Observational Study

Transition from early intervention program to primary school in children with autism spectrum disorder

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Abstract

AIM
To evaluate the characteristics that are associated with successful transition to school outcomes in preschool aged children with autism.

METHODS
Twenty-one participants transitioning from an early intervention program were assessed at two time points; at the end of their preschool placement and approximately 5 mo later following their transition to school. Child characteristics were assessed using the Mullen Scales of Early Learning, Vineland Adaptive Behaviour Scales, Social Communication Questionnaire and the Repetitive Behaviour Scale. Transition outcomes were assessed using Teacher Rating Scale of School Adjustment and the Social Skills Improvement System Rating Scales to provide an understanding of each child's school adjustment. The relationship between child characteristics and school outcomes was evaluated.

RESULTS
Cognitive ability and adaptive behaviour were shown to be associated with successful transition to school outcomes including participation in the classroom and being comfortable with the classroom teacher. These factors were also associated with social skills in the classroom including assertiveness and engagement.

CONCLUSION
Supporting children on the spectrum in the domains of adaptive behaviour and cognitive ability, including language skills, is important for a successful transition to school. Providing the appropriate support within structured transition programs will assist children on the spectrum with this important transition, allowing them to maximise their learning and behavioural potential.

Key words: Autism spectrum disorder; School transition; Primary school; Outcomes

Core tip: Assess, address and communicate children's strengths and difficulties during the transition to school process for better outcome including language skills, cognitive ability and adaptive function.

INTRODUCTION

Children with autism often find change difficult. This makes transitioning between different settings and stages of life particularly challenging[1]. In this regard, transition to primary school from preschool settings or early intervention programs is particularly significant as this is a major transition point in the child's life. A successful start to school has been defined as consisting of feeling secure and comfortable in the new school environment, increased academic and social skills, increased independence, engagement and motivation to participate in class and school activities[2]. It is also associated with academic progress, positive relationships with peers and teachers, positive attitudes and feelings about school and learning, and a sense of wellbeing, belonging and inclusion[2]. There is evidence to suggest that children who have a positive start to school are likely to engage well and experience academic and social success[3,4]. While there have been some efforts to provide specific programs to support transition to school, this is often targeted broadly for children with a disability and not specific to children on the autism spectrum, who arguably have individualised transition support needs[3]. Children with autism attend a variety of school settings including mainstream schools, specialised support classes within mainstream settings, specialised schools or centres[5].

Children with autism have a greater risk of poor school outcomes, including emotional and behavioural problems[6], bullying[7], school exclusion[8] and peer rejection[9]. It is therefore critical that both the barriers and protective factors for a positive transition for children with autism are well understood. However, there is a lack of empirical research that examines the transition to school for children with autism, and existing research on primary school transition has tended to adopt cross-sectional survey based methodology[3,4,10,11], rather than longitudinal designs with specific measurement of children's social, emotional, adaptive, cognitive and academic progress. A large number of school transition practices has been identified and endorsed from these survey studies; however, the adequacy of these practices has not been established. There is a need to understand the specific support needs of children on the autism spectrum in order to develop evidence based programs to enhance the school transition process. Additionally, a more systematic monitoring of developmental and behavioural progress, using standardised instruments, is also required in order to understand transition outcomes for children with autism[12].

This project aimed to evaluate transition to school outcomes for children transitioning from early intervention settings to primary school. It also aimed to

determine the individual characteristics associated with successful transition to school in children on the autism spectrum.

MATERIALS AND METHODS

Participants

Data were collected from children with a confirmed diagnosis of autism who were transitioning to school from six early intervention centres [Autism Specific Early Learning and Care Centres (ASELCCs)] across six states in Australia in 2016. The early intervention programs provided at each ASELCC were varied and included manualised programs like the Early Start Denver Model[13] and the SCERTs program[14], through to other programs based on evidence based principles that are still to be manualised. This total sample of 21 participants included 3 females (14%) and 18 males (86%). The mean age of the sample at exit from the centres was 5.4 years (SD = 0.4). Children had been attending the centre for a mean duration of 23 mo (SD = 9.9).

Design

Data were collected at two time points; at the end of the preschool placement and approximately 5.4 (SD = 1.8) months later following their transition to school. A number of measures were administered at the end of the early intervention program. These included the Mullen Scales of Early Learning (MSEL)[15], Vineland Adaptive Behaviour Scales (VABS)[16], Social Communication Questionnaire (SCQ)[17,18], and the Repetitive Behaviour Scale (RBS)[19] There were a number of outcome measures that were collected following transition to school. Teachers were asked to complete the Teacher Rating Scale of School Adjustment (TRSSA)[20] and the Social Skills Improvement System Rating Scales (SSIS)[21]. Parents were also asked to rate their child on the parent form of the SSIS. Parents were also asked questions about their child's school placement.

Measures

MSEL: The MSEL[15] is a standardised assessment which provides a measure of cognitive and motor development in children from birth to 68 mo. The MSEL consist of four subscales evaluating visual reception, fine motor, and receptive and expressive language skills. Developmental quotients (DQs) were calculated for each subscale of the MSEL by dividing each child's age equivalent score by their chronological age at the time of testing and multiplying by 100[22] given that a number of children in the sample did not receive MSEL subscale raw scores that were high enough for calculation of a meaningful *t* score (*i.e.*, they were performing at a level < 0.1 percentile).

VABS: The VABS second edition[16] evaluates parent perceptions of their child's adaptive functioning in a number of domains including communication, daily living skills, socialisation and motor skills. A norm-referenced standardised score with a mean of 100 and SD of 15 is calculated for each domain. This is also calculated for the

overall adaptive behaviour index. VABS scale scores with a mean of 15 and an SD of 3 are calculated for each subdomain. Higher scores are indicative of better adaptive function.

Social communication questionnaire: The SCQ[17,18] is a 40 item parent report measure evaluating autism symptoms, with a total score above 15 indicating probable autism[18].

RBS: The RBS[19] is a 44 item parent report questionnaire designed to evaluate repetitive behaviour in children with autism. The RBS consists of six subscales including stereotyped, self-injurious, compulsive and ritualistic behaviour, as well as restricted interests. Higher scores indicate a greater presence of repetitive behaviours.

SSIS: The parent and teacher SSIS[21] were included in the project to collect information on children's social skills development following their transition to school. The SSIS includes subscales evaluating social skills, including communication, cooperation, assertion, responsibility, empathy, engagement and self-control. It also evaluates problem behaviours, including bullying, hyperactivity/inattention, and symptoms of autism. A measure of academic competence is also included on the teacher rating form. Standard scores and percentile ranks are calculated for the social skills and problem behaviours composite scales.

TRSSA: TRSSA[20] is a 52 item measure that assesses adjustment to the school or classroom setting. It consists of five subscales including independent participation, cooperative participation, teacher's perception of children's school liking, teacher's perception of children's school avoidance, and teacher's perception of children's interest/comfort with the teacher. Higher scores on these subscales indicate a higher frequency of this behaviour.

Semi-structured interview: Parents completed a semi-structured interview following their child's transition to school. This was included in order to provide details regarding their child's school placement setting and experience of starting school.

Statistical analysis

The TRSSA and teacher rated SSIS were assessed as outcome variables of successful school transition. Cognitive ability, adaptive behaviour, autism symptoms and repetitive behaviours at exit from early intervention were entered into correlation analyses to evaluate their relationship with the TRSSA and teacher SSIS at school follow up. In order to account for the multiple comparisons and minimise type I errors alpha was set at $P = 0.01$ across all analyses.

RESULTS

School placement details

A large proportion of the sample (94%) transitioned

Table 1 Correlation between Teacher Rating Scale of School Adjustment and child characteristics at exit (*n* = 21)

	Cooperative participation	Independent participation	Likes School	Avoids School	Comfortable with teacher
Cognitive ability (MSEL)					
Visual reception	0.317	0.442	0.26	0.406	0.574[a]
Fine motor	0.318	0.486	0.454	0.421	0.622[a]
Receptive language	0.469	0.488	0.364	0.289	0.598[a]
Expressive language	0.453	0.603[a]	0.316	0.284	0.635[a]
Early learning composite	0.453	0.603[a]	0.316	0.284	0.635[a]
Adaptive function (VABS)					
Communication	0.596[a]	0.588[a]	0.124	-0.018	0.493
Daily living skills	0.531	0.505	0.051	-0.212	0.355
Socialisation	0.411	0.555[a]	0.22	0.045	0.519
Motor skills	0.568[a]	0.721[b]	0.445	-0.004	0.621[a]
Adaptive behaviour composite	0.567[a]	0.727[b]	0.332	-0.031	0.621[a]
Autism symptoms (SCQ)					
Total score	0.027	-0.156	-0.286	-0.254	-0.493
Repetitive behaviours (RBS)					
Stereotypic	-0.206	-0.248	0.209	0.129	-0.044
Self-injurious	0.204	0.301	0.353	0.454	-0.025
Compulsive	-0.188	-0.101	0.313	0.09	-0.065
Ritualistic	0.28	0.319	0.343	0.4	0.021
Restricted interests	-0.177	-0.258	0.189	0.49	-0.381

[a]$P < 0.05$, [b]$P < 0.01$. MSEL: Mullen Scales of Early Learning; VABS; Vineland Adaptive Behaviour Scales; SCQ: Social Communication Questionnaire; RBS: Repetitive Behaviour Scale.

from the early intervention centres to a full time (5 d a week) school program. Fifty-six percent transitioned to a mainstream setting, with 29% enrolled in a specialised school setting, 10% attending a mixed mainstream and special school, and 5% a special class in a mainstream school setting. Parents reported that the experience of starting school ranged from very good (53%) to fairly good (37%), with a smaller proportion indicating that their experience was just ok (5%) or not very good (5%).

Predictors of transition outcomes at school follow up
Correlations were conducted to evaluate the relationship between the child measures at exit and teacher ratings on the domains of the TRSSA and SSIS following transition to school. Results are presented in Tables 1-3.

TRSSA: Table 1 outlines the relationship between the TRSSA and child characteristics including cognitive ability, adaptive function and autism symptoms. Results indicated a significant positive relationship between scores on the MSEL and the TRSSA, with visual reception, fine motor skills and receptive and expressive language shown to be positively associated with comfort with the teacher. Expressive language skills were also associated with increased independent participation in the classroom.

 Communication skills, as measured by the VABS, were also positively associated with both cooperative and independent participation in the classroom. Motor skills and overall adaptive function were also positively related to both forms of classroom participation, as well as comfort level with the teacher. There was no relationship between autism severity or repetitive behaviours and the TRSSA.

SSIS: There were a number of associations between scores on the social skills subscales of the SSIS and child characteristics at exit (Table 2). All subscales of the MSEL were positively associated with the communication, assertion, empathy and engagement subscales of the SSIS. Receptive and expressive language skills were also related to overall teacher rated social skills.

Results indicated a significant positive relationship between all subscales of the VABS and communication and engagement on the teacher rated SSIS. The overall adaptive behaviour composite score was also shown to be associated with communication, assertion, empathy, engagement and social skills.

As noted for the TRSSA, there were no significant relationships between autism symptoms or repetitive behaviours and the social skills subscales of the SSIS. There was no significant relationship between cognitive ability, adaptive function, autism symptoms or repetitive behaviour and the problem behaviour subscales of the SSIS (Table 3).

DISCUSSION

This study evaluated the characteristics associated with transition to school outcomes in children transitioning from early intervention to their first year of school. There were a number of significant relationships between child characteristics at exit and school transition outcomes. Cognitive ability, including visual reception, fine motor skills and receptive and expressive language were positively associated with the level of comfort children showed with their classroom teacher. Expressive language skills and overall scores on the MSEL were also associated with increased independent participation in the classroom. This indicates that cognitive ability, and particularly

Table 2 Correlation between the social skills subscales of the Social Skills Improvement System Rating Scales and child characteristics at exit (*n* = 21)

	Communication	Cooperation	Assertion	Responsibility	Empathy	Engagement	Self-control	Social skills scale
Cognitive ability (MSEL)								
Visual reception	0.590[a]	-0.065	0.660[a]	0.114	0.591[a]	0.697[b]	0.161	0.468
Fine motor	0.606[a]	-0.03	0.671[a]	0.14	0.574[a]	0.733[b]	0.182	0.492
Receptive language	0.665[a]	0.101	0.718[b]	0.29	0.574[a]	0.792[b]	0.326	0.600[a]
Expressive language	0.784[b]	0.151	0.793[b]	0.259	0.651[a]	0.833[b]	0.321	0.655[a]
Early learning composite	0.784[b]	0.151	0.793[b]	0.259	0.651[a]	0.833[b]	0.321	0.655[a]
Adaptive function (VABS)								
Communication	0.732[b]	0.076	0.597[a]	0.416	0.563[a]	0.698[b]	0.319	0.591[a]
Daily living skills	0.656[a]	0.145	0.497	0.437	0.479	0.570[a]	0.372	0.548
Socialisation	0.677[a]	-0.099	0.695[b]	0.195	0.443	0.634[a]	0.096	0.464
Motor skills	0.799[b]	0.329	0.836[b]	0.35	0.529	0.717[b]	0.343	0.680[a]
Adaptive behaviour composite	0.815[b]	0.136	0.821[b]	0.338	0.580[a]	0.762[b]	0.261	0.647[a]
Autism symptoms (SCQ)								
Total score	-0.28	0.482	-0.4	0.218	-0.245	-0.256	0.289	-0.032
Repetitive behaviours (RBS)								
Stereotypic	-0.45	0.09	-0.331	-0.244	-0.358	-0.187	-0.346	-0.294
Self-injurious	0.107	0.29	0.168	0.222	-0.084	0.303	0.239	0.213
Compulsive	-0.291	0.099	-0.095	-0.194	-0.195	-0.03	-0.211	-0.153
Ritualistic	0.176	0.396	0.199	0.322	-0.044	0.319	0.317	0.289
Restricted interests	-0.38	0.035	-0.362	-0.029	-0.405	-0.121	-0.089	-0.201

[a]$P < 0.05$, [b]$P < 0.01$. MSEL: Mullen Scales of Early Learning; VABS: Vineland Adaptive Behaviour Scales; SCQ: Social Communication Questionnaire; RBS: Repetitive Behaviour Scale.

Table 3 Correlation between the problem behaviours subscales of the Social Skills Improvement System Rating Scales and child characteristics at exit (*n* = 21)

	Bullying	Hyperactivity/inattention	Externalising	Internalising	Problem behaviours scale	Academic competence scale
Cognitive ability (MSEL)						
Visual reception	0.233	0.005	0.218	-0.145	0.001	0.158
Fine motor	0.232	0.013	0.245	-0.28	0	0.101
Receptive language	0.097	-0.086	0.145	-0.167	-0.066	0.201
Expressive language	0.158	-0.119	0.146	-0.204	-0.08	0.093
Early learning composite	0.158	-0.119	0.146	-0.204	-0.08	0.093
Adaptive function (VABS)						
Communication	-0.083	-0.315	-0.095	-0.476	-0.374	-0.214
Daily living skills	-0.099	-0.374	-0.201	-0.452	-0.415	-0.025
Socialisation	0.243	-0.006	0.245	-0.237	-0.051	0.013
Motor skills	0.166	-0.186	0.113	-0.078	-0.104	0.384
Adaptive behaviour composite	0.149	-0.164	0.125	-0.257	-0.171	0.227
Autism symptoms (SCQ)						
Total score	-0.382	-0.296	-0.443	0.497	-0.138	0.404
Repetitive behaviours (RBS)						
Stereotypic	-0.228	0.023	-0.05	0.088	0.113	0.334
Self-injurious	0.004	-0.112	-0.031	0.255	0.033	0.41
Compulsive	-0.032	0.133	0.136	0.267	0.256	0.314
Ritualistic	-0.147	-0.188	-0.098	0.237	-0.045	0.36
Restricted interests	-0.140	0.075	0.031	0.317	0.17	0.179

MSEL: Mullen Scales of Early Learning; VABS: Vineland Adaptive Behaviour Scales; SCQ: Social Communication Questionnaire; RBS: Repetitive Behaviour Scale.

language skills, play a role in successful transition to school for children with autism. This is consistent with previous research highlighting that children on the spectrum with a higher level of skills, particularly in communication, tend to make more progress over time[12]. Interestingly, the current research also indicates that these skills are also associated with being comfortable with the teacher in the school environment.

Communication skills, as measured by the VABS, were also positively associated with both cooperative and independent participation in the classroom. Motor skills and overall adaptive function were also positively related to both forms of classroom participation, as well as comfort level with the teacher. Previous research has highlighted that both independent and cooperative participation in the classroom are critical to a child's

achievement and educational progress[23]. These findings therefore have clinical implications for transition practices.

Interestingly, while there were a number of cognitive and adaptive characteristics that were associated with successful transition to school for children with autism, there was no relationship between autism severity or repetitive behaviours and transition outcomes. This has important clinical implications for transition practices, as it indicates that autism symptoms were not the most important predictors of transition outcomes for children with autism exiting early intervention. This highlights that it is cognitive, language and adaptive functioning that are critical to successful transition to school.

Taken together, these findings indicate the need to assess and address cognitive ability, communication skills and adaptive function for better transition to school outcomes for children on the autism spectrum. Understanding and supporting any communication and cognitive difficulties will be of significant benefit to children with autism transitioning to school.

There were also a number of significant associations between child characteristics at exit and the social skills subscales of the teacher rated SSIS. Cognitive ability, as measured by the MSEL, was positively associated with communication, assertion, empathy and engagement. Receptive and expressive language skills were also positively related to overall social skills. This indicates the importance of cognitive ability and language in the development of social skills, particularly in the classroom environment. This is consistent with previous research outlining the link between language and social skills in autism[24].

Results indicated a significant positive relationship between all subscales of the VABS and communication and engagement on the teacher rated SSIS, highlighting the importance of adaptive function in relating to others. The overall adaptive behaviour composite was also shown to be associated with communication, assertion, empathy, engagement and social skills. This highlights the importance of adaptive behaviours in the development of social skills and school transition.

As noted for the TRSSA, there were no significant relationships between autism symptoms or repetitive behaviours and the social skills subscales of the SSIS, highlighting that autism symptom severity is not a significant barrier to school transition and less important than the language, cognitive and adaptive skills of the child. There was also no relationship between child characteristics at exit and the problem behaviour subscales of the SSIS, indicating that cognitive ability and adaptive function are more important in the development of participation in the classroom, level of comfort with the teacher and social skills but do not play as much of a role in the number of problem behaviours reported by school teachers.

Limitations
The response rate for this study was low, resulting in a limited sample size. This made it difficult to include models with a large number of predictors and correlates. Future research is warranted to replicate these findings within a larger sample. The findings from the current study would also benefit from the inclusion of a comparison group of children without a diagnosis of autism, as well as children who may not have transitioned from targeted early intervention settings. Future research incorporating these comparisons would allow for a more fine grained understanding of the unique challenges that are associated with children attending more specialised intervention programs and those receiving support in the community.

The results of the study indicated that child characteristics, including cognitive ability and adaptive function had a significant influence on transition to school outcomes for preschool aged children with autism. It is important to target relevant issues as they emerge across both home and school contexts. Targeting these issues in early intervention programs will assist children on the spectrum with this important transition, allowing them to maximise their learning and behavioural potential.

COMMENTS

Background
Transition from early intervention programs to the school setting can be a challenging time for children with autism. While a number of programs have been implemented to support transition to school, these have not been specifically tailored for children with autism. Children who have a positive start to school are more likely to experience academic and social success. This highlights the importance of effectively supporting children on the spectrum to experience a positive transition from early intervention services to primary school.

Research frontiers
This study aimed to evaluate the characteristics that are associated with successful transition to school outcomes in preschool aged children with autism. This study addresses an area that is currently under researched.

Innovations and breakthroughs
Cognitive ability and adaptive behaviour were shown to be associated with successful transition to school outcomes for children with autism. These factors were also associated with social skills in the classroom including assertiveness and engagement.

Applications
Understanding the factors associated with successful school transition will enable the development of guidelines for service providers and families to assist children on the spectrum to achieve academic and social success.

Terminology
ASELCC: Autism Specific Early Learning and Care Centres; MSEL: Mullen Scales of Early Learning; VABS: Vineland Adaptive Behaviour Scales; SCQ: Social Communication Questionnaire; RBS: Repetitive Behaviour Scale; TRSSA: Teacher Rating Scale of School Adjustment; SSIS: Social Skills Improvement System Rating Scales.

Peer-review
The paper is well-written and has interesting findings.

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