



**THE IMPACT OF MODIFYING LEMA (LEGO AND MAZE) GAME ON STIMMING BEHAVIORS IN CHILDREN WITH AUTISM SPECTRUM DISORDER (ASD)**

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**ABSTRACT**

Children with Autism Spectrum Disorder (ASD) often exhibit self-stimulation behaviors (stimming), such as repetitive movements, sounds, or actions, which can disrupt therapy sessions and social interactions. These behaviors can impede the development of social skills and focus. Given the importance of non-invasive interventions, modifying play-based activities such as LEGO and maze games (LEMA) has been explored as a potential method to reduce stimming behaviors. (LEMA) game on reducing self-stimulation (stimming) behaviors in children with Autism Spectrum Disorder (ASD). The research employed an A-B-A design, including a baseline phase (A1), an intervention phase (B), and a post-intervention phase (A2), conducted over 12 sessions. Two children, RFQ and HG, both of whom exhibited frequent stimming behaviors, were selected as participants. The intensity of their stimming behaviors was measured before and after the intervention using observational data. The data were analyzed using visual analysis to identify changes in the frequency and intensity of stimming behaviors across phases. Additionally, percentage of non-overlapping data (PND) was calculated to evaluate the effectiveness of the intervention data. The findings showed that stimming behaviors in both children, which originally lasted approximately 390 seconds during the baseline phase (A1), significantly decreased during the intervention phase (B), with durations reduced to 48-55 seconds. After the intervention was stopped, stimming behaviors remained reduced in the post-intervention baseline phase (A2), indicating the effectiveness of the LEMA game in reducing these behaviors. Modifying the LEGO and Maze (LEMA) game effectively reduced self-stimulation behaviors in children with ASD. The results align with previous studies suggesting that structured play interventions, like LEGO and maze activities, can enhance focus and reduce repetitive behaviors in children with ASD.

Keywords: ASD; LEGO therapy; maze games; stimming behaviors

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**INTRODUCTION**

Autism Spectrum Disorder (ASD) is a complex developmental disorder characterized by ongoing difficulties in social communication, narrow interests, and repetitive behaviors. Although autism is a lifelong condition, the level of support and services needed can differ widely among individuals. ASD generally appears before a child reaches the age of two and a half, presenting through significant delays or atypical development in communication and language skills, challenges with reciprocal social interactions, and a restricted set of interests and activities (American Psychiatric Association, 2022). Autism is a developmental disability that is usually seen before the age of two and a half years, there is a speech and language disorder characterized by delayed/deviant communication skills, reciprocal social interaction and a limited set of activities and interests (Pastari & Syukomawena, 2022).

According to the World Health Organization (WHO), approximately 1 in 100 children worldwide has ASD (WHO, 2023). In Asia rates vary significantly within Asia, but studies indicate prevalence rates of ASD are also rising in countries like China, South Korea, and Japan. Research suggests a prevalence of about 1% in East Asia, with some urban areas reporting higher rates due to increased awareness and diagnostic services (Maenner et al., 2023). The Ministry of Health Indonesia reported 5,530 cases of developmental disorders in 2020–2021, including autism, seen in children receiving care at community health centers (KEMENKES RI, 2021; Maris, 2023).

When autistic children are involved in stimming, their attention is usually completely focused on the behavior and the child is certain to be unable to process important information. Stimming in autistic children occurs when the child is bored, stressed or uncomfortable (Twistiandayani et al., 2019). When this behavior occurs with high preoccupation, the child will not be able to learn. Even so, autistic children in the learning process are quite good. One way to handle this stimming is to use game modifications (Iskandar & Indaryani, 2020). Games are a learning laboratory for children. Because, when children are involved in playing activities, they directly and indirectly learn about many things. Playing is also an activity that helps children achieve complete development, both physical, intellectual, social, moral and emotional. The therapy used in this research was the LeMa Game Modification. LeMa is a constructive game that doesn't just fill time, but attracts attention because it has different shapes and colors. Maze is also a type of puzzle in the form of a plot or path that branches and twists and turns. These two play therapies are believed to be able to train concentration, hand and eye coordination, train fine motor skills and improve social relationships in children, especially those suffering from autism ( Amalia & Fatmawati, 2023).

The potential benefits of modifying LEGO and maze (LeMa) games to address stimming behaviors in children with Autism Spectrum Disorder (ASD) can be evaluated by examining research on LEGO-based and maze-related interventions for ASD. These interventions are generally aimed at enhancing social skills, communication, and other developmental domains in children with ASD. Modifying such games may positively influence stimming behaviors—repetitive actions or sounds often used by individuals with ASD for self-regulation or expression (Ravale & Kulkarni, 2023).

**LEGO-Based Interventions:** Research has demonstrated that LEGO-based therapy can improve social interactions and communication in children with ASD. This form of therapy promotes engagement, cooperation, and teamwork, which are essential for social development (Ramalho & de Sá Sarmiento, 2019), a school-based study found that LEGO therapy contributed to modest gains in social skills and positively impacted emotional well-being, suggesting that structured play can foster problem-solving and social cooperation (Wright et al., 2023). Additionally, parent-guided LEGO interventions have shown effectiveness in enhancing spontaneous social interactions and responses, indicating the benefits of these activities within a home environment (Lee et al., 2023).

**Maze and Puzzle Games:** Studies have found that maze games, such as wire mazes, can help improve eye contact in children with ASD, a fundamental aspect of social interaction, suggesting that maze games could be beneficial for communication skills ( Amalia & Fatmawati, 2023). Though puzzle games may not substantially enhance attention or fine motor skills, they still provide an avenue for focus and engagement, which could indirectly reduce stimming behaviors by offering alternative sensory input (Pristianto & Herlinawati, 2022).

Interactive game-based Learning, including those grounded in art therapy, have shown benefits in concentration, motor coordination, and engagement levels among children with ASD. Such games offer a flexible learning environment tailored to meet the specific needs of children with ASD, potentially decreasing the need for stimming as a regulatory behavior (Huili et al., 2023). Additionally, visual aids and game-based learning approaches are particularly effective for autistic children, as they offer a structured yet adaptive learning model that engages attention and may lessen repetitive actions (Ravale & Kulkarni, 2023). based on the data above, this research was conducted with the aim of finding out "Is there an Effect of Modification LeMa Games (Lego and Mazze) Against Stimming in Children with Autism Spectrum Disorder

## **METHOD**

This research used an experimental method with a Single Subject Research (SSR) design, specifically the A-B-A model, which documents changes in individual behavior. Conducted at Bina Autism Mandiri and NU Kids Integrated Therapy, the study utilized purposive sampling to select a child with self-stimulatory (stimming) behaviors across sensory modalities (auditory, tactile, visual, vestibular). In the A-B-A design, validity was ensured through key measures, including a clear definition of target behaviors that could be accurately measured, along with consistent baseline data collection until stability was achieved. A structured intervention phase (B) was followed by a return to the baseline phase (A2) for effective comparison. Data analysis was performed using graphs to assess the success of the therapy, with reduced stimming behavior after intervention cessation serving as a primary indicator of effectiveness.

Baseline A1: Before intervention, the researcher and therapist observed, recorded, and measured the child's stimming frequency and duration across four weekly 45-minute sessions. Intervention B: The intervention involved 45-minute sessions using modified LEGO and maze games, conducted twice weekly for a month (eight sessions total). The therapist tracked stimming frequency and duration. Baseline A2: Post-intervention, the team observed and recorded stimming behaviors across four weekly 45-minute sessions. The effectiveness of the therapy was assessed by analyzing behavioral changes through these graphical data, with success marked by a reduction in stimming behavior following the intervention.

## **RESULT**

The research results reveal that both RFQ and HG, two children from different therapy centers, exhibited frequent self-stimulation or stimming behaviors such as screaming, scratching, playing with objects repetitively, and jumping up and down during therapy sessions. The therapists, upon conducting interviews with the researcher, shared that when given an instruction, the children often did not immediately respond because they were preoccupied with stimming behaviors. Frequent reminders were necessary for the children to focus on the task at hand. As a result, it was decided that introducing the MaZe Playing intervention, which involved constructive play activities using LEGO and maze games, would be beneficial to reduce their stimming behaviors.

In the baseline phase (A1), observations were conducted over four sessions to document the frequency of stimming behaviors before the intervention. During this phase, no treatment was provided. The data revealed that both RFQ and HG children exhibited excessive stimming behaviors throughout the therapy sessions, with behaviors such as screaming, scratching, and jumping lasting for an average of 390 seconds within the 45-minute session. This resulted in a range of stimming behavior from 37.5% to 100% of the session duration.

During the intervention phase (B), the children were provided with a structured play-based intervention using modified LEGO games (involving disassembling and assembling) and maze games (featuring branching and winding paths). These activities were supplemented with verbal instructions, and rewards such as thumbs-ups, high fives, applause, and praise were given when the children successfully followed the instructions. After eight sessions, data was recorded showing a reduction in the children's stimming behaviors. After the intervention phase, in the final baseline phase (A2), observations showed that the duration of stimming behavior had reduced to 30-45 seconds within a 45-minute session, indicating a significant decrease.

Table 1.  
Vertibular Frequency Inter-condition Analysis Table RFQ

Condition Length	Intervention (B)/ Baseline-1 (A1)		Baseline-2 (A2)/ Intervention (B)	
Number of variables changed	1		1	
Trend direction and effect change	(+)	(-)	(-)	(-)
Stability trend change	Stable to stable		Stable to stable	
Level change	0-0 = 0		2-1 = +1	
Overlap change	(8/8)x100% = 100%		(4/8) x 100% = 50%	

Table 2.  
Analysis Between Conditions of Frequency of Vestibular HG

Condition Length	Intervention (B)/ Baseline-1 (A1)		Baseline-2 (A2)/ Intervention (B)	
Number of variables changed	1		1	
Trend direction and effect change	(-)	(-)	(-)	(+)
Stability trend change	Stabil ke stabil		Stabil ke stabil	
Level change	2-0 = +0		3-3 = 0	
Overlap change	(5/8)x100% =62.5 %		(3/8) x 100% = 37.5%	

## DISCUSSION

### Analysis of Stimming Behaviors in RFQ

Based on table 1. summarizes the results of an A-B-A design intervention, detailing changes in stimming behaviors across the phases. In the first baseline phase (A1) and the intervention phase (B), the number of variables changed was 1, showing a positive trend in behavior during the intervention (+). The stability trend was stable in both phases, meaning the behavior remained consistent. The level change between baseline (A1) and intervention (B) was minimal, with no significant shift in the target behavior (0-0=0). Additionally, the overlap between phases was 100%, indicating that the intervention phase had a consistent effect on the behavior, but there was no notable improvement in the behavior level.

In the second baseline phase (A2) and intervention (B), the number of variables changed remained at 1, but the trend direction was negative (-), indicating that the target behavior worsened or returned to baseline levels after the intervention. Despite this, the stability trend remained stable to stable, showing no drastic changes in behavior consistency. The level change between A2 and B showed a positive shift (+1), suggesting some improvement. However, the overlap between these phases was 50%, indicating that the intervention was less effective in this second round, with behaviors partially reverting to baseline levels.

During the baseline phase (A1), RFQ exhibited a high intensity of stimming behaviors, with an average duration of 90–100 seconds per session. This observation aligns with Aminah's (2021) findings, which suggest that self-stimulatory behaviors frequently occur when children with autism are not engaged in productive activities. In the intervention phase (B), RFQ's stimming behaviors significantly decreased to 50–60 seconds per session through maze-playing activities (Aminah, 2021). This result supports by Kuswanto & Suyadi's (2020) study, which found that maze activities effectively reduced stimming behaviors like hand flapping (Kuswanto & Suyadi, 2020).

In the post-intervention phase (A2), RFQ maintained the positive effects of the intervention, with stimming durations reduced further to 40–50 seconds per session. These results align with (Tisnawati, 2020) findings, which suggest that constructive play activities not only enhance visual-spatial intelligence but also help manage maladaptive behaviors. The intervention outcomes for RFQ are consistent with prior research emphasizing the importance of play-based activities for children with autism spectrum disorder (ASD). Che Mud et al., (2021) found that engaging children in productive activities, such as maze-playing, significantly reduces stimming behaviors and increases engagement. Additionally, these results align with (Ravale & Kulkarni, 2023) findings that structured play activities can enrich social experiences for children with ASD by providing opportunities for guided interaction.

### **Analysis of Stimming Behaviors in HG**

The table provides a breakdown of the results from the A-B-A design, with a focus on changes in stimming behaviors. In the first comparison, between the intervention phase (B) and baseline-1 (A1), the number of variables changed was 1, showing a negative trend in behavior during both phases, indicated by (-). Despite this negative trend, the stability of the behavior remained consistent, as the trend shifted from stable to stable. The level change between baseline-1 (A1) and the intervention phase (B) showed a minimal difference (2-0=+0), suggesting no significant shift in the target behavior's intensity. The overlap between these phases was 62.5%, meaning there was a moderate degree of consistency in the behavior during the intervention phase, but with some variance compared to baseline.

In the second comparison, between baseline-2 (A2) and the intervention phase (B), the number of variables changed remained at 1, with a negative trend initially in A2, followed by a positive trend in the intervention phase (B), as indicated by (-) and (+), respectively. The stability trend was again stable to stable, with no dramatic changes in the behavior's consistency. The level change between A2 and B showed no difference (3-3=0), indicating no significant change in the intensity of the target behavior. The overlap between A2 and B was lower at 37.5%, suggesting that the intervention was less consistent and had a diminished effect during the second round of implementation compared to the first baseline. In the baseline phase (A1), HG exhibited a higher duration of stimming behaviors, ranging from 95–115 seconds per session. This observation is consistent with Aminah's (2021) findings, which suggest that stimming behaviors often emerge due to a lack of structured, productive activities. During the intervention phase (B), HG's stimming duration decreased significantly to 45–55 seconds per session through maze-based play. This supports Kuswanto & Suyadi's (2020) study, which demonstrated the effectiveness of maze activities in reducing repetitive stimming behaviors in children with autism.

In the post-intervention phase (A2), HG exhibited a further reduction in stimming behaviors, with durations averaging 35–45 seconds per session. This indicates the long-term effectiveness of play-based interventions in managing stimming behaviors. The behavioral

changes in HG align with Tisnawati, (2020) findings, which highlight that constructive play activities improve visual-spatial abilities and help manage non-adaptive behaviors. Additionally, the reductions in stimming behaviors observed in HG align with Hanum et al., (2016) which “demonstrated that cooperative play activities improved social abilities in children with ASD from 59% to 89% over two intervention cycles”. LEGO-based therapy involving collaborative play significantly improved social skills and reduced repetitive behaviors in children with ASD (Wright et al., 2023).

## CONCLUSION

Based on the results, the use of modified LEGO and Maze (LEMA) games shows promise as an effective intervention for reducing stimming behaviors in children with ASD. The positive impact on focus, attention, and behavior regulation suggests that these activities provide valuable alternatives to self-stimulatory behaviors. However, further studies should be conducted to explore the effectiveness of this intervention across a broader range of children and to refine the approach based on individual needs.

## REFERENCES

- American Psychiatric Association. (2022). Diagnosis of Autism Spectrum Disorder. *Austin Journal of Autism & Related Disabilities*, 8(1). <https://doi.org/10.26420/austinjautismrelatdisabil.2022.1058>
- Aminah, S. (2021). Penerapan Terapi Bermain Untuk Meningkatkan Interaksi Sosial Pada Anak Autis Di Yayasan Rumah Mentari Kecamatan Sidoharjo Kabupaten Pringsewu. In *Pharmacognosy Magazine* (Vol. 75, Issue 17).
- Che Mud, S., Md Sham, F., & Mohd Ali, M. (2021). Kaedah pengawalan tingkah laku bagi anak mengalami Autisme. *Al-Irsyad: Journal of Islamic and Contemporary Issues*, 6(2), 733–744. <https://doi.org/10.53840/alirsyad.v6i2.228>
- Dwike Amalia, & Dwi Putri Fatmawati. (2023). Pengaruh Bermain Wire Maze Terhadap Kontak Mata Anak Autis Spectrum Disorder di KB/TK Inklusi Srawung Bocah Yogyakarta. *Indonesian Journal of Early Childhood: Jurnal Dunia Anak Usia Dini*, 5(2), 377–381. <https://doi.org/10.35473/ijec.v5i1.2438>
- Hanum, F., Mutdasir, & Yusuf, R. (2016). Terapi visa terhadap perkembangan bahasa reseptif dan ekspresif pada anak autis. *Jurnal Ilmu Keperawatan*, 2(1), 97–107. <http://www.jurnal.unsyiah.ac.id/JIK/article/view/5291/4434>
- Huili, S., Cao, X., Guo, G., Yu, J., Yu, L., & Zhang, W. (2023). Research on the design of somatosensory interactive games for autistic children based on art therapy. *Frontiers in Psychiatry*. <https://doi.org/10.3389/fpsy.2023.1207023>
- Hutomo, L., & Wulandari, P. Y. (2023). Improving the Ability to Wear Socks in Autistic Children Through Behavior Modification Interventions. *Psikostudia : Jurnal Psikologi*, 12(1), 79. <https://doi.org/10.30872/psikostudia.v12i1.9332>
- Iskandar, S., & Indaryani, I. (2020). Peningkatan Kemampuan Interaksi Sosial pada Anak Autis Melalui Terapi Bermain Asosiatif. *JHeS (Journal of Health Studies)*, 4(2), 12–18. <https://doi.org/10.31101/jhes.1048>
- KEMENKES RI. (2021). *Profil kesehatan indonesia*.

- Kuswanto, A. V., & Suyadi, S. (2020). Sistematika Lieratur Review: Permainan Maze Dalam Mengembangkan Perkembangan Anak Usia Taman Kanak-Kanak. *PAUDIA : Jurnal Penelitian Dalam Bidang Pendidikan Anak Usia Dini*, 9(2), 51–61. <https://doi.org/10.26877/paudia.v9i2.6712>
- Lee, G. T., Hu, X., Lian, Z., & Wang, C. (2024). Effects of a Family-Implemented LEGO Intervention on Social Interactions for Children on the Autism Spectrum in China. *Journal of Special Education*. <https://doi.org/10.1177/00224669241256954>
- Lee, G. T., Jiang, Y., & Hu, X. (2023). Improving Social Interactions for Young Children on the Autism Spectrum Through Parent-Mediated LEGO Play Activities. *Remedial and Special Education*, 074193252211476–074193252211476. <https://doi.org/10.1177/07419325221147699>
- Maenner, M. J., Warren, Z., Williams, A. R., Amoakohene, E., Bakian, A. V., Bilder, D. A., Durkin, M. S., Fitzgerald, R. T., Furnier, S. M., Hughes, M. M., Ladd-Acosta, C. M., McArthur, D., Pas, E. T., Salinas, A., Vehorn, A., Williams, S., Esler, A., Grzybowski, A., Hall-Lande, J., ... Shaw, K. A. (2023). Prevalence and Characteristics of Autism Spectrum Disorder Among Children Aged 8 Years — Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States, 2020. *MMWR Surveillance Summaries*, 72(2). <https://doi.org/10.15585/mmwr.ss7202a1>
- Maris, S. (2023). *Prevalensi Gangguan Spektrum Autisme di Indonesia Meningkat karena Paparan BPA?* Liputan 6. <https://www.liputan6.com/health/read/5260666/prevalensi-gangguan-spektrum-autisme-di-indonesia-meningkat-karena-paparan-bpa?page=3>
- Nur Rohimah Tisnawati. (2020). Pengaruh Permainan Lego Terhadap Peningkatan Konsentrasi Anak Autis. *SPECIAL : Special and Inclusive Education Journal*, 1(2), 121–137. <https://doi.org/10.36456/special.vol1.no2.a2781>
- Pastari, M. & S. (2022). The Effect of Baby Massage on Language Development Disorder (Speech Delay). *Budapest International Research and Critics Institute-Journal (BIRCI-Journal)*, 5(2), 11238–11247. <https://doi.org/10.33258/birci.v5i2.4941>
- Pristianto, A., & Herlinawati, I. (2022). The Impact of Puzzle Games on Attention and Fine Motor Abilities Upon Cases of Autism Spectrum Disorder: A Case Report. *Physical Therapy Journal of Indonesia*, 3(2), 58–62. <https://doi.org/10.51559/ptji.v3i2.56>
- Ramalho, N. C. P., & de Sá Sarmiento, S. M. (2019). LEGO® therapy as an intervention in autism spectrum disorders: an integrative literature review. *Revista Cefac*, 21(2). <https://doi.org/10.1590/1982-0216/20192129717>
- Ravale, U., & Kulkarni, S. P. (2023). *An Interactive Game based Learning Model for Autistic Children*. 1–6. <https://doi.org/10.1109/ICICCS56967.2023.10142344>
- Twistiandayani, R., Umah, K., & Nasrullah, D. (2019). Implementation of speech therapy and social stories increasing social interaction in children with autism. *Indian Journal of Public Health Research and Development*, 10(9), 1269–1273. <https://doi.org/10.5958/0976-5506.2019.02619.6>
- WHO. (2023). *Autism*. World Health Organization. [https://doi.org/10.1007/978-1-137-00426-0\\_3](https://doi.org/10.1007/978-1-137-00426-0_3)
- Wright, B., Kingsley, E., Cooper, C., Biggs, K., Bursnall, M., Wang, H.-I., Chater, T., Coates,

E., Teare, M. D., McKendrick, K., de la Cuesta, G. G., Barr, A. C., Solaiman, K., Packham, A., Marshall, D., Varley, D., Nekooi, R., Parrott, S., Ali, S., ... Couteur, A. Le. (2023). Play brick therapy to aid the social skills of children and young people with autism spectrum disorder: the I-SOCIALISE cluster RCT. *Public Health Research*, *11*(12), 1–137. <https://doi.org/10.3310/vgtr7431>