on the individualized intervention strategies for children. Any intervention should examine the relationship between antecedents, behaviors, and consequences toward the individual itself.

Limitation of this review is that the effectiveness of this sensory integration intervention is only conducted by a small number of studies only. Lack of power due to small sample sizes, bias due to the inclusion of children from clinical samples, and limited external validity of the findings are some of the limitations of past studies [6]. Thus, these findings may not be able to generalize to communities that were not included in this study. Large studies that examine SIB in children with ASD are needed from educational as well as clinical settings. Only study included in the

systematic review is randomized controlled trial meanwhile the others are case report and single subject experimental studies. Future studies are needed to explore in the following areas such as larger sample size in order to has a significant results and to examine the result of sensory integration intervention for quite longer period in order to ensure for a better positive behavior and also to reduce self-injurious behaviors. This is because most of the studies conducted in less than 6 weeks, and to compare with the result of the previous studies, it shows that longer intervention done may influence on the positive results as mentioned by Case Smith and Bryan in their study that the results was better when the intervention conducted was more than 10 weeks (Case-smith & Bryan, 1999).

ACKNOWLEDGEMENT

Thank you to the Most Gracious Allah SWT for giving me a good health, strength and times in completing my research project.

Lastly, thanks to my parents for giving me utmost support, the participants, family members and my friends

REFERENCES

- [1] Case-smith, J., & Bryan, T. (1999). Jane Case-Smith, Teresa Bryan Key Words: child development disorders, pervasive • interpersonal relations • play therapy. *American Journal of Occupational Therapy*, 53, 489–497.
- [2] Davis, T. N., Dacus, S., Strickland, E., Copeland, D., Chan, J. M., Blenden, K., ... Christian, K. (2013). The effects of a weighted vest on aggressive and self-injurious behavior in a child with autism. *Developmental Neurorehabilitation*, 16(3), 210–215. <https://doi.org/10.3109/17518423.2012.753955>
- [3] Davis, T. N., Durand, S., & Chan, J. M. (2011). The effects of a brushing procedure on stereotypical behavior. *Research in Autism Spectrum Disorders*, 5(3), 1053–1058. <https://doi.org/10.1016/j.rasd.2010.11.011>
- [4] Devlin, S., Healy, O., Leader, G., & Hughes, B. M. (2011). Comparison of behavioral intervention and sensory-integration therapy in the treatment of challenging behavior. *Journal of Autism and Developmental Disorders*, 41(10), 1303–1320. <https://doi.org/10.1007/s10803-010-1149-x>
- [5] Devlin, S., Leader, G., & Healy, O. (2009). Comparison of behavioral intervention and sensory-integration therapy in the treatment of self-injurious behavior. *Research in Autism Spectrum Disorders*, 3(1), 223–231. <https://doi.org/10.1016/j.rasd.2008.06.004>
- [6] Duerden, E. G., Oatley, H. K., Mak-Fan, K. M., McGrath, P. A., Taylor, M. J., Szatmari, P., & Roberts, S. W. (2012). Risk factors associated with self-injurious behaviors in children and adolescents with autism spectrum disorders. *Journal of Autism and Developmental Disorders*, 42(11), 2460–2470. <https://doi.org/10.1007/s10803-012-1497-9>
- [7] Henderson, L. (2013). Effectiveness of Sensory Integration Interventions in Children, 65(1), 76–85.
- [8] Iwata, B. A., Pace, G. M., Dorsey, M. F., Zarcone, J. R., Voufmer, T. R., Smith, R. G., ... Wnills, K. D. (1994). The Functions of Self-Injurious Behavior: An Experimental-Epidemiological Analysis, 2(summER), 215–240.
- [9] Lang, R., O'Reilly, M., Healy, O., Rispoli, M., Lydon, H., Streusand, W., ... Giesbers, S. (2012). Sensory integration therapy for autism spectrum disorders: A systematic review. *Research in Autism Spectrum Disorders*, 6(3), 1004–1018. <https://doi.org/10.1016/j.rasd.2012.01.006>
- [10] N Young, S., & Furgal, K. (2016). Effectiveness and Implication of Sensory Integration Therapy on School Performance of Children with Learning Disabilities. *International Journal of Neurorehabilitation*, 03(01), 10–12. <https://doi.org/10.4172/2376-0281.1000198>
- [11] Richards, C., Oliver, C., Nelson, L., & Moss, J. (2012). Self-injurious behaviour in individuals with autism spectrum disorder and intellectual disability. *Journal of Intellectual Disability Research*, 56(5), 476–489. <https://doi.org/10.1111/j.1365-2788.2012.01537.x>
- [12] Saloviita, T. (2016). The treatment of severe self-injurious behavior through sensory stimulation: A case report. *Journal of Human Sciences*, 13(3), 4126. <https://doi.org/10.14687/jhs.v13i3.4097>
- [13] Sankar, D. U. G. (2015). Effect of Sensory Integration Therapy on Self-Stimulating and Self-Injurious Behaviours in Children with Autism: A Pilot Study. *International Journal of Science and Research (IJSR)*, 4(6), 935–938. Retrieved from <https://www.ijsr.net/archive/v4i6/SUB155365.pdf>
- [14] Smith, S. a, Press, B., Koenig, K. P., & Kinnealey, M. (2005). Effects of Sensory Integration Intervention on. *American Journal of Occupational Therapy*, 59(4), 418–425. <https://doi.org/10.5014/ajot.59.4.418>
- [15] Soke, G. N., Rosenberg, S. A., Rosenberg, C. R., Vasa, R. A., Lee, L. C., & DiGuiseppi, C. (2018). Self-injurious behaviors in children with autism spectrum disorder enrolled in the Study to Explore Early Development. *Autism*, 22(5), 625–635. <https://doi.org/10.1177/1362361316689330>
- [16] Summers, J., Shahrani, A., Cali, S., D'Mello, C., Kako, M., Palikucin-Reljin, A., ... Lunsky, Y. (2017). Self-injury in autism spectrum disorder and intellectual disability: Exploring the role of reactivity to pain and sensory input. *Brain Sciences*, 7(11), 1–16. <https://doi.org/10.3390/brainsci7110140>