



## Opinion Article

# Equitable Opportunities for Students with Neurodevelopmental Disorders? A Preliminary Framework for Fostering Academic and Social Participation

Liane Kaufmann<sup>1,2</sup>, Michael von Aster<sup>3</sup>, Erwin Concepcion<sup>4</sup>, Martin Schöfl<sup>5,6\*</sup>

<sup>1</sup>Department of Neurology, Ernst-von-Bergmann Hospital, Potsdam, Germany

<sup>2</sup>University of Innsbruck, Institute of Psychology, Innsbruck, Austria

<sup>3</sup>Center for School and Psychosocial Rehabilitation (ZSPR), DRK Hospitals Berlin, Germany

<sup>4</sup>Direct Care & Treatment, Minnesota Department of Human Services, St. Paul, Minnesota, United States

<sup>5</sup>Department of Educational Sciences, University of Education Upper Austria, Linz, Austria

<sup>6</sup>Research Institute for Developmental Medicine, Johannes Kepler University, Linz, Austria

\*Corresponding author: Martin Schöfl, Research Institute for Developmental Medicine, Johannes Kepler University, Linz, Austria

**Citation:** Kaufmann L, Aster MV, Concepcion E, Schöfl M (2023) Equitable Opportunities for Students with Neurodevelopmental Disorders? A Preliminary Framework for Fostering Academic and Social Participation. Arch Pediatr 8: 261. DOI: 10.29011/2575-825X.100261

**Received Date:** 2 May 2023; **Accepted Date:** 10 May 2023; **Published Date:** 15 May 2023

## Abstract

This Opinion Article critically highlights the current state of students with neurodevelopmental disorders and their opportunities for academic and social participation. Focusing on neurodevelopmental disorders, such as attentional disorders, autism spectrum disorders and specific learning disorders, we (i) outline the adverse effects of cognitive deficits on health-related issues and academic outcomes, and (ii) formulate a desirable target state regarding a successful participation and equal opportunities for students with neurocognitive deficits. In proposing a potential framework for enhancing students' participation at different levels of involvement, we discuss the importance of providing effective action steps inside and outside the academic setting that go beyond frequently offered disadvantage compensation. We advocate that successful participation and equitable opportunities require a full assessment of function rather than focusing on deficit-oriented diagnostic and interventional approaches.

**Keywords:** Cognitive deficits; Neurodevelopmental disorders, Attention disorders, Autism spectrum disorders, Specific learning disorders, Participation, Equitable opportunity

## Introduction

Cognitive deficits are frequently associated with acquired brain injury, but may also be core symptoms of atypical developmental trajectories involving neurodevelopmental

disorders (e.g., attention-deficit/hyperactivity-disorder (ADHD), autism-spectrum-disorders (ASD), specific learning disorders [1]). However, while acquired neurocognitive deficits in children and adults are generally easily recognized based on a noticeable decline from premorbid levels of functioning and may be treated accordingly through rehabilitation and remediation, neurocognitive deficits associated with neurodevelopmental disorders may be more difficult to detect. For instance, in university students of

at least average intellectual functioning, neurodevelopmental disorders like ADHD, ASD, or SLD may remain undiagnosed as affected individuals compensate for cognitive deficits as long as the tasks at hand are not too complex. However, these compensatory mechanisms are often insufficient when faced with increasingly challenging and complex university course work [2]. By the time they begin having academic difficulties, many of these students have already developed associated problems such as low self-efficacy and self-esteem, depression, anxiety, and sleep disorders. These are side effect of the ongoing negative experiences related to their neurocognitive deficits and harmful effects on their academic performance that, in the worst-case scenario, lead them to discontinue their studies [3,4].

In the following section, we will focus our position on students with neurodevelopmental disorders. Current diagnostic classification systems [5,6] classify ADHD, ASD and SLD as brain-based disorders identified as neurodevelopmental disorders.

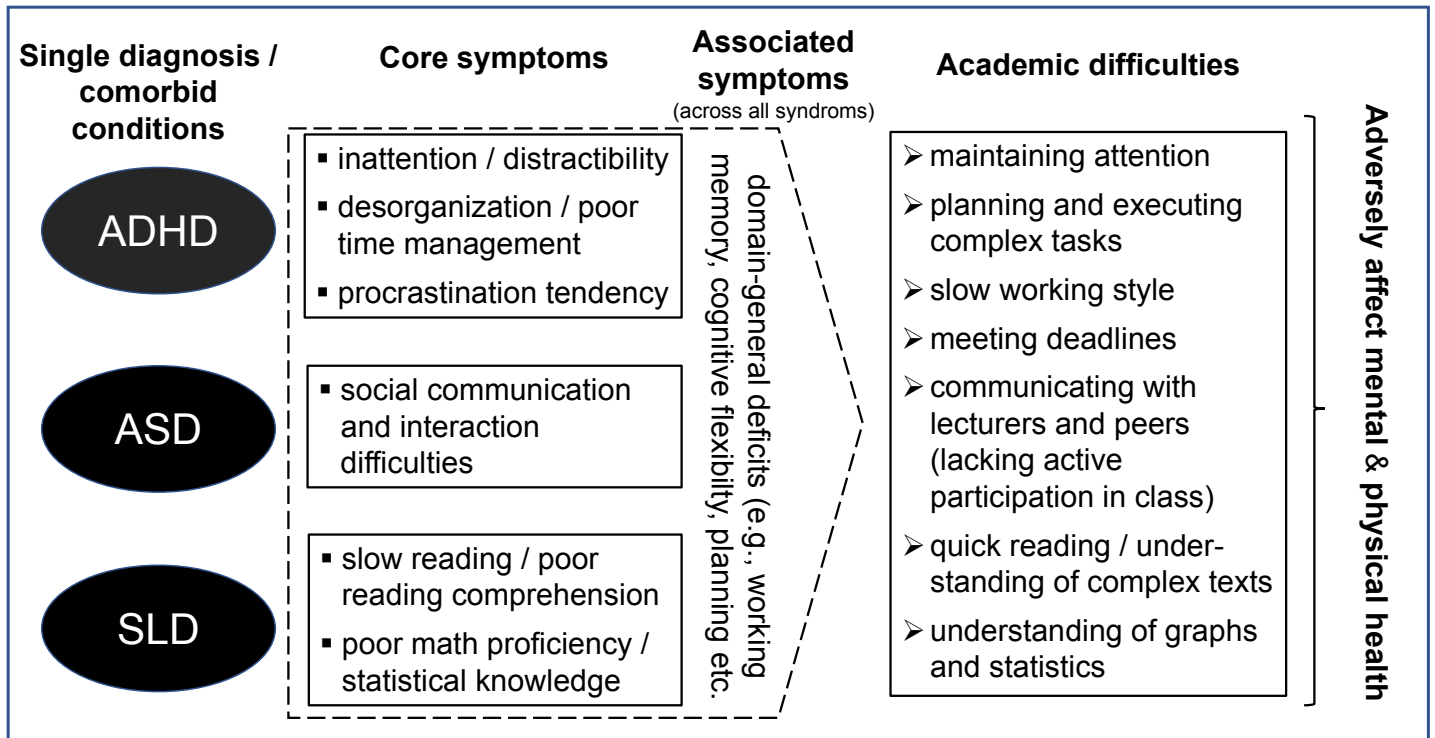
### **Neurodevelopmental disorders and their effects on academic learning**

As far back as 20 years ago, Frith emphasized the complex nature of neurodevelopmental disorders by postulating a ‘causal modeling’ approach [7]. This model disentangled the tightly intertwined dimensions of developmental disorders to reveal multiple levels of influence involving biological/brain, cognitive, and behavioral levels. Likewise, Pennington proposed a ‘multiple-deficit-view’ of developmental disorders by considering the close interplay of multiple cognitive risks and protective factors [8]. Since then, interest in further elucidating the neurocognitive underpinnings of neurodevelopmental disorders has increased considerably in the neuroscientific community (for reviews, see [9]), culminating in (i) greater understanding of the distinct yet closely interacting levels, especially related to the neurofunctional aspects complemented by an epigenetic component [10,11]

and (ii) a rapidly increasing body of literature (as reflected in 220,848 citations generated for the keyword ‘neurodevelopmental disorders’ in a Pubmed search; April 23, 2023).

While each neurodevelopmental disorder in childhood and adolescence may be characterized by its own unique set of domain-specific cognitive deficits (e.g., increased motor activity and deficient impulse control in ADHD, deficient social communication skills in ASD, poor reading skills in developmental dyslexia, deficient arithmetic skills in developmental dyscalculia), there is also increasing evidence of a set of comorbid symptoms that cut across several neurodevelopmental disorders associated with domain-general deficiencies that include attentional difficulties, executive dysfunctions such as poor working memory and deficient inhibitory control, as well as poor planning and organizational skills.

Similar difficulties can be observed in students diagnosed with ADHD, ASD and SLD (Figure 1). Moreover, and as depicted in Figure 1, recurring and persistent experiences of academic failure are likely to have negative effects on mental health by hampering self-efficacy, contributing to or even causing depressive symptoms, leading to the development of insecurities and anxiety which can generalize and hinder academic achievement- and social activities [12]. Consequently, persistent mental health problems are likely to emerge and spread to individuals’ physical health, exerting both direct and indirect effects on body functions [13]. Likewise, children and adolescents with neurodevelopmental disorders such as ADHD, ASD and SLD are reported to exhibit a high prevalence for physical co-occurring conditions such as migraine, respiratory (asthma), and gastrointestinal complaints, among others [14,15]. Interestingly, the latter findings reveal that comorbidities and specific constellations of neurodevelopmental disorders impose even higher risks for physical problems in affected children and adolescents.



**Figure 1:** Consequences of syndrome-specific core cognitive symptoms and frequently associated domain-general symptoms observed across all three neurodevelopmental disorders and the academic challenges they present.

Despite our improved understanding of the neurocognitive underpinnings of neurodevelopmental disorders through the development of more refined, differentiated and sensitive diagnostic tools, our knowledge of efficient intervention methods lags behind [11]. Moreover, affected children and adults remain considerably disadvantaged in social and academic/vocational participation [16,17,12].

**Deficit- or function-oriented view on neurodevelopmental disorders?**

At present, neither the developmental conceptualizations of neurocognitive deficits and their association with neurodevelopmental disorders, nor the frequently used symptom-oriented DSM or ICD diagnostic classification systems, adequately consider issues related to social and academic/vocational participation of affected individuals. Consequently, in clinical and research practices alike, the focus on the neurofunctional and neurobehavioral aspects of neurodevelopmental disorders is inadequate to meet the every-day needs of affected individuals which clearly go beyond the above-described complex interplay at neural, cognitive and behavioral levels [11]. The International Classification of Functioning, Disability and Health provides a useful framework for examining individuals' functioning level

and for determining their potential for participation [18]. However, the ICF has been largely ignored in the clinical, cognitive, and neuroscientific literature. Recently, there have been promising attempts to systematically incorporate the ICF in research settings to also include developmental conceptualizations and functional diagnostics, which in turn facilitate treatment planning and patient outcomes. With respect to neurodevelopmental disorders, international expert committees established ICF Core Sets for ADHD [19] and ASD [20] that have been empirically defined and evaluated. Interestingly, though ICF Core Sets have been developed for ADHS and ASD, there are – to the best of our knowledge – no such attempts for SLD (i.e., developmental reading/writing and/or mathematics disorders). However, upon acknowledging the high phenotypic overlap across the three disorders as well as the high comorbidities between ADHD and SLD (> 45%) [21] and between ASD and SLD (being as high as 55% [22,23] it becomes readily apparent that ICF Core Sets are also strongly needed for SLD to better capture students' needs and strengths alike (thus paving the way for true participation).

Empirically validated measures that allow a fine-grained assessment of participation in students with neurocognitive deficits due to neurodevelopmental disorders are needed to obtain

greater information on those topics. Pletschko and colleagues developed and validated an ICF-based questionnaire targeted at measuring the participation pediatric patients with neurocognitive deficits [24]. Future research is clearly needed to (i) provide a more differentiated picture of the need for participation related to neurocognitive deficits in affected individuals, and (ii) identify and evaluate suitable measures to foster academic, vocational, and social participation of affected individuals.

Despite policies requiring equal opportunity for students with cognitive deficits due to neurodevelopmental disorders, these rights are often overlooked or neglected by clinicians and researchers. For instance, the law of the United Nations Conventions contains paragraphs (i) on the rights of the child to participate in all matters concerning their wellbeing [25]. Likewise, virtually all universities claim equal rights for opportunities and accessibility to all students. This implies that students with disabilities (e.g., physical, mental, cognitive) should have the same chances as non-disabled students to enroll and successfully complete their academic careers. While these rights are anchored in university law and frequently utilized by physically disabled students or those with chronic illnesses, most students with neurocognitive deficits are either unaware or unable to take advantage of the equal opportunity measures offered by universities. In Europe, these measures are mostly limited to alternative exam modalities such as extended exam times, offering options for written instead of oral assessments or vice versa, use of headphones to eliminate distracting sounds, etc. However, we suggest that the provision of equitable opportunities should not be restricted to exam modalities but should instead be provided from the time of enrollment to the completion of a course or even obtaining a university degree [1].

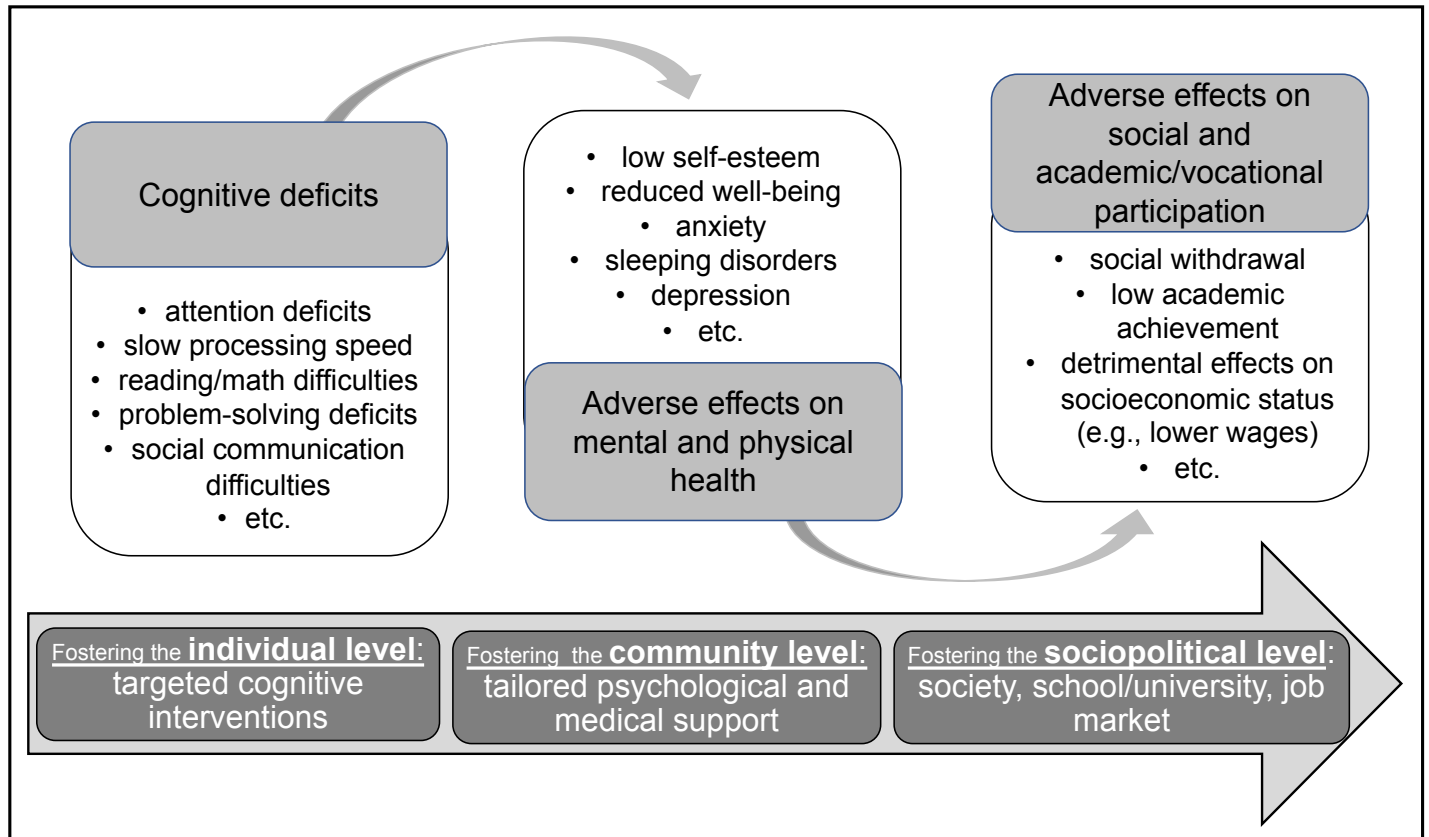
### **Preliminary framework to foster participation of students with cognitive deficits due to neurodevelopmental disorders**

Cognitive deficits associated with neurodevelopmental disorders (and acquired neurocognitive disorders alike) are long-lasting and have detrimental effects on academic, vocational, and social participation. Initial promising attempts to foster

participation were made in children with acquired cognitive deficits due to brain tumor [26]. In particular, this study examined the effects of using telepresence systems to enable affected children to attend classroom activities online which decreased social isolation and increased children's self-esteem and well-being. In contrast, the literature on social and academic participation of students with cognitive deficits due to neurodevelopmental disorders is scarce to date.

In the following, we propose a preliminary framework to foster participation of students with cognitive deficits. Specifically, and as depicted in (Figure 2), we aim to untangle different domains of participation and for each of these domains, we propose specific action steps to help foster student participation. Domains of student participation can be divided into four areas:

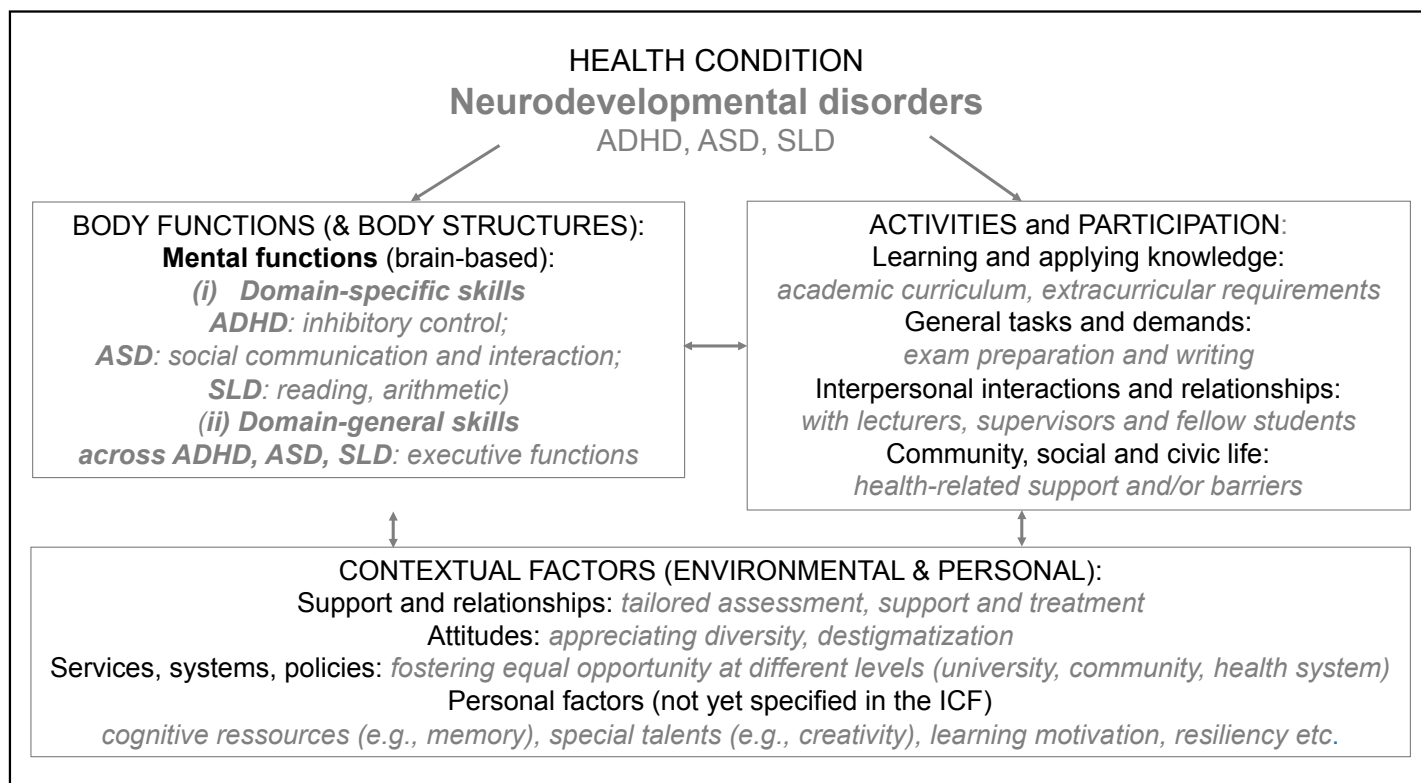
- (i) School/academic environment:** Alternative teaching approaches involving participatory teaching and use of telepresence systems; alternative assessments of performance such as learning interests and motivation (among others) instead of achievement-based assessments; alternative exam modalities and accommodations like time-extensions for written examinations, breaks for lengthy examinations, oral instead of written examinations or vice versa; implementation of tailored buddy and mentoring systems supporting the specific needs of students with neurocognitive impairments; etc.
- (ii) Sociopolitical environment:** Destigmatization, accepting and fostering diversity, tailored task and work assignments, vocational training, affordable high-quality treatment options, etc.
- (iii) Legislative framework:** More refined medical diagnostic classification systems that fully acknowledge differential levels of impairment and their impact on participation, establishing a job market that fosters accessibility and adaptation for individuals with cognitive deficits due to neurodevelopmental disorders), awareness of comprehensive diagnostic and treatment options, etc.
- (iv) Individual/home environment:** Support of interpersonal resources such as cognitive strengths, unique talents, resilience, and motivation for learning, etc.



**Figure 2:** A preliminary framework to foster participation of students with neurodevelopmental disorders at different domain levels within and outside universities.

Please note that the above-mentioned action steps to enhance the participation of students with neurodevelopmental disorders is not exhaustive, but rather should be regarded as a starting point that still awaits further modifications and updates. However, it is important to stress that the application and further refinements of this preliminary framework requires a lively and critical dialog between affected individuals, advocates, researchers and professionals. Clearly, there is a strong need for tailored support and intervention approaches to help foster participation at different levels inside and outside of academic settings.

Finally, we believe that the time is right to adopt a function-oriented approach that takes into account the complex nature of neurodevelopmental disorders as they present in neural, cognitive, behavioral and emotional areas of a person’s life [10,11]. We support and urge the adoption of an ICF-guided approach to properly evaluate and treat students with neurocognitive deficits (associated with ADHD, ASD and SLD), placing their unique constellations of functional and participatory capabilities at the center of attention (Figure 3).



**Figure 3:** ICF-guided function-oriented approach to foster participation of students with neurodevelopmental disorders.

Students with neurodevelopmental disorders such as ADHD, ASD and SLD that are characterized by neurocognitive deficits are especially in need of the proposed function-oriented approach in order to develop and implement customized adaptations and aids that can help level the playing field and foster equitable opportunities for academic and vocational participation.

To summarize, emphasizing individuals' functions rather than deficits will enable clinicians and others who support students with neurodevelopmental disorders to develop a more comprehensive functional profile, which is essential for designing effective intervention and treatment regimens. Moreover, adopting a function-oriented rather than deficit-oriented approach, may also have positive effects on self-efficacy and resiliency. Additional benefits include fostering individuals' capabilities which are also known to have protective effects on mental and physical health alike [27,28].

### Author contributions

All authors contributed to the study conception. The first draft of the manuscript was written by Liane Kaufmann and all authors commented on this and the following versions of the manuscript. All authors read and approved the final manuscript.

### Declarations

The authors have no conflicts of interest to disclose.

### Funding

The work of LK was supported by the science fund of the Federal State of Tyrol (project number F.38686).

### References

1. Thapar A, Cooper M, Rutter M (2017) Neurodevelopmental disorders. *Lancet Psychiatry* 4: 339-346.

2. Kaufmann L, Kucian K, von Aster M, Weiss E, Schweiger-Wachsmuth D (2022) Participation of university students with neurocognitive deficiencies: Evidence from ADHD and Specific Learning Disorders. *Journal of Neuropsychology* 33: 213-225.
3. Ahn S, Hwang S (2017) Cognitive rehabilitation with neurodevelopmental disorder: A systematic review. *Neuro Rehabilitation* 41: 707-719.
4. King BH (2016) Psychiatric comorbidities in neurodevelopmental disorders. *Curr Opin Neurol* 29: 113-117.
5. American Psychiatric Association (2015) Neurodevelopmental disorders. In: *Diagnostic and statistical manual of mental disorders*. Arlington, VA: American Psychiatric Association.
6. World Health Organization (2019) ICD-11: International classification of diseases (11th revision).
7. Frith U (2003) What framework should we use for understanding developmental disorders? *Dev Neuropsychol* 20: 555-563.
8. Pennington BF (2006) From single to multiple deficit models of developmental disorders. *Cognition* 101: 385-413.
9. Ismail FY, Shapiro BK (2019) What are neurodevelopmental disorders? *Curr Opin Neurol* 32: 611-616.
10. Boivin MJ, Kakooza AM, Warf BC, Davidson LL, Grigorenko EL (2015) Reducing neurodevelopmental disorders and disability through research and interventions. *Nature* 527: 155-160.
11. Morris-Rosendahl DJ, Crocq MA (2020) Neurodevelopmental disorders - the history and future of a diagnostic concept. *Dialogues in Clin Neurosci* 22: 65-72.
12. Şahin S, Kaya Kara Ö, Köse B, Kara K (2020) Investigation on participation, supports and barriers of children with specific learning disabilities. *Research in developmental disabilities*, 101:103639.
13. Ohrnberger J, Fichera E, Sutton M (2017) The relationship between physical and mental health: A mediation analysis. *Social science & medicine* (1982). 195: 42-49.
14. Alabaf S, Gillberg C, Lundström S, Lichtenstein P, Kerekes N, et al. (2019) Physical health in children with neurodevelopmental disorders. *J Autism Dev Disord* 49: 83-95.
15. Muskens JB, Velders FP, Staal WG (2017) Medical comorbidities in children and adolescents with autism spectrum disorders and attention deficit hyperactivity disorders: a systematic review. *Eur Child Adolesc psychiatry* 26: 1093-1103.
16. Kaljača S, Dučić B, Cvijetić M (2019) Participation of children and youth with neurodevelopmental disorders in after-school activities. *Disabil Rehabil* 41: 2036-2048.
17. May F, Ford T, Janssens A, Newlove-Delgado T, Emma Russell A, et al. (2021) Attainment, attendance, and school difficulties in UK primary schoolchildren with probable ADHD. *Br J Educ psychol* 91: 442-462.
18. World Health Organization (2001) ICF. International classification of functioning, disability and health. Geneva: World Health Organization.
19. de Schipper E, Mahdi S, Coghill D, de Vries PJ, Gau SS, et al. (2015) Towards an ICF core set for ADHD: a worldwide expert survey on ability and disability. *European child & adolescent psychiatry*. 24: 1509-1521.
20. Schiariti V, Mahdi S, Bölte S (2018) International Classification of Functioning, Disability and Health Core Sets for cerebral palsy, autism spectrum disorder, and attention-deficit-hyperactivity disorder. *Dev Med Child Neurology* 60: 933-941.
21. Şahin B, Karabekiroğlu K, Bozkurt A, Usta MB, Aydın M, et al. (2018) The Relationship of Clinical Symptoms with Social Cognition in Children Diagnosed with Attention Deficit Hyperactivity Disorder, Specific Learning Disorder or Autism Spectrum Disorder. *Psychiatry Investig* 15: 1144-1153.
22. DuPaul GJ, Gormley MJ, Laracy SD (2013) Comorbidity of LD and ADHD: implications of DSM-5 for assessment and treatment. *Journal of learning disabilities* 46: 43-51.
23. Somale A, Kondekar SV, Rathi S, Iyer NR (2016) Neurodevelopmental comorbidity profile in specific learning disorders. *International Journal of Contemporary Pediatrics* 3: 355-361.
24. Pletschko T, Knasmüller S, Schwarzingner A (2022) Assessment of Participation in Pediatric Neuropsychology. *Zeitschrift für Neuropsychologie* 33: 245-258.
25. UNICEF UK (1989) The United Nations convention on the rights of the child.
26. Pelzer C, Turner A, Rockenbauer G, Röhsner M, Pletschko T (2022) Use of telepresence systems to enhance school participation in pediatric patients with chronic illnesses involving the CNS. *Journal of Neuropsychology* 33: 227-234.
27. Lu H, Li X, Wang Y, Song Y, Liu J (2018) The hippocampus underlies the association between self-esteem and physical health. *Scientific reports* 8: 17141.
28. Mann M, Hosman CM, Schaalma HP, de Vries NK (2004) Self-esteem in a broad-spectrum approach for mental health promotion. *Health Educ Res* 19: 357-372.