



Contents lists available at ScienceDirect

Research in Developmental Disabilities

journal homepage: www.elsevier.com/locate/redevdis

Introduction to special issue on neurodevelopmental disorders in the classroom



According to the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2013), neurodevelopmental disorders include all developmental disorders; intellectual disabilities, communication disorders, autism spectrum disorders (ASD), attention deficit and hyperactivity disorder (ADHD), specific learning disorders (i.e. dyslexia), motor disorders (including developmental co-ordination and movements disorders, Tourette's, and tic disorders), and other specified and unspecified neurodevelopmental disorders. Many of the children with these neurodevelopmental disorders experience difficulties that affect their educational and psychosocial outcomes. Yet, these disorders have different aetiologies and it is likely that their educational and psychosocial difficulties are associated with different cognitive, cultural, and personal developmental pathways. Therefore, it could be assumed that each management programme needs to be individualised and address issues related to the school, the child, as well as the family. However, research in relation to academic progress or the prevention, detection, and treatment of academic underachievement in neurodevelopmental disorders is still limited. As a result, it is unclear what factors facilitate or hinder academic achievement or how progress can be supported either in the classroom or through parental interventions.

This special issue brings together 14 original research papers related to neurodevelopmental disorders in the classroom. These manuscripts are exemplars of the depth and breadth of the research in neurodevelopmental disorders related to education and achievement. These studies showcase the different study designs and methods available to obtain a better understanding of the facilitators and barriers to learning for children with neurodevelopmental disorders as well as discuss new interventions to improve outcomes for children with neurodevelopmental disorders. The manuscripts in this issue focus on four main themes.

The first theme describes the experiences of children with neurodevelopmental disorders in the classroom. Although research in developmental coordination disorder (DCD) has steadily increased over the past few years, the prevalence of children with DCD in classrooms is still unclear. The study by Delgado-Lobete, Santos-del-Riego, Pérttega-Díaz, and Montes-Montes (2019) examined the prevalence of children with DCD in Spanish classrooms and found that up to 12% of children in a classroom could be at risk for DCD and are at an increased risk of being overlooked. As motor difficulties will impact children's development beyond the classroom, early detection and intervention is important in order to ensure these children can reach their full potential. The second manuscript focused on another under-researched area, namely bilingualism. Although recent research has shown that raising children with neurodevelopmental disorders in a bilingual environment does not put them at a disadvantage (Kay-Raining Bird, Genesee, & Verhoeven, 2016), research on any benefits is still sparse. Howard, Katsos, and Gibson (2019) interviewed for the first time bilingual children with ASD and showed that giving children with ASD from bilingual backgrounds opportunities to explore their linguistic identities in the classroom may actually enhance their experiences of school. This research showcases an aspect for neurodevelopmental disorders that has often been overlooked and that is the importance of eliciting the voices of children with neurodevelopmental disorders about various aspects of their school experiences and school lives. When children with neurodevelopmental disorders are given appropriate methodologies to express their voices, they can provide useful and accurate accounts of their experiences at school, which can be used as guiding lines for planning together support and appropriate interventions.

The second theme concerns the teachers working with neurodevelopmental disorders and includes five manuscripts. Love, Toland, Usher, Campbell, and Spriggs (2019) developed a new instrument to measure teachers' self-efficacy in the USA as well as Australia and showed that general teaching self-efficacy scales are not as informative nor as sensitive as one that asks a teacher specifically about a student they are working with. A better understanding of teachers' self-efficacy in relation to specific neurodevelopmental disorders would allow useful information for supporting teachers' beliefs for teaching students with ASD. Adams, MacDonald, and Keen (2019) compared predominantly primary school teacher responses to anxiety-related behaviour in students who do and do not have a diagnosis on the autism spectrum using the Teacher Responses to Anxiety in Children (TRAC). They found that teachers respond to anxiety differently when a student has a diagnosis of autism compared to students without autism and are more likely to use anxiety-promoting strategies, such as overprotecting and avoidance reinforcement, for presentations indicative of general anxiety and separation anxiety, but not social anxiety. Although it is currently not clear how students respond to these

<https://doi.org/10.1016/j.ridd.2019.103431>

differences, as anxiety is one of the major clinical features that affects ASD in the classroom, a better understanding of how teachers react to anxiety behaviour will allow for better outcomes for children with ASD in the classroom.

In a similar vein, [Welsh, Rodgers, and Honey \(2019\)](#), explored the attributions, emotional response and feelings of confidence held by teachers working in different educational settings when faced with restricted and repetitive behaviours (RRBs) in children with ASD. This study showed that professionals in mainstream education potentially hold less helpful beliefs and showed increased levels of frustration and reduced confidence in response to RRBs. Therefore, mainstream school teachers are a professional group who may benefit the most from additional support and training in how to respond to RRBs in the classroom.

[Feldman, Maye, Levinson, Carter, and Eisenhower \(2019\)](#) examined the quality of the relationship between teachers and students with ASD and how specific components of child language abilities (semantics, syntax, and pragmatics) mediated this relationship quality in the fall and spring of a school year. The results showed that pragmatic language was associated with student-teacher closeness for all children with ASD as well as semantic language for those children in a general education setting. Meanwhile, syntactic language skills (i.e., grammar) did not relate to the quality of the relationship between teachers and students. A noteworthy finding includes the role of classroom placement as a moderator of the relationship between child language and STR quality, suggesting that children in general education may need particular support in developing close relationships with their teachers.

Not only teachers work with children with neurodevelopmental disorders; most children with neurodevelopmental disorders have complex needs and require the support from a number of specialist professionals such as speech and language therapists, special educational needs coordinators and many more. Although studies have examined the views of teachers with regards to the support students with neurodevelopmental disorders should receive within the classroom, study by [Van Herwegen, Ahsworth, and Palikara \(2019\)](#) is one of the first to examine the views and beliefs of teachers as well as specialist professionals working with these children. This study shows that although educational professionals are familiar with the stereotypical difficulties that children with ASD, Down syndrome or Williams syndrome may experience, they are less familiar with the less phenotypical difficulties that children with a specific disorder may experience. These five studies highlight the fact that we need to ensure that research on neurodevelopmental disorders gets translated into the classroom and reaches practitioners, as providing professionals with evidence-based facts will allow them to implement better classroom practices and educational programmes.

Yet, before any support can be put into place by professionals, it is important to examine what difficulties children with neurodevelopmental disorders experience in the classroom and what cognitive mechanisms can explain these difficulties. Although there have been a number of studies in the field that have examined the cognitive mechanisms that underpin educational achievement, such as reading, writing and mathematical abilities, in neurodevelopmental disorders, studies have often included small sample sizes with participants showing a lot of variability in their performance. Therefore, the special issue includes one manuscript that, although it focuses on cerebral palsy (CP), demonstrates nicely how multiple case studies can provide an in-depth understanding of this variability. [Critten, Messer, and Sheehy \(2019\)](#) examined the reading and spelling difficulties in children with CP who had appropriate language and communication abilities. Their descriptive analysis provides a rich insight into the individual variability with regards to cognitive abilities in CP and suggests that reading and spelling difficulties might be related to both a visual as well as phonological processing difficulties. This indicates that both a direct and indirect reading route might be impaired. This finding has implications for teaching strategies and suggests that variability and complexity are two aspects that need to be taken into account when designing interventions for children with neurodevelopmental disorders.

The third theme of the special issue includes six manuscripts that have trialled different interventions to better support the educational and psycho-social needs of children with neurodevelopmental disorders. [Cartwright, Marshall, Huemer, and Payne \(2019\)](#) examined what factors contribute to reading comprehension and fluency of low-achieving readers and show how a training in cognitive flexibility improved reading fluency in 33 2nd and 3rd graders with reading difficulties.

[Arcuili and Baily \(2019\)](#) examined the efficacy of *Abracadabra* programme, an early literary intervention delivered via game-based learning activities in schools to young children with ASD. Results showed significant improvement mainly in word and passage-level reading accuracy but not so much for reading comprehension for the instruction group when compared to the control group. These findings have important seeing that computer-assisted instruction could be a cost-effective way to improve educational outcomes for children with neurodevelopmental disorders.

Examining adjustments to the classroom for children with neurodevelopmental disorders, [Remington, Hanley, O'Brien, Riby, and Swettenham \(2019\)](#) provides evidence for the first time concerning the question on whether children with ASD have increased mental capacity. The findings show that for some specific conditions, an increased amount of task-related information does not seem to negatively affect learning both for those with ASD but also for typically developing children. These findings have important educational implications as they challenge the prevalent view that the classroom environment should be made simple in order to benefit children with ASD. Additionally, it draws the attention on the type of information the children are presented with.

Digital text is increasingly more frequently used than printed text. However, to date how this gradual change affects the academic achievements of children with developmental disabilities has not been considered in any detail and this is particularly true for young adults with ADHD. [Ben-Yehudah and Brann \(2019\)](#) examined the effect of media (digital, print) on reading comprehension and self-monitoring skills of young adults with ADHD when compared to a group of matched controls. The results showed that when accessing digital text adults with ADHD achieved significantly lower reading comprehension scores and they showed worse self-monitoring skills when compared to print text. This suggests that as the use of digital academic texts is becoming more frequent, we need to further examine and identify strategies to improve self-monitoring during technology-enhanced learning and that we should be mindful when using technology in the classroom without assessing the impact of this technology.

Finally, family environment and what happens before children attend formal education can impact on classroom environment functioning. [Heyman and Hauser-Cram \(2019\)](#) examined longitudinally trajectories of adaptive functioning in children with

developmental disabilities and early childhood and home environment as predictors of these trajectories. The results showed growth of adaptive functioning in children with developmental disabilities between the age of 3 to 15 years of age, although variability was observed both in initial levels of school-based adaptive functioning and rates of change. Additionally, early childhood home and family environment and in particular the mother-child relationship emerged as significant predictors of school-based adaptive functioning. Fontil, Sladeczek, Gittens, Kubishyn, and Habib (2019) examined the support offered for children with ASD during transition from preschool to school in Canada. The results showed that early intervention support providers were mostly offering individualized support to the children and their families and they also had direct contact with elementary school staff for transition planning purposes. However, service providers reported lack of government support and elementary school engagement as significant barriers to the implementation of transition supports. The findings also highlighted that an increase in transition support was related with transition specific training offered to staff and ASD-specific services.

Overall, the manuscripts in this special issue show that there is an increased interest in improving educational and psychosocial outcomes of children with neurodevelopmental disorders. However, more research is needed in eliciting the views of children with neurodevelopmental disorders themselves. In addition, there is a need to examine cross-cultural differences and variability in more depth as a better understanding of which children need support and in which settings will benefit the implementation of interventions and educational programmes. Finally, there is scope to extend the evidence based interventions that can better support these children and professionals in the classroom.

All papers were evaluated by at least two reviewers and we would like to thank all of the reviewers for their helpful comments and feedback. Finally, we would like to thank all of the authors for their valuable contributions and the RIDD office for their help with this special issue.

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Jo Van Herwegen^a, Olympia Palikara^{a,b}

^a Department of Psychology and Human Development, UCL Institute of Education, UK

^b School of Education, University of Roehampton, UK

E-mail address: j.vanherwegen@ucl.ac.uk (J. Van Herwegen).