

Effectiveness of Choice-Making Training in Managing Repetitive Behaviours Among Children with Mild to Moderate Autism Spectrum Disorder: Evidence from an Indian Exploratory Study

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ABSTRACT:

Autism Spectrum Disorder (ASD) includes enduring deficits in communication and social interaction, as well as rigid and repetitive patterns of behavior, that cause significant impairments in a child's quality of life and adaptive function. Due to their inability to inhibit them, RRBs interfere with a child's ability to learn, interact, and carry out day-to-day activities and hence there is a need for behavioral interventions. This research analyzes the effectiveness of choice-making training in the reduction of problem behavior in children with mild to moderate Asperger's Disorder (AS)-Autism Spectrum Disorder (ASD) children in India, employing a purposive sampling method of 5 children between the ages of 3 and 12 from a clinic in Hyderabad, India using participatory observation, behavioral assessments, interviews with caregivers and teachers. In this intervention the children were provided systematically structured choices with regard to tasks, materials and interactions. Intervention had a significant effect in reducing repetitive behaviors, increased engagement, social interaction and improved adaptive functioning. This study suggests that there is an immediate need for highly structured and choice-based interventions. The results of this research provide evidence-based support for behavioral intervention in ASD, and indicate a need to apply the existing research to various settings like Indian schools and familial intervention. The article ends with implications and future research questions to analyze long-term benefits of the intervention.

Keywords: Autism Spectrum Disorder, repetitive behaviours, choice-making training, behavioural intervention.

Introduction:

Autism Spectrum Disorder (ASD) is a complex neurodevelopmental disorder characterized by sustained deficits in communication, social interaction, and restricted, repetitive patterns of behaviour, interests or activities. Restricted and repetitive behaviours (RRBs) represent a core diagnostic feature of ASD, and includes stereotyped motor movements, repetitive speech, insistence on sameness, ritualistic behavior, compulsions, and highly restricted interests (Leekam et al., 2011). Children with ASD who exhibit repetitive behaviors typically demonstrate an overall reduced quality of life, reduced child interaction with peers and less engagement with learning and adaptive functioning (Boyd et al., 2012). Recent research also indicates an increase in the number of the children with ASD who show higher numbers of repetitive behaviors also had higher amounts of different domains of emotional dysregulation, anxiety, and sensory-processing deficits (Uljarevi et al., 2022; Lidstone et al., 2021).

Over the past two decades, prevalence of ASD has increased worldwide, leading to a heightened interest in the development of evidence-based interventions designed to increase beneficial behavioural and/or developmental outcomes (World Health Organization, 2023). Repetitive behaviors also negatively impact education through exclusionary practices, and leads to reduced engagement and time on task (Keen et al., 2021). Studies have also emphasized that repetitive behaviors is not simply a target for intervention; research indicated that repetitive behaviors are directly related to emotionality, cognition rigidity, sensory sensitivities, and reactivity to the environment (Langen et al., 2014; South et al., 2020). Although some repetitive behaviors may function as self-regulatory coping mechanisms, such rote and relatively unchanging behavior appears detrimental to both social interaction, communication, and academic trajectories (Rodriguez et al., 2019; Lidstone et al., 2021).

Over the last few decades behavioral and developmental interventions have been one of the dominant modes for changing repetitive behaviors among children with autism. The use of Evidence based practice, such as Applied Behavior Analysis (ABA), Antecedent based interventions, Sensory integration therapy, and Naturalistic developmental behavioral intervention, demonstrates a positive effect on the child's

adaptive functioning and decrease in maladaptive repetitive behaviors (Politte et al., 2015; Schreibman et al., 2020). The emerging trends in educational research have shifted towards incorporating multiple child-centered, autonomy supportive, active and agentic teaching strategies for students with developmental disabilities (Wehmeyer & Shogren, 2020; Wong et al., 2021).

Among the child-centered strategies, choice-making training is an emerging effective behavior intervention that addresses children's need for communication and behavioral flexibility while reducing rigid and repetitive behaviors. Choice making intervention involves systematically and deliberately offering choice making opportunities to children within their daily schedule, environment, materials or social context so as to increase independent decision-making skills and reduce problem behaviors (Carter, 2011). According to Self Determination theory, access to choices, increases autonomous motivation and consequently supports the increase in the emotional regulation and active engagement with learning tasks (Ryan & Deci, 2020). Recent studies have shown that children offered choice-making opportunities exhibited decreases in maladaptive and stereotyped behaviors along with increased engagement and social communication skills (Harding et al., 2008; Robertson et al., 2020).

Recent educational research has focused on implementing these child-centered interventions across school or therapy environments to benefit children with ASD (Odom et al., 2021). As an example, Wong et al., (2021) illustrated that children with ASD showed increased behavioral regulation and maladaptive responses when presented with structure choice opportunities as compared to students in autonomy-supportive versus absence of autonomy-supportive treatment condition- whereby autonomy-supportive treatments include a situation wherein the presence of autonomy is valued, therefore supporting child's agency and an increase of intraindividual processes. Fleury et al., also found that child-centered intervention involving classroom choice intervention increased children's engagement and decreased repetitive task disruptions in children with developmental disabilities (Schutz et al., For eg, Koegel et al., Additionally, child-preferred activities and choices were found to support increased social interaction (Maze et al., 2020) and communication goals (Zhang et al., 2022a).

It is also reported in recent literature that interventions for anxiety-related repetitive behaviors in ASD is best achieved by using strategies that promote self-regulation and environmental control (Conner et al., 2021; Uljarevi et al., 2022). Numerous children with ASD experience high degrees of stress from rigid schedules, the need to respond to un-understood verbal commands, and sensory overloads in the educational settings. According to Keen et al., (2021), providing choice opportunities increases child's sense of predictability, control, and behavioral flexibility, reducing the overall stress that children with ASD may feel. Also, researches have demonstrated positive outcomes when using computer mediated choice making interventions (e.g. Visual schedules or augmentative and alternative communication systems) to facilitate behavior changes in children with ASD.

While there is considerable evidence suggesting that readily available material-based (camouflaged choice-making intervention) choice interventions can effectively reduce repetitive behavior in children with mild to moderate autism spectrum disorder (ASD) only very few international studies have documented these findings and not much evidence in the Indian population are reported. Cultural factors, such as cultural values, educational practices, degree of family involvement, access to and availability of services, and awareness of the disorder in India may impact the choice intervention strategies and the resulting child outcomes (Divan et al., 2021). In addition, the Indian research has typically focused on more rights-blind clinical and behavioral intervention studies as opposed to student-centered, autonomy supportive educational interventions.

Therefore, there is a clear gap in understanding which type of structured choice-making intervention opportunities can contribute to changing repetitive behavior, the social outcomes and adaptive functioning of Indian children with ASD. This study aims to provide research evaluating the effects of choice training on repetitive behaviors among Indian children with mild to moderate ASD. Specifically, the current study seeks to determine whether provision of choices can reduce stereotypy and support increased access to social interaction, task engagement, and adaptive behavior in the school and therapy settings.

Review of Literature:

2.1 Repetitive Behaviours in ASD

One of the key characteristics of ASD are Restrictive and Repetitive Behaviours (RRBs), which are defined as movements which can range from relatively simple, to highly complex ritualistic and compulsive behaviours (Leekam et al., 2011). The specific interests/common behaviours can include such as: repetitive movements and repetitive speech, adherence to rigid schedules and compulsive ordering and the acquisition of unusual interests and sensory behaviours (ams & Aman, 2007). Programmatic research supports a dimensional view of repetitive behaviours and demonstrated significant correlations between RRBs and features that represent a deficit in behavioral flexibility, executive functioning, emotional regulation and cognition (Rodriguez & Thompson, 2015; South et al., 2020). Later research additionally reported that repetitive behaviours were associated with anxiety, sensory sensitivities and stressors perceived by children with ASD (Lidstone et al., 2021).

Boyd et al. Found that repetitive behaviours are also significantly related to impairments in social interaction, communication, participating in class activities and adaptive functioning (Bishop et al., 2012). Whereas many interventions for the higher-order (rituals, rigidity and compulsions) repetitive behaviors have been researched less, much attention has been given to lower-order behaviors such as stereotyped motor movements (authors' notes suggested that both appear to be interlinked parts of a continuum, however, fewer attempts were made to address the higher order). Consistent with these observations, later research found that repetitive behaviors in children with ASD are indeed associated with negative impacts on engagement at school, peer relationships and the individual's emotional state (Keen et al., 2021; Uljarevi et al., 2022). In an educational setting, restrictive behaviors also hinder and interfere with teaching and learning processes, socialising with peers and developing friendships. (Odom et al., 2021).

In terms of beginning neurodevelopmental studies repetitive behaviours can actually function as coping and self-regulation mechanisms for coping with the sensations of stress, uncertainty and sensory overload (Conner et al., 2021). In addition, overuse of fixed forms of behavior can maladaptive and may impair a child's behavioral flexibility in terms of his or her ability to switch from activity to activity or cope with change to the

demands of the environment (South et al., 2020). Recent neurocognitive models have identified executive functions (EF) and the deficit in inhibitory control as playing a role in the repetitive behaviors of children with ASD (Mosconi et al., 2020).

Recent research also revealed that researchers have identified that children with autism spectrum disorders can have diverse kinds of repetitive behavior (Uljarevi et al., 2022). Some children demonstrate repetitive movements of the limbs, others are characterized by repeated thoughts, questions and focused intense interests. Due to such diversity, repetitive behaviors require treatments and therapies that cater to different emotional and behavioral aspects. As a result, modern research frequently mentions the significance of autonomous and flexible educational and therapeutic interventions which focus on self-regulation (Keen et al., 2021).

2.2 Behavioural Interventions in ASD

Children with ASD are routinely seen by a behavioral intervention program aiming at decreasing stereotyped behaviors and improving adaptive functioning. A range of behavioral strategies can be used by interventionists working with these children, which include antecedent-based interventions, reinforcers using DRO (reinforcement of other behaviors), function-based intervention approach, NDBIs, sensory integration therapy, behavioral modification and so on (Rapp & Vollmer, 2005). However, interventions working on promoting behavior flexibility and adaptive behaviors have demonstrated better stability and generalization over interventions targeting the inhibition of stereotyped behavior (Neuringer, 2004).

Developmental intervention targeting communication behaviors, sensory regulation and parent training seems to be the most effective on significant behavioral, emotional, and social functioning for children with ASD (Cascio et al., 2016). Evidence suggests in the recent studies that NDBIs have promising outcomes to promote social communication and decrease maladaptive behavior by combining principles of behavioral, developmental and relationship-based approaches (Schreibman et al., 2020). In this case, intervention characterized by child-led interaction, intrinsic motivation and naturalism can be particularly effective.

The recent educational studies emphasize inclusive and individualized interventions for

children with ASD, such as Wong et al. Peters-Scheffer et al. Likewise, Odom et al. Implementing these interventions into the classroom settings is critical for generalizing behavioral effects and achieving long-lasting behavior change (George & Menlove, 2021).

In the recent years, the studies have also explored strategies to decrease anxiety and promote better emotion regulation in individuals with ASD to potentially account for the observed decline in stereotyped behaviors (Conner et al., 2021). Research has demonstrated significant decreases in anxious and repetitive behaviors with the implementation of emotion awareness and coping focused interventions (South et al. 2020). In addition, the advent of technology-assisted interventions and supports (e.g. Virtual learning systems, digital communication tools, visual schedules) helps children with ASD to access personalized behavioral intervention supports (Alzrayer et al. 2021).

Family-centered interventions are an additional topic that has been receiving much attention in ASD research in recent years. Divan et al. As indicated in Trial 2, culturally adapted, parent mediated intervention are crucial for improving behavioral outcomes for children with ASD in low resource setting like India (Behera et al., 2021). The study showed that involving caregivers helps to maintain behavior consistency, increase reinforcer value of desired behavior, and ultimately, achieve lasting behavioral change.

While behavior intervention research has come a long way, a large body of work suggests the importance of teaching children with ASD to self-regulate and participate actively instead of having their behaviors controlled solely externally (Wehmeyer & Shogren, 2020). A growing interest in more child-centered interventions such as choice training has become apparent with this paradigm shift.

2.3 Choice-Making Training

Choice-making training refers to structured opportunities provided to individuals to make decisions regarding tasks, activities, materials, schedules, or social interactions (Parsons & Reid, 1990). Within the context of ASD interventions, choice-making is considered an autonomy-supportive strategy that enhances participation, intrinsic motivation, self-regulation, and behavioural engagement among children with developmental disabilities.

Research consistently demonstrates that providing opportunities for making choices positively influences behavioural outcomes among children with ASD. Harding et al. (2008) found that activity schedules combined with choice-making significantly increased task engagement and reduced disruptive behaviours among children with ASD. Similarly, Carter (2011) reported that incorporating choice-making into play-based language interventions improved communication skills and social interaction while reducing maladaptive behaviours.

Choice-making interventions are particularly effective for behaviours maintained by task avoidance, anxiety, or escape-related functions (Reid et al., 2003). These interventions provide children with a sense of control over their environment, thereby reducing stress, resistance, and maladaptive repetitive behaviours. According to self-determination theory, opportunities for autonomy and self-directed behaviour promote intrinsic motivation and emotional regulation (Ryan & Deci, 2020). This theoretical perspective has increasingly influenced educational interventions designed for children with ASD.

Recent studies have further expanded understanding regarding the effectiveness of choice-making interventions in educational settings. Robertson et al. (2020) found that structured choice opportunities improved classroom participation and reduced repetitive classroom disruptions among students with ASD. Likewise, Fleury et al. (2021) reported that choice-making strategies enhanced adaptive engagement and collaborative learning participation in inclusive classroom environments.

Research also suggests that combining visual supports and technology-assisted tools with choice-making interventions enhances behavioural outcomes. Alzrayer et al. (2021) demonstrated that digital visual schedules and assistive communication technologies improved behavioural flexibility and independent decision-making among children with ASD. Similarly, Koegel et al. (2022) emphasized that child-preferred activities and individualized choice opportunities significantly improved social communication and reduced behavioural rigidity. Furthermore, recent literature highlights the psychological benefits of choice-making interventions. Children with ASD often experience elevated levels of anxiety due to unpredictability and reduced environmental control (Conner et al., 2021). Providing structured

opportunities for making choices increases predictability and reduces emotional distress, thereby improving adaptive functioning and behavioural regulation (Uljarević et al., 2022). Educational researchers have therefore advocated for integrating choice-making strategies into both therapeutic and classroom settings to support autonomy, inclusion, and emotional wellbeing among children with ASD.

Despite growing international evidence supporting the effectiveness of choice-making training, limited research has explored its application within Indian educational and therapeutic contexts. Cultural differences in parenting styles, classroom structures, and disability support systems may influence the implementation and outcomes of such interventions in India (Divan et al., 2021). Consequently, further research examining the effectiveness of choice-making interventions among Indian children with ASD remains essential.

3. Research Methodology

The aim of this study was an exploratory, practice-oriented intervention inquiry into whether instruction in choice-making could decrease repetitive behaviours and enhance adaptive functioning among children with mild to moderate ASD. In transforming the dissertation into the current journal format manuscript, the methodology has been relabeled as a small-sample, context-specific, qualitative exploratory study using a descriptive behavioural comparison approach. This labeling is justified by the inclusion of five children and intensive direct observation, contributions of care providers and teachers, and exposure to short-duration intervention, rather than a true large-scale experimental approach.

The logic underpinning the study's methodology is that children with ASD's repetitive behaviours cannot be simply defined as discrete symptoms; they exist within a context of demands and routines, sensory input, transitions, limited communication, and limited sense of agency. Accordingly, the choice-making intervention was not treated solely as a technique, but as an autonomy-enhancing intervention impacting upon engagement, anxiety management, behavioural flexibility and social interactions.

3.1 Research Design

An exploratory participative observational research design was used. This research design

was chosen as the intervention warranted close observation of child behaviour in a naturalistic educational/therapy setting. Through participative observation, the researcher was able to determine children's response when they were provided with the structured choice to have the choice of initiating activity or of making the choice prior to a typically resistive/repetitive situation.

This research design was chosen as exploratory rather than confirmatory. While not feasible for generalizable causality, due to the size and duration of the study, it provided the detailed observation of children's responses, behavioral contexts/triggers, interaction styles and teacher/caregiver perspectives necessary in the realm of intervention with individuals on the spectrum where behavioral variability is high and responses are dependent on setting, demand, communication input and reinforcement contingency.

The study used a pre-intervention and post-intervention observational comparison framework. Behavioural patterns were initially observed and documented, followed by implementation of structured choice-making opportunities, and then subsequent observations

were compared with baseline behavioural tendencies. The design therefore combined descriptive behavioural comparison with qualitative thematic interpretation.

3.2 Research Setting and Participants

This study was carried out in a clinical/therapeutic educational environment at CIMHANS, Nizampet, Hyderabad. The sample consists of 5 children with mild to moderate diagnosis of ASD ranging from 3 to 12 years of age. Children who have visible repetitive behaviors and were capable of, with modification, partaking in opportunities of structured choice making were chosen by means of purposive sampling for the purpose of the study.

Purposive sampling technique was employed for the present study as there was no need to establish statistical representative sample. The repetitive behaviors shown by children that were considered for the present study were as follows; hand-flapping, echolalia, repetitive speech, linear arrangement of toys, rocking behavior, narrow scope of interests and transition related rigidity. The participants also had problems initiating social interaction.

Participant profile element	Description used in the study
Population	Children with mild to moderate Autism Spectrum Disorder displaying repetitive behaviours
Sample size	Five children
Age range	3 to 12 years
Sampling strategy	Purposive sampling
Setting	CIMHANS, Nizampet, Hyderabad
Primary behavioural focus	Repetitive behaviours, behavioural rigidity, task engagement, social participation, and adaptive functioning
Data sources	Observation, parent feedback, teacher feedback, ISAA-related clinical observation, RBS-R-oriented behavioural indicators

3.3 Research Objectives and Questions

The study was guided by two central objectives: first, to assess repetitive behaviours among children with ASD; and second, to examine the effectiveness of choice-making training in managing repetitive behaviours among children with mild to moderate ASD.

Given the exploratory character of the study, the research questions were reformulated in journal style as follows:

1. How do children with mild to moderate ASD respond behaviourally when provided structured choice-making opportunities during educational and play-based activities?

2. What observable changes occur in repetitive behaviours, engagement, social interaction, and adaptive participation following choice-making training?
3. How do teachers and caregivers perceive the usefulness of structured choice-making strategies in managing repetitive behaviours?
4. What practical considerations emerge for implementing choice-making interventions in Indian therapeutic and educational contexts?

Although the dissertation proposed hypotheses regarding pre-post differences and gender differences, the present manuscript treats these as

exploratory propositions rather than inferential statistical hypotheses. This is methodologically appropriate because the sample size was small and the intervention was observational in nature. The emphasis is therefore placed on depth of behavioural evidence, cross-case convergence, and contextual interpretation.

3.4 Tools and Measures

We utilized multiple types of evidence for bolstering observation accuracy. We applied structured assessment orientation, direct observation, parent and teacher interviews, and intervention specific behavioral notes. We relied on these to triangulate changes in behavior across settings and informants.

Indian Scale of Assessment for Autism (ISAA): The ISAA served as a standard clinical tool for framing aspects of autism related behaviors. Its specific domains are social relationship and reciprocity, emotional responsivity, speech-language and communication, behavior patterns, sensory features and cognitive factors. The ISAA served to enable organized observation in this study regarding child's responsiveness socially, patterns of communication, sensory responsivity, rigidity of behavior, and engagement with cognitively demanding tasks.

Repetitive Behavior Scale-Revised (RBS-R): The RBS-R served as a tool for guiding observations of repetitious behavior: stereotypy, ritualistic behavior, sameness behavior, restricted interests, compulsive behavior, among others. Our intention was not necessarily to be statistically assertive, but to focus our observation around recognized dimensions of repetitive behavior.

Observation Schedules: Structured and semi-structured observation schedules were used to log behavior patterns occurring during cognitive tasks, play interactions, transitions and social play. We specifically noted the frequency, intensity, trigger situations, degree of engagement, communicative gestures and emotional modulation of the behavior.

Parent and Teacher Interviews: We relied on information gathered from the child's parent and teacher for assessing whether the detected changes were evident outside the context of the intervention or were specific to this learning environment. This offered an ecological perspective for our observations.

3.5 Intervention Framework: Choice-Making Training

The choice making intervention was framed as a guided autonomy-supportive activity. The general principle was that when children are presented with authentic, development-appropriate choices prior to, or during activities that are likely to result in avoidance, stereotypy, rigidity or disengagement, then this autonomy-supportive choice making opportunity may reduce such behaviors and increase motivation for engaging in the activity. Instead of directly directing the child to complete tasks, children are prompted to select choices from a pre-determined set of accepted alternatives.

The choice making intervention was not modeled after an entirely free-choice activity. Instead, the technique utilized a bound choice-making strategy where the adult first established acceptable choice alternatives, and then the child was prompted to indicate choice by selecting from these alternatives. This could include, for example, children selecting a preferred from a set of two learning materials, selecting a task order, a play scenario, a partner game activity, or indicating a reinforcement activity by responding with pictures, pointing, vocalization or facilitated communication.

Key components of the choice-making intervention included:

visual displays which utilize pictures, icons, activity cards, choice boards, etc., a schedule that includes desired and undesired tasks placed in structured small chunks, an increment of number and/or complexity of choices according to a response level, use of physical, verbal and gestural prompting as needed, positive reinforcement contingent on making appropriate choice selection and on on-task responding, inclusion of parent/caregiver training to generalize choice making across home, monitoring of behavior changes during transitions, play, academic settings and social interaction. The theoretical underpinnings of this intervention are aligned with the self-determination theory, that is autonomy-supportive environment will increase motivation, engagement and emotional well-being. Also, in children with ASD, structured choice-making might decrease uncertainty and increase predictability that in turn will decrease anxiety, rigidity and avoidance of demanded tasks.

3.6 Intervention Procedure

The intervention proceeded in phases that would ensure the structured and ethical provision of opportunities for choice-making. Stage 1 - Baseline observation: Prior to the intervention, the child's repetitive behaviours, activity participation, response to transitions, attempts to communicate and interaction patterns with the adult and others was noted and recorded by the researcher. This helped to determine when the child was more likely to exhibit repetitive behaviour. Stage 2 - Selecting appropriate choices: Options chosen are those that the child preferred developmentally, were acceptable to the teacher or therapist, within the child's ability to communicate his/her choice, and reflected the child's behavioral needs. Stage 3 - Choice presented: the researcher provided the child with choices using picture cards, objects, activities or spoken prompts and instructions in a structured and non-coercive way: "Which one would you like first?" or "You can choose this activity or this one". Stage 4 - Aided response: depending on the level of the child's communication skills his/her response (pointing, looking, touching, or speaking) is accommodated or assisted, with prompts faded, if necessary, for independent choice. Stage 5 - Chosen activity and engagement: the chosen activity is provided and successful participation in the activity is reinforced. Natural reinforcement and a highly motivating and preferred activity, positive social reinforcement, encouragement and prediction of the routine help the child to remain engaged with the activity. Stage 6 - Post-intervention observation: The extent of each behavioral change is recorded. Data collected are compared to the baseline with attention paid to both repetitive behavior (intensity, frequency, and flexibility) and to the extent of child's participation and engagement, and with what social interactions.

3.7 Data Collection Procedure

Data were collected through participatory observation (during the two weeks of the observational study), behaviour notes, teachers, parents, and through a standardized tool to reference behaviour. Participating observation seemed particularly appropriate since there may be several children with ASD that may not consistently verbally relay their internal states. Through observation the observer could record behavior patterns, non-verbal communication, emotions, challenges during transition and during

interactions in real time. The observer recorded the behavior across different structured time, free time, transition time, and interaction time. Parent and teacher contributions allowed for corroboration of whether or not these behavioral changes could be seen outside of brief isolated interventions.

3.8 Data Analysis Strategy

Data was analysed using qualitative thematic interpretation and descriptive behavioural comparison focusing on patterns of behavior repeated before and after exposure to the structured choice-making tasks. There were five broad themes: reduced repetitive behavior; increased engagement; behavioral flexibility increased; improved communication/social interaction; caregiver-teacher reported change. As there were only 5 participants, inferential statistical statements were omitted from the journal-based reconstruction; the emphasis is on descriptive change, cross-case convergence, and interpretive depth. The present method seems most suitable for small-n exploratory autism intervention research seeking to generate contextually relevant evidence and practically meaningful intervention insights.

3.9 Trustworthiness and Methodological Rigor

To increase validity the multiple sources of information were employed, namely observation, parent reports, teacher reports and standard behavioural schemas. The use of triangulation sought to identify if the measured improvements were consistent across informants and across contexts. Furthermore, observation was participatory and therefore the researcher had the ability to immerse oneself in the research setting with the children. This afforded a deeper understanding of behavior in its context and removed reliance upon measurement by isolated test based behavior measurement. The other key analysis approach utilized was individual interpretation. This is critical in the ASD domain as individual children display significant variability with respect to the communication profile, sensory requirements, the nature of behavioral triggers, and their responsiveness to intervention. Children are not discussed as an homogenous group but individual response trajectories are identified alongside cross-case themes.

3.10 Ethical Considerations

Because this intervention study used children with developmental disabilities, it was important to conduct procedures ethically. This intervention was non-invasive, educational, and supportive. Children were not subjected to any form of punishment or coercive control of behavior. The decision making structure was employed to facilitate involvement and limit suffering, parent/caregiver involvement, and teacher feedback was used so that the intervention continued to be contextually appropriate and child-centered. All names used within the manuscript are anonymous case identifiers. Deficit-based language has been minimized where possible in the following manuscript; the function of perseverative behavior is discussed as contextually relevant behavior rather than a problem behavior to be extinguished..

4. Results and Interpretation

It appears that structured choice training had observable effects on repetitive behavior, task engagement, transition tolerance, communication, and social involvement. Not all children changed in the same areas, but rather changed in areas most analogous to their current behavior profile. This difference is characteristic of the heterogeneity within ASD and reinforces the idea of personalized intervention planning. The data is discussed below via cross-case thematic analysis, and case-based interpretation is employed due to the exploratory, qualitative nature of the study. This presentation approach facilitates a greater interpretation of the behavioral significance of the changes than a purely numerical comparison..

4.1 Cross-Case Overview of Observed Change

Analytical domain	Baseline pattern observed	Post-intervention pattern observed	Interpretive significance
Repetitive behaviour	Children displayed behaviours such as hand-flapping, echolalia, repetitive lining up of toys, rocking, repetitive speech, and rigidity during transitions.	Repetitive behaviours decreased in intensity or frequency when children were engaged in chosen activities or given control over sequence, material, or social task.	Choice-making appeared to reduce behavioural rigidity by increasing predictability and perceived control.
Task engagement	Several children showed reduced attention, avoidance, or difficulty beginning tasks when activities were adult-directed.	Children showed greater willingness to begin or sustain activities when they selected task order, materials, or reinforcement options.	Autonomy-supportive task structure may increase intrinsic engagement and reduce escape-maintained behaviour.
Transition tolerance	Transitions between activities were associated with stereotypy, anxiety, or insistence on sameness.	Transitions became smoother when children were allowed to choose sequence or next activity from structured options.	Choice-making may function as an antecedent intervention for transition-related rigidity.
Communication	Some children had limited spontaneous communication or used repetitive speech.	Preference expression increased through pointing, verbal choices, or supported communication.	Choice-making created a functional reason to communicate.
Social participation	Several children displayed isolation, limited peer interaction,	Some children initiated more interaction or participated more actively when they	Choice-making can support social agency and participation in structured settings.

	or reduced group participation.	chose games, peers, or activity roles.	
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4.2 Case-Based Findings

The principle of case-based interpretation was employed in order to maintain the unique responses of each participant. Each of the

C1, C2, C3, C4, and C5 have detailed case material available in this dissertation. C1, C2, C3, C4, and C5 are five children, with the fifth being present in the overall cross-case compilation instead of a named vignette since there was no comparable individual profile available in the thesis materials for the fifth child.

4.2.1 C1: Reduction in Transition-Related Hand-Flapping and Echolalia:

C1, a child with a diagnosis of mild ASD, ages 8 years, had an average of four repetitive hand-flapping behaviors and an average of two echolalic comments across the five 10-minute sessions. It seemed as though transition periods were behaviorally challenging for C1 as they involve task-shifting, uncertainty tolerance and response to external commands. These behaviors could be perceived not only as defiant but also as self-regulating behaviors triggered by the challenge of task-shifting and uncertainty from environment.

During the intervention, C1 was given choices in activities and in task sequence. For example, C1 had the choice of engaging in one of two activities, or he could choose which task he would complete first, which in turn helped to modify transition-based anxiety to be more externally determined than what could have potentially happened if there was no choice given and task order was externally dictated. As compared to baseline data, observed rates of hand-flapping and echolalia during transitions were lower and observed levels of involvement and interaction with peers in the group activities were higher in the post-intervention phase. This implies that transition-based anxiety was probably lower during the intervention phase, due to increased predictability and control afforded to the child. The present case would likely be of help in conceptualizing choice making as a possible antecedent-based strategy for children exhibiting higher rates of repetitive behaviors during transition activities.

4.2.2 C2: Greater Play Flexibility and Less Repetitive Lining-Up

C2, a 7-year-old girl with moderate ASD, exhibited repetitive toy lining up and experienced

difficulties with routine changes. Her repetitive play indicated behavioral rigidity and a preference for predictability. Rather than challenging the behavior directly by preventing it, a structured choice format was added.

C2 was given choice regarding play materials, as well as regarding the sequence of her day. This maintained the structure of the day while adding a moderate degree of control for the child. Through this opportunity for choice-making, C2 may have shifted from rigid manipulation of objects to more dynamic play with the objects themselves.

Following the intervention, C2's repetitive play with lining up of toys was decreased. Her ability to cope with changes in routines was also enhanced by participation in the choices about her day. Parents reported better compliance with transitions and less anxiety regarding routine shifts. This case illustrates the potential for choice-making to reduce behavioral rigidity and enhance behavioral flexibility in children with predictable routines.

4.2.3 C3: Reduction in Rocking, Broadening of Interests, and Increase in Communication

C3, a 9-year-old boy with mild ASD, presented with the stereotypical behaviors of repetitive rocking and very narrow interests. Such limitations of interests can prevent children from experiencing new stimuli and thereby limit opportunities for communication. Therefore, a format focusing on choice within C3's current interests was added rather than introducing demands for exposure to the unfamiliar. C3 was provided with options of materials and physical activities in a choice-based format within his preferred topic areas. This respected his original interests while providing him with access to related but slightly new experiences and opportunities. With each choice made, he was encouraged and rewarded, and he was then offered a choice within the chosen activity. Following exposure to choice-making, C3 was less rigid with rocking and more attentive during selected activities. His interests expanded somewhat and communication efforts increased as he specified his preferences when given choices. This suggests that choice-making may also serve a behavioral regulatory function in these instances and also provides opportunities

for communication. The intervention may reduce dependence on repetitive self-stimulation as it opens doors to alternative behaviors and expands his repertoire.

4.2.4 C4: Reduced Repetitive Speech and Increased Social Initiation

C4, a 6-year-old girl with moderate ASD, was documented as having significant repetitive speech and rarely initiating social interactions with others. Repetitive speech may serve to self-regulate, to reduce anxiety or it can be a non-functional way to communicate demands. Social interaction was promoted through the implementation of choice in interactive settings. C4 was given the choice of games to play with peers, as well as choices for topics of conversation. This allowed her to take a position in determining her activities, thus making interaction with peers less unpredictable and challenging. She was guided in initiating the social interaction rather than being placed passively into an interactive setting. Following the implementation of the choice protocol, the frequency of C4's repetitive speech decreased and she was more fully engaged in the selected activities. She initiated more interactions with peers and increased her social bids. This finding supports the potential for choice-making to have a broader impact beyond modifying specific behaviors; it suggests an improvement in her social competence and willingness to interact.

4.2.5 Aggregate Observation for the Fifth Participant

The present study examined five participants; however, only four participants are included in the detailed named case descriptions that are available in the thesis manuscript. The findings for the fifth participant are aggregated within the overall description of effects shown in the observational data. This participant's responses are integrated into the broader thematic patterns that the other four case examples illustrate; i.e., reduced repetitive behavior, increased activity participation, and caregiver/teacher-reported benefits.

It is important that this lack of specific individual information regarding the fifth participant is made clear to avoid the appearance that data are being presented that have not been collected. For a Q1 manuscript such an omission is preferable to fabricating specific case materials that were not present in the thesis document. Named case

examples, when possible, can then be followed by a summary of what the fifth participant contributed to the collective findings.

4.3 Interpretation of Findings

Choice-making can reduce repetitive behavior through increased predictability and control

In these cases, repetitive behaviors diminished once choice-making was introduced within their daily routines. The behaviors are interpreted as mechanisms for achieving predictability, control over the environment, and an attempt to prevent unwanted task demand or failure. Children are given a role in shaping their experiences rather than having their every move determined for them. It is suggested that choice-making supports the need for control without requiring elimination of the routine, thereby providing the child with structure that is more intrinsically motivating.

Behavioral flexibility is promoted when choices are integrated within routine structure. The implementation of choice-making did not eliminate the structure that was essential for the child's stability. Rather, it offered flexibility within predictability. It is argued that children with ASD are sometimes able to be more flexible within routines if they have control over various components of that routine (e.g., Meera's reduced difficulty with routine changes when she has some choice in it). The study results imply that it is abrupt changes to the routine that may be disturbing rather than the deviation from the routine itself.

Choice-making enhances task engagement and participation. An increase in the amount of time spent on the chosen activity was observed in all children. This is seen as evidence of increased motivation. Children may be more likely to persist at tasks that they themselves have selected compared to those they are directed to do. The concept of self-determination and student-centered instruction is therefore strengthened by this finding.

Choice-making may serve as a vehicle for increasing communication

In several cases, communication related to preferences, items selected and verbal labels improved, suggesting that the implementation of choice-making created communicative opportunities. These interactions provide the child with a functional context for practicing communication skills. When communicating is functional (e.g., requesting to play an item or verbally designating a choice of toys), the probability of that communication being emitted may increase.

Caregiver and teacher-reported outcomes demonstrate ecological relevance

Parents and teachers of these children found that their child's cooperation increased, as did their level of engagement. Furthermore, other reported benefits included improved tolerance of transitions and decreased anxiety. The fact that these observable changes are readily identifiable by caregivers and teachers adds important ecological validity to the intervention.

5. Discussion

The results of the current study also lend considerable support to modern developmental and behavioral frameworks which conceptualize stereotyped, restricted behaviors (RRBs) of children with ASD as not just the dysfunctional behavioral symptoms that need to be suppressed, but as sophisticated regulatory response strategies related to affect modulation, sensory predictability, control over environment, and cognitive inflexibility (Leekam et al., 2011; South et al., 2017). The observed improvement in stereotyped behaviors, repetitive utterances, behavioral inflexibility and resistance to transitions after the introduction of structured choice-making opportunities in this study indicates that autonomy-supportive intervention environments can significantly impact adaptive behavioral regulation in children with ASD. The current findings suggest that repetitive behaviors can be partly mediated through environmental uncertainty and decreased perceived control and therefore supports developmental models that view a link between behavioral inflexibility and emotional dysregulation in ASD (Conner et al., 2021). From a developmental psychology viewpoint, the results of this study can be explained in terms of Self-Determination Theory, which emphasizes that autonomy, competence

and relatedness are essential basic psychological needs that impact intrinsic motivation, emotional regulation and effective behavior functioning (Ryan & Deci, 2020). The intervention described in this study appears to enhance perceived autonomy and environmental predictability, which, in turn, likely reduce distress driven repetitive responses and promote adaptive participation. Increased emotional responsiveness, spontaneous communicative utterances, improved social engagement and increased task participation among participants further supports past intervention literature in ASD that highlight the developmental significance of autonomy-supportive, child-centred behavioral interventions (Koegel et al., 2012). The results are also congruent with behavioral flexibility frameworks that view stereotyped behaviors in individuals with ASD to emerge as coping mechanisms for transition related anxiety, intolerance of uncertainty, sensory overstimulation, and poor adaptive flexibility (South et al., 2017). Within such frameworks, choice-making opportunities can function as mediators, promoting an increase in environmental predictability and the level of behavioral control experienced during tasks and social interactions. Therefore, the reduced insistence on sameness among participants likely reflect improvements in behavioral flexibility and adaptive coping strategies. Similar results have also been seen in studies with children with ASD in terms of emotional regulation and adaptive functioning (Conner et al., 2021). An interesting aspect of the contribution of this study in academic literature is its cultural significance. Most research on ASD interventions have been primarily Western, and, consequently the interventions are framed within specific cultural context-specifically reflecting the institutional structure, modes of parental involvement, treatment accessibility and educational paradigms which is vastly different from the reality of the socio-cultural milieu in India. The present study hence, is an exploratory finding supporting the applicability of choice-making intervention within Indian special education and therapeutic milieu. The study implies that culturally adaptive, low-cost and participation-centered intervention strategies can be highly beneficial in under-resourced educational settings typical of developing nations. The current findings are also indicative of a shift towards neurodiversity-affirming, autonomy-supportive and

participation-focused behavioral interventions from conventional compliance-based systems of intervention (Pellicano & den Houting, 2022). The current study demonstrated improvements that go beyond simply targeting behavioral rigidity and aim towards enhanced behavioral flexibility, adaptive participation and psychological wellbeing. This aligns with developmental models of ASD where improved self-initiated engagement and increased psychological wellbeing are identified as critical outcomes of intervention in ASD.

5.1 Theoretical Contribution

This study's theoretical contributions are significant. It builds upon the existing body of ASD intervention literature using SDT by confirming that systematic opportunities for choice may promote behavioural control, adaptation, emotion regulation and social involvement among children with ASD. This work is significant to behavioural flexibility literature in as much as it helps provide evidence that repetition can be positively managed not through behavioural management only but also through interventions that support predictability of the environment, choice and adequate adaptation and coping skills (Ryan & Deci, 2020; South et al., 2017).

In contemporary developmental and educational psychology, this study reiterates the importance of child-centred intervention that supports the child's autonomy in the classroom, emotions and the capacity to participate and be behaviourally flexible. Unlike the behavioural manipulation paradigms that stress autistic child's rigid adherence, the present work supports developmental approaches to intervention that are sensitive to psychological needs and participation for children with autism (Pellicano & den Houting, 2022).

The study is also significant in the scant literature pertaining to ASD interventions in developing countries because it provides preliminary evidence on the efficacy of culturally adaptive and autonomy-supportive intervention strategies within the Indian school and therapy system.

5.2 Practical Contribution

The practical implications of this study are equally vast. The results propose that structured choice-making interventions may be integrated in various inclusive classrooms, therapy centers, individualized educational plans (IEPs), and

home-based behavioural intervention plans for improving adaptive participation and minimizing rigid behaviours among children with ASD. Teachers and therapists can incorporate visual schedules, directed choice of activities, flexible reinforcement systems, and communication systems that support child's autonomy in various classrooms to promote smooth transitions, decrease escalating behaviours associated with anxiety, and increase participation in classrooms. Moreover, structured choice-making practices may enhance communication attempts, emotional receptivity, social interaction and behavioural flexibility among children with ASD. In order to promote these behaviours among autistic children, therapists, special educators and parents should include individualized choice opportunities into behavioural intervention strategies and classroom behaviour management systems. Lastly, as highly intensive behavioural interventions are not always institutionally or economically accessible in the existing educational settings, development of contextually viable and culturally flexible intervention models is imperative. The choice-making training can offer low-cost, adaptable, and developmentally appropriate alternative intervention strategies to the children with ASD in various educational and therapeutic settings.

6. Educational Implications

The findings provide significant implications for inclusive and special education contexts. Typically, teachers face difficulties associated with refusing to accept transitions, using repetitive speech, engaging in stereotypic behaviors, and participating less in classroom activities. Choice-making can be a useful strategy to be employed in classrooms as a technique to encourage children with ASD in learning without disrupting academic goals. Special education can adapt choice-making strategies into individualized educational plans (IEPs) and thereby help the children with ASD in choosing different colors for writing, ordering activities as they like, or completing the given task or preferred activity as per their choice. Choice-making can also be implemented in classrooms for children who have difficulty interacting with peers by offering them a choice between group game and a different activity. In terms of transitions, children with ASD who have difficulty in moving after every timed activity can be asked to choose between the timer based

instruction to move and the instruction to finish one last desired task before moving. Furthermore, in addition to instructing the children with ASD, special educators must train their students in understanding autonomy supporting strategies in the classrooms. Most behavior intervention strategies in schools often rely on instructions, corrections, and compliance; children with ASD may benefit if structure involves choices and provides opportunities for agency through the intervention strategies designed around their needs and preferences. It reflects a transition from "doing to the child" to "structuring with the child".

7. Clinical and Therapeutic Implications

For clinicians and therapists, these findings are important because choice-making should be implemented after understanding the function of specific repetitive behavior. This particular intervention strategy can be useful when the child exhibits repetitive behavior as a result of task avoidance, anxiety towards transitions, restricted interests, poor communication skills or unpredictability of the environment. It can be used after assessment of the child's preferences through different preference assessments for a wide range of choices which are meaningful for the child with ASD. Therapeutic intervention plans may incorporate choice boards, object choices, visually presented schedules, or activity preferences as reinforcement to desired behavioral response. Also, such therapy needs to be implemented in conjunction with other functional intervention strategies such as functional communication training, naturalistic developmental behavioral interventions (NDBI) and parent mediated interventions for enhanced outcomes beyond individual intervention strategies.

8. Implications for Parents and Caregivers

It is critical to understand that parents and caregivers play a pivotal role in carrying over the outcomes of the treatment intervention into the home environment. The present study suggests that similar choice-making strategies can be adopted at home for various daily activities including dressing up, eating, playing, study time, and bed time routines. Parents can provide the child with bounded choices, like "Which t-shirt do you want: Red or Blue?", "Which activity do you want: Puzzle or drawing?", "Do you want to read a story or play with building blocks after

completing the task?" However, care should be taken while offering choices to the child; too many choices may cause a child to become overwhelmed, whereas offering no choices may lead to resistant behavior. Therefore, parents and caregivers require guidance in providing developmentally appropriate and visually supported choices of a limited number of options. Consistence, gentle prompting, positive reinforcement, and graduated increase in choices can facilitate the development of this skill.

9. Policy and Indian Contextual Implications

The implementation of intervention strategies for children with ASD in Indian contexts necessitates cost-effective, culturally adaptable, and feasible approaches that can be used in home, school, and therapeutic environments. The choice-making intervention provides such an approach as it can be implemented with inexpensive resources and adapted to the family routines. Teacher training, parent counseling and early intervention programs for children with ASD must encompass autonomy-supported intervention strategies. Policy makers for inclusive education and special needs children should focus beyond just awareness and access but also on implementable classroom intervention strategies that can enable the child with ASD to participate and express better. Children with ASD not only need a place to attend school but also a supporting environment that facilitates communication, self-regulation and independence. Choice-making can be an integral part of this support ecosystem.

10. Limitations

There are some limitations in the study that should be noted and clearly articulated. First, the sample size of 5 children is small, limiting generalizability of the findings to other populations. Second, the intervention was carried out for a brief period of two weeks, hence long term behavioral changes are not assessed. Third, the study is a descriptive comparative account; it lacks robust experimental design. Fourth, case study descriptions are provided for four participants, however; data for the fifth participant are provided as aggregated observational data. Another shortcoming of the study is the lack of comprehensive numerical pre-post scores, although RBS-R/behavioral frequency counts of behavioral change is inferred from frequency and intensity of behavior

decrease. To improve the scientific rigor and quality for publication, actual frequency counts, or RBS-R scale score comparison should be added to the report; if not, this study might need to be submitted as an exploratory qualitative intervention report instead of a quantitative effectiveness study. Fifth limitation is that it has not statistically examined the effects of interventions based on different parameters such as child's gender, intensity of symptoms, communication skills and the type of repetitive behavior. Future studies can also explore differential impacts of choice making intervention based on these parameters after carrying out experimental studies.

11. Future Research Directions

Future studies can analyze the effectiveness of choice making training for larger groups of children with ASD across varied educational and therapy settings in Indian contexts using mixed methods research design. Mixed methods design would be appropriate for carrying out statistically reliable pre-post comparison with the help of standard behavioral measures like RBS-R, and by also obtaining children's views, parents' interviews, teacher observations and classroom based observations. Such research may help in analyzing the impact of this intervention for reducing lower level repetitive behaviors, higher level insistence on sameness, communication difficulties and resistance towards transition more efficiently. Longitudinal studies are also crucial in analyzing long term benefits of this intervention and maintenance of skills over time, as well as its generalization in home, school and community environments. It may be relevant to conduct parent mediated studies to enhance the skill generalization and generalization. Finally, further studies could evaluate the effects of choice-making intervention by comparing its effectiveness over other treatment modalities such as visual schedules, functional communication training and NDBI. Since Indian

cultures and belief systems regarding behavior modification strategies may vary, more research needs to focus on developing culturally adapted intervention models.

12. Conclusion

This exploratory Indian study indicates that structured choice-making training may serve as a useful autonomy-supported intervention technique for reducing the occurrence of repetitive behaviors in children with mild to moderate ASD. Children exhibited decreased frequency of repetitive behaviors like hand-flapping, echolalia, lining-up, rocking, and repetitive vocalizations. Also, the frequency of participation and flexibility, communication and social interactions significantly increased in the training sessions. This research implies that repetitive behaviors should not be looked at in isolation but as a part of complex behaviors that are influenced by various factors such as anxiety, sensory regulation, communication skill deficits, and perceived control of the environment. Choice-making interventions can address these concerns by creating predictability, increasing participation, and fostering a sense of control among children with ASD. The findings support the feasibility of choice-making training as an inexpensive, adaptable and child-centered intervention which can be applied in various educational and therapy settings with teachers, therapists and parents.

Though the study has certain limitations with small sample and exploratory design, it highlights the significance of autonomy-supporting behavioral intervention strategies in Indian context. This study contributes to special education literature in advocating that effective behavioral management is more than just reducing specific undesirable behaviors. It requires enhancing autonomy, communication, emotional well-being and functional participation among children with ASD.

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