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THE USE OF A PICTURE ACTIVITY SCHEDULE FOR VOCAL STEREOTYPY REDUCTION IN A CHILD WITH AUTISM

Abstract

Children with ASD exhibit auto-stimulatory behaviour of different types, with the most common behavioural problem being auto-stimulatory stereotyped behaviour. It is believed that vocal auto-stimulatory behaviour occurs because the individuals with ASD do not receive sufficient stimulation from their environment and therefore have the need to stimulate themselves by emitting vocal stereotypy of different form and magnitude. The participant is a 10-year-old boy diagnosed with ASD. The intervention used was a picture activity schedule. Results showed an immediate decrease in self-stimulatory behaviour upon implementation of the intervention, with a 100% success rate. There is insufficient research on the implementation of picture activity schedules in order to reduce self-stimulatory behaviour in children with ASD. The present study shows that picture activity schedules can be used in certain situations where it is inappropriate to exhibit self-stimulating behaviour. It is not certain if the picture activity schedule functioned as a prompt for the participant to actively engage in his spare time, or if it functioned as a discriminative stimulus for situations when the problem behaviour is inappropriate. The social validity of the intervention was discussed, as well as suggestions for future research implementation.

Keywords: autism; picture activity schedule; vocal stereotypy; auto stimulation

UPOTREBA VIZUALNOG RASPOREDA ZA REDUKCIJU VOKALNIH STEREOTIPIJA KOD DJETETA S AUTIZMOM

Sažetak

Osobe s poremećajima iz spektra autizma (PSA) ispoljavaju različita auto-stimulativna ponašanja, a kao najčešći problemi u ponašanju navode se stereotipna auto-stimulativna ponašanja. Smatra se da se vokalne stereotipije kod osoba sa PSA javljaju uslijed nedovoljne stimulacije iz okruženja, stoga posljedično djeca sa PSA imaju potrebu da se dodatno stimuliraju kroz emitiranje vokalnih stereotipija različite forme i jačine. Primjenom metode kvazi-eksperimentalnog dizajna u dvije točke u istraživanju provedena je intervencija s desetogodišnjim dječakom sa PSA. Intervencija je imala cilj reducirati vokalne stereotipije upotrebom vizualnog rasporeda. Intervencija je dovela do potpune redukcije auto-stimulativnog ponašanja, s uspješnošću od 100 %. Nedovoljan broj istraživanja primjenjivao je vizualni raspored s ciljem redukcije auto-stimulativnog ponašanja kod djece sa PSA. Rezultati pokazuju da se vizualni raspored može koristiti u situacijama kada je potrebno naučiti djecu da nije primjereno ispoljavati vokalne stereotipije. Nije najjasnije je li vizualni raspored služio kao poticaj dječaku da svrsishodno provodi slobodno vrijeme ili kao diskriminativni stimulus za razlikovanje situacija u kojima je neprikladno ispoljavati određeno ponašanje. U zaključnim razmatranjima, raspravljena je populacijska valjanost navedene procedure, kao i preporuke za buduća istraživanja.

Ključne riječi: autizam; vizualni raspored; vokalne stereotipije; autostimulacija

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1   INTRODUCTION

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by impairments in social communication and restricted, repetitive patterns of behavior, interests or activities (APA, 2013, according to Gajić et al., 2021a). Having in mind the mentioned impairments in the form of repetitive behaviours, it is not uncommon for children with ASD to exhibit auto-stimulatory behaviour of different types (Gajić et al., 2022; Min & Fetzner, 2019), where more than a half of children with ASD exhibit vocalizations of different types (Gajić et al., 2021b).

It is believed that vocal auto-stimulatory behaviour occurs because the individuals with ASD do not receive sufficient stimulation from their environment and therefore have the need to stimulate themselves in a way of emitting vocal stereotypy of different form and magnitude (De Luise et al., 2022; Kapp et al., 2019; Lukić et al., 2023). However, due to behaviour contrast (Reynolds, 1961), meaning that reducing stereotypy in one setting can lead to increase of stereotypy in another setting, it is not recommended to reduce stereotypy completely, but only if it disrupts the learning process or increases the likelihood of receiving negative attention from others, which further enables the child to participate in certain environments and interact with peers (Esposito et al., 2021).

Most children exhibit vocal stereotypy because such behaviour produces automatic reinforcement, meaning that the child engages in this behaviour because it feels good or sounds good (Rincover, 1981, according to Cooper, Heron & Howard, 2007). One way of determining the function of behaviours is ABC data collection (Lewis et al., 2017; Roscoe et al., 2015). ABC data collection is a tool used to record behaviours in terms of environmental events that occur before and after certain behaviour (Borgmeier et al., 2017; Lanovaz et al., 2013; Solnick, 2010).

Because a great number of children with ASD exhibit vocal auto stimulatory behaviour, there is an emerging need for professionals and researchers to develop effective interventions (Maajeenyi, 2021). There are numerous interventions successfully used for reducing vocal self-stimulating behaviors, but most commonly used are behavioral interventions based on the principles of Applied Behavior Analysis (ABA) (Gajić et al., 2022; Lanovaz & Sladeczek, 2012). ABA is the intervention in which tactics derived from the principles of behavior are applied to improve socially significant behaviour (Cooper et al., 2020). ABA is most commonly used to enhance communication skills and self-help skills (Choi et al.,

2022; LaBrie, 2019; Rodriguez, 2020), as well as to reduce problem behaviours exhibited by children with ASD (Gover et al., 2019; Jeong & Copeland, 2020; Kurtz et al., 2020).

The most common behavioural interventions used to decrease vocal stereotypy exhibited by children with ASD are discrimination training (Haley et al., 2010; O'Connor et al., 2011), matched stimulation (Saylor et al., 2012) and response interruption and redirection (Ahearn et al., 2007), but not many authors used picture activity schedules as a tool for reducing vocal auto-simulations.

Picture activity schedule refers to a sequence of photographs, videos, drawing, text or other visual symbols that represent upcoming activities or events arranged in the order they should be completed in (Knight et al., 2015; McClannahan & Krantz, 2019; Sparapani et al., 2016; Spriggs et al., 2015). One advantage of using a picture activity schedule is can be incorporated into many existing activities and it can be used across a variety of settings, as well as increase independent transitioning between activities (Banda et al., 2009). Also, they can reduce anxiety in children with ASD, increase predictability, support communication skills and improve participation in on-task behaviours (Rutherford et al., 2020).

On-task behaviour is a way of reducing self-stimulating behaviour exhibited by children with ASD (Kuo & Plavnick, 2015; Malyarchuk & Karasyov, 2019; Nigmatulina & Dadakina, 2019). Burcley et al. (2014) successfully used picture activity schedules for developing on-task behaviour in an adolescent with ASD and Bryan & Gast (2000) used it with the same purpose with four children diagnosed with ASD.Both found that once the children learned how to use it independently, the use of it can be generalized to new activities and settings. A metaanalysis that examined the effectiveness of picture activity schedules proved that this procedure promotes independence and self-management skills, as well as independent task initiation and on-task behaviour, and it can be used successfully in a variety of settings, as well (Koyama & Wang, 2011). Ting & Breslin (2013) used picture activity schedules to teach 25 children aged three to 16 novel motor skills, which implies that this procedure can be used for teaching new behaviours and skills to children with ASD ,as well.

The aim of the present study was to examine the effectiveness of the use of picture activity schedules in order to reduce self-stimulating behaviour in a child diagnosed with ASD.

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2 METHODOLOGY

2.1 Participant

The participant is a 10-year-old boy diagnosed with ASD, who attended fourth grade in a regular classroom, where he was being educated according to an individual educational plan consisting of global reading skills, learning how to perform mathematical operations with a calculator and learning to tact some crucial items/ nouns from different subjects. He also received ABA services every week day (five times a week) in a duration of two hours daily (total duration was 10 hours per week), with the treatment consisting of Verbal Behaviour Intervention (VBI) following Sundberg's *Verbal Behaviour Milestones and Assessment protocol* (VB-MAPP, Sundberg, 2008) and focusing only on intraverbal skills, as well as self-help skills following the self-help subscale of the *Assessment of Basic Language and Learning Skills – Revised* (ABLLS, Partington, 2010).

The boy engaged in high rates of vocal and motor stereotypy. He recently had a baby sister and the parents reported that they were having difficulties with her sleeping schedule, due to the high rates of vocal stereotypy of great magnitude, meaning that the boy would hum loudly throughout the day. The father worked from home due to COVID-19 restrictions and had to be online and connected to live audio, so the loudness of the participant's humming, as well as his baby sister's crying that occurred as a consequence, were disrupting his work productivity. Therefore, the parents emphasized the importance and the necessity of reducing his self-stimulatory behaviour in certain situations in the home environment.

2.2. Measurement and procedure

The humming exhibited by our participant was defined as a continuous emission of wordless steady tone (excluding song melodies) with closed or open mouth fora minimum duration of three seconds. Dependent measures included total duration of the humming sound emitted by the participant measured in seconds. Total duration data was collected using a stopwatch across six fifteen-minute conditions.

The participant was already familiar with different schedule forms, because he had used a token system economy in the past. The first presentation of a picture activity schedule was designed as 'First X, then X' and the participant needed a

short verbal instruction on how to use it. After the explanation, the participant completed the activity that was presented on the picture. The next step was introducing several activities that had to be completed in order to obtain reinforcement and that would serve as activities that help organize his free time. The participant needed a short verbal instruction before he was able to independently complete the entire picture activity schedule. The picture activity schedule implementation started from that point on. After coming home from school, the participant's mother prompted him to look at the schedule and to complete it independently. The prompting occurred during the first day of the intervention, whereas the participant independently approached the schedule the next day and later on could use it independently.

For ABC narrative data collection, the materials needed were data sheets designed by the therapist. The data sheets were simple and the parents received instructions on how to gather data and demonstrated the collection method via role play with a therapist. ABC recording took place at the participant's home environment and the data were collected by both parents and the therapist during home sessions.

The materials needed for procedure implementation were a picture activity schedule, a stopwatch and activities for child's independent use. The picture activity schedule was on a laminated white A4 paper and consisted of two columns of six black empty squares and an arrow between them. Each square had circled self-adhesive Velcro on it. In the first column there were laminated pictures representing the activities the child should engage in, with Velcro on the back side. The stopwatch used for measurement was a phone app. Activities for the child's independent use, that were also presented in the pictures, were different puzzles with 20-50 pieces, a calculator and a 'book' with ten A4 stapled white papers with different four-digit addition tasks, complex printed clip art pictures of different objects or scenes for colouring, as well as crayons needed to complete the assignment, different complex shape sorters with 40-50 pieces that resemble each other, a small zip lock bag filled with 50+ beads that the child liked to bead on a plastic rope and also a stapled 'book' of ten white A4 papers with different textual first language assignments that were currently a part of the participant's school IEP (such as pronouns, nouns, verbs, etc.).

All the activities were already present in the child's repertoire and he could

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perform them successfully on his own, without any prompts or assistance, but they were selected because they each required a minimum of ten minutes to complete and represented neutral stimuli for the participant. This is also the reason why addition and textual language assignments consisted of ten tasks, because the participant needed approximately a minute for completing each.

The process of teaching the participant independent use of the picture activity schedule was performed by a therapist during home sessions, while the procedure itself was implemented by the parents in the home environment, after they received training on prompting the participant how to use the schedule.

3 RESULTS

3.1. Results before implementation of the intervention

The data collection procedure used to hypothesize the function of the participant's humming behaviour was ABC narrative recording (Lanovaz et al., 2013). The data was collected by the therapist and by the participant's parents. The participants' behaviour was monitored and measured across three different days during three 60-minute intervals. The time of the day when ABC data was collected was when the participant arrived home from school, after lunch and during the evening, before going to bed.

The data collected from ABC recording was later grouped into six different conditions that showed the longest and the shortest duration of humming. When the participant was alone (94%) and while he was watching cartoons (86%) the duration of humming was the longest, as well as during transitioning between two activities during sessions (56%). An interesting result of ABC continuous recording was that he did not exhibit any self-stimulating behaviour during task presentation (0%). On the contrary, we noted a long duration of humming during engagements in free time activities, such as alone or watching cartoons, as well as during the transitioning pause between activities, which led us to a hypothesis that this behaviour occurs during free time and non-structured leisure activities (*Figure 1*).
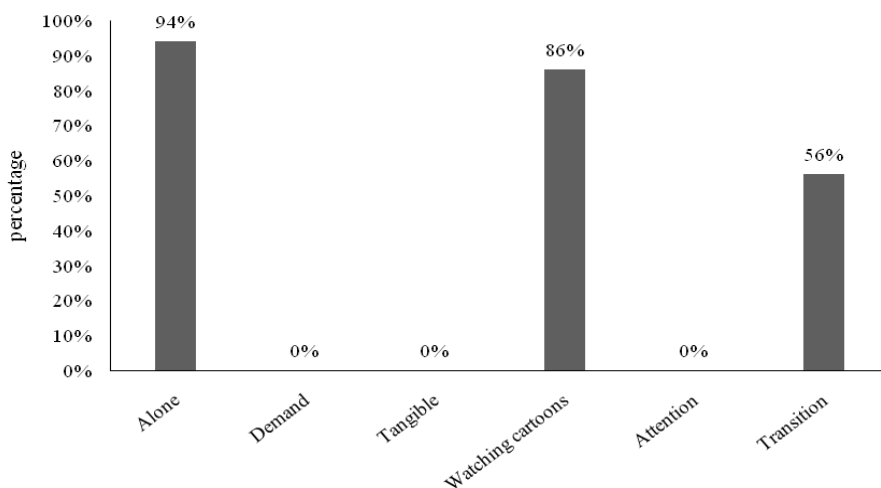
Figure 1: ABC data collection results

Firstly, the aim of the procedure of matched stimulation was to reduce his vocal stereotypy. The participant's humming was recorded with the phone voice app and played to him in order to see if he would stop engaging in this behaviour, because hearing the sound alone would be reinforcing enough. While listening to the sound, the participant placed his hands on his ears and the magnitude of his vocalizations increased (recorded via decibel meter app on the therapists' phone), therefore we assumed that he engaged in this behaviour because the vocal cord vibrations were what he found reinforcing. The parents were then given the explanation and examples of the potential use of the procedure of unmatched stimulation with the use of vibrating talk tools toys® (Rosenfeld-Johnson, 2021), which we assumed could be efficient, but they decided against this procedure. Therefore, a picture activity schedule was proposed in order to teach the child to actively and independently spend his free time in the household, as well as during transitioning between activities, which could possibly reduce his engagement in vocal stereotypy in certain settings, through development of on-task behaviour.

The therapist sessions with the participant were recorded during the first two days and the video recordings were sent to the parents, in order to ensure procedural fidelity. The parents also received written and verbal instructions on how to implement the procedure in the home environment, as well as instructions on

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how to collect data. After that, they practiced data collection and procedure implementation via role play with a therapist. When the parents showed that they understood the process of data collection and were able to perform it accurately, they started implementing the procedure with the participant.

3.2. Results after implementation of the intervention

The X axis represents the number of sessions, while the Y axis represents the percentage of 60-minute intervals during which the participant engaged in vocal stereotypy. Baseline data was collected for sixty minutes each day using total duration recording, across three consecutive days. We recorded the duration of the participant's humming behaviour during his free time after school.

The results of the picture activity schedule procedure implementation are presented in Figure 2. Results show an immediate decrease in self-stimulatory behaviour upon implementation of the intervention. These results were maintained throughout the 17 consecutive days during which the intervention was implemented, meaning that the vocal stereotypy was at a significantly lower level than during baseline (mean value during baseline condition was 90%, while mean value during intervention condition was 1.5% of 60-minute intervals).
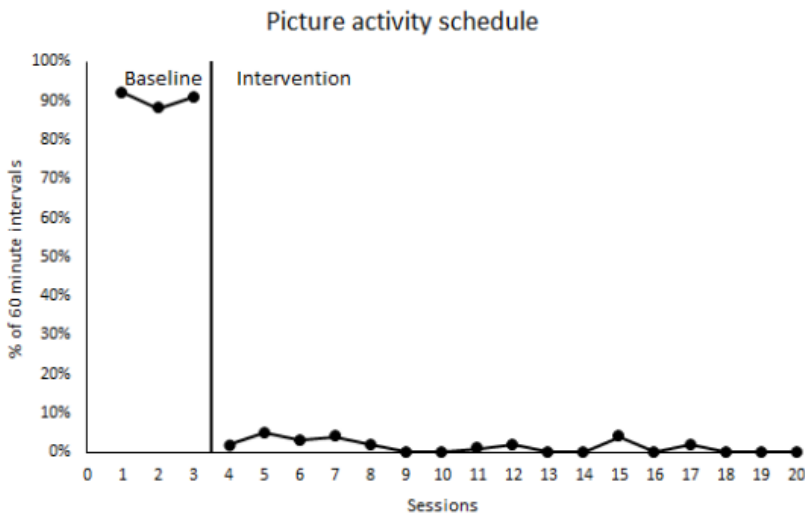

Figure 2: Picture activity schedule procedure results

The participant exhibited zero level of vocal stereotypy during sessions 9,10,13,14 and 16, however we decided to stop the intervention after obtaining three consecutive zero level values. This represents a 100% success rate of reducing the vocal stereotypy exhibited by the participant.

4 DISCUSSION AND CONCLUSIONS

There is insufficient research that implemented picture activity schedules in order to reduce self-stimulatory behaviour in children with ASD. The present study shows that picture activity schedules can be used in certain situations where it is inappropriate to exhibit self-stimulating behaviour. The procedure was implemented in a home setting due to the long duration of humming that influenced the participant's father's work productivity and his sister's sleeping schedule. It is important to state that, after his father's working hours finished and his eight-month sister's sleeping time was over, the participant was provided with access to his favourite cartoon during which he could engage in his vocal stereotypy.

The picture activity schedule seems to be a successful tool in controlling the events when self-stimulating behaviour was appropriate to occur, and it enabled the reduction of humming behaviour in contexts that were found inappropriate by the participant's parents. These results were significant because the parents were taught how to implement the procedure, which allowed them to use it in different contexts where humming behaviour is labelled as inappropriate. Another significance of this research refers to teaching the participant a useful tool that could be used for the organisation of spare time, thereby developing self-regulatory behaviour (Gajić et al., 2021).

The social validity of this intervention was supported by the change in the quality of life in the participant's family. The father was able to work without interruptions and his work productivity increased, as he reported. The mother emphasized how her eight-month daughter was getting enough sleep, with no disruptions. Also, the participant was able to engage in his self-stimulatory behaviour at appropriate times, when his father's working hours finished and when his sister woke from her sleep.

Future research might focus on applying this procedure with different types of self-stimulatory behaviours that occur in children with ASD, when the highest frequency of this behaviour occurs as a result of inadequate independent organization of free time (alone or transition conditions). Another recommendation refers to applying this procedure with children with ASD in different contexts, such as

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school environment or vocational setting, also if the self-stimulatory behaviour disrupts others during important activities. However, it is important to highlight that we suggest using this procedure in the mentioned contexts only if the frequency of self-stimulatory behaviour is the highest during transitioning between activities or when the child is alone, due to probable efficiency.

However, it is not certain if the picture activity schedule functioned as a prompt for the participant to actively engage in his spare time and therefore reduced self-stimulatory humming, or if it functioned as a discriminative stimulus for situations when the problem behaviour is inappropriate and therefore functioned as a procedure for developing stimulus control. We hope to obtain this information while observing the participant's future picture activity schedule use, in order to examine if picture activity schedules can be useful in developing stimulus control over certain behaviours.

CONFLICT OF INTEREST STATEMENT

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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