

Stereotyped Behavior among Children with Autism Spectrum Disorder—A Scoping Review

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Introduction

Autism Spectrum Disorders (ASD) is the leading cause of developmental disabilities worldwide. ASD is a complex developmental disorder characterized by impaired social interaction and communication as well as restrictive and repetitive behaviors. The incidence of children diagnosed with ASD, once considered relatively rare, has increased worldwide from 2 to 6/10,000 in epidemiological studies prior to the 1990s, and is currently estimated at 260/10,000 or 2.6% (Wall 2016). It is estimated that more than 2 million people in India may suffer from ASD (Krishnamurthy V, 2008).

According to a new study (Children's National Health System, 2019), tetra hydroprogesterone, a hormone produced by the placenta during the third trimester, is a very potent neurosteroid if its continued supply to the developing fetus is disrupted, which may predispose to damage associated brain disorders.

Repetitive and stereotyped behaviors are one of the hallmarks of autism spectrum disorders (ASD; American Psychiatric Association 2000). The most common stereotypical behaviors were handshakes, head or arm nods, sudden running, body balancing forwards and backwards, repetitive handling of objects, and finger movements (Hattier, M.A, 2013). These movements are involuntary and have the unique function of generating physical and sensory self-regulation that limits the individual's interaction with the environment (Freeman, R.D, 2010).

Systematic reviews on stereotyped behavior in autism spectrum disorder

A systematic review was carried out to comprehensively examine the outcomes of RRB in children with autism from birth to 3 years old. A detailed protocol was pre-designed according to PRISMA systematic review guidelines. From the published literature, 41 peer-reviewed journal articles were identified and included in this review. The synthesis of the literature shows that, in children with or about to be diagnosed with autism, differences in RRB are evident before the

age of 2 years. These differences are evident in both the frequency and strength of RRB in the field. In particular, RRB levels do not appear to correlate with autism severity in young autistic children.

A wide range of RRBs have been reported in the first years of life in autistic children, including repetitive motor behaviors, atypical sensory behaviors, persistence of identity (IS), and self-injurious behaviors (SIB). Compared to studies of older children, RRB in young children with autism does not appear to be associated with functional outcomes, but may be useful for early detection efforts (Chaxiong P, Dimian AF and Wolff JJ, 2022).

A systematic review was conducted through meta-analysis (SRM) to assess the effect of physical activity (PE) on stereotyped behavior in children diagnosed with ASD in intervention studies. These eight studies included a total of 129 children (115 boys and 14 girls) with a mean age of 8.93 ± 1.69 years. The number of stereotyped behavioral events was reduced by 1.1 in autistic children after the physical activity intervention. Evidence has been found to support physical activity as an effective tool in reducing the number of episodes of stereotyped behavior in children diagnosed with ASD (Jose Pedro Ferreira, Thaysa Ghiarone et al, 2019).

Developmental outcomes in autism spectrum disorder

Knoch, Kelley (2012) examined developmental differences in the frequency and severity of RRB in children with autism ($n=109$) and children with developmental disabilities (DD) ($n=34$). Participants were assessed at ages 2 and 4, with individual items of the Autism Diagnostic Interview rated as low or high and changes in frequency and severity assessed over time. Specifically, the data showed an increase in high-level behaviors without significant changes in the frequency of low-level behaviors. The RRBs were then examined against other developmental markers.

In children with ASD, low-level RRB severity was inversely associated with intelligence level and adaptive functioning, even when repetitive behavior in ASD controlled IQ. This suggests that children with ASD at age 2 had both high-functioning and low-functioning behaviors and then experienced a significant increase in the frequency of high-functioning behaviors at age 4. Suggesting that when an early diagnosis is made, it continues to investigate the relationship between RRB and other relationships marked by social communication are important.

Megan A Hattier et al (2013) examined the prevalence of repetitive motion and the relationship between stereotyping and sensory disturbances in young children (17-37 months) with ASD and atypical development. Children with ASD ($n=13$) exhibited significantly more repetitive behaviors than the non-ASD group ($n=12$). For the ASD group, support was significantly higher on almost all items of the Behavior Problems Inventory-01 (BPI-01) Stereotypes subscale. More repetitive behaviors tended to coexist with other stereotypes in the ASD group. A modest correlation was found between the severity of stereotypes and sensory deficits. These findings

suggest that stereotyped behaviors can be identified at an early age, negatively impact behavioral performance in people with autism, and should be considered when developing treatment plans.

Nola Chambers, Amy Wetherby et al (2008) studied autism spectrum disorder (ASD, n=50), developmental delay without ASD (DD; n=25) and typical development (TD), n= 50) Between the age of 18 and 24 months. Compared to the DD and TD groups, children with ASD showed significantly higher frequencies and longer durations of RSB with object, bodily, and sensory behaviors in the systemic behavior samples. The RSB with Objects is Associated with Simultaneous Measures of Symbolic Ability and Sociability in the Second Year and Predicts Developmental Outcomes and Symptom Severity of Autism at Age 3 in Children with communication disorders. RSB in the second year appears to be important for early identification and prediction of developmental outcomes.

Sensory processing in autism spectrum disorder

Meredith J. McCarty, Audrey C (2021) described autistic people's first-person narratives as relaxing and helping to focus and cope with an overwhelming sensory environment. As such, we generally oppose technologies designed to remove stereotypes of people with autism. Additionally, hypothesized that understanding the neurobiology of stereotypes could guide the development of treatments to produce the benefits of stereotypes without producing repetitive movements. Here, we link first-person accounts and clinical findings to the underlying neuroanatomy and physiology to produce a testable stereotyped model. Hypothesize that stereotypes enhance sensory processing and attention by modulating brain rhythms, either directly from rhythmic motor commands or through movement-generated rhythmic sensory feedback.

Laura Hiruma, Rebecca Edmondson Pretzel, Amanda L. Tapia et al. (2021) used exploratory factor analysis of RRB items from Autism Diagnostic Interview Modification (ADI), examining 827 people aged 35-71 months (RRB-R) from preschool children collected by Exploring Early Development Research. Qualitative comparison of RRB factor structure in children with diagnosed ASD and developmental difficulties in non-autistic children. Correlations between RRB factors and participant characteristics were examined in the ASD group. Three conceptually well-defined factors characterized by repetitive sensorimotor behavior (RSMB), persistence of identity (IS), and new stereotyped language factors (SPEECH) were present only in the ASD group. Different clinical correlates support different factors. The findings have important implications for improving the differential diagnosis and understanding of ASD symptoms in this age group.

Appropriate treatment for stereotyped behavior in autism spectrum disorder

Treatment options aimed at reducing stereotypes of people with ASD are often very invasive. Psychotropic medications and intensive behavioral interventions are the most common treatments. The effect of treatment on reducing stereotyped behaviors was assessed in terms of

the number of stereotyped occurrences over time, that is, the number of repetitions of a purposeful behavior during a limited observation period (Rosenberg, R.E. 2010).

This is a method of treatment that has been used successfully in various conditions where the lymph flow is obstructed by an obstruction in the lymph nodes. Behavioral interventions aim to encourage appropriate behavior (such as dressing or talking to others) and discourage inappropriate behavior (such as self-harm or attacking others). Therapists, teachers, and/or parents break down desired behaviors into small, doable tasks, which are then taught in a very structured way.

Conclusion

Behavioral interventions can significantly improve core characteristics of autism, such as social interaction difficulties, social interaction difficulties, and restrictive and stereotyped behavior patterns. Additionally, researchers say that behavioral interventions can lead to recovery in some autistic children.

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