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Policy approaches and practices for the inclusion of students with attention-deficit hyperactivity disorder (ADHD)

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Abstract

OECD countries have developed various practices and policy approaches to promote inclusive education systems for students with special education needs (SEN), which include learning disabilities, physical impairments and mental disorders. Among the latter, Attention-Deficit/Hyperactivity Disorder (ADHD) is a particularly relevant: being often comorbid with other learning disabilities, it causes significant difficulties in academic and social outcomes to affected students. Compared to other disorders that can cause difficulties to students, ADHD is less consistently accepted as an impairing condition.

Mapping and analysing the key elements of diverse practices across OECD countries is fundamental to correctly define the situation of students with ADHD in education systems and the future direction of policy-making.

Through a holistic approach, the paper adopts the analytical framework developed by the *OECD's Strength through Diversity project: Education for Inclusive Societies* to analyse policies and practices to include students with ADHD in education systems and promote their well-being.

Introduction

Attention-Deficit Hyperactivity Disorder, also known as ADHD, is a growing concern regarding children and adolescents in education systems all across OECD countries. Nowadays, the global prevalence rate is estimated at 7.2%, even though it shows large variations between and within countries. With the rates of prevalence growing in most of the countries during the past decades, increasing attention has been paid to exploring how to best serve the needs of this population and to effectively include students with ADHD in education systems. Nonetheless, there still exist inconsistent and unclear definitions of ADHD within legal frameworks, which in turn produce fragmented regulatory systems that are not always capable of fully responding to the needs of this population. As ADHD is often comorbid with learning disabilities, it poses a double burden on students that have worse academic and well-being outcomes compared to their peers. This literature review aims at mapping the current practices and policies adopted by countries, while shedding light on the complexity of the management of ADHD in school settings and providing evidence-based analysis on the effectiveness of said policies and practices.

This literature review, as part of the OECD project Strength through Diversity: Education for Inclusive Societies, serves as a case study for one of the dimensions of diversity taken into consideration by the project: Special education needs. Moreover, it also studies the intersection with the other dimensions of diversity: i) migration; ii) gender; iii) gender identity and sexual orientation; iv) ethnic groups, national minorities and Indigenous peoples; and v) giftedness. Moreover, all these dimensions are analysed under the overarching aspects of socio-economic status and geographic location.

The review is structured around the five main policy areas defined by the Design and Implementation Plan for the Strength through Diversity Project (OECD, Forthcoming[1]). These areas are: i) the overall framework for governing equity, and inclusion of students with ADHD; ii) the use of resources to support students with ADHD in education systems; iii) capacity building to support students with ADHD; iv) school-level interventions to manage ADHD and v) monitoring and evaluation of policies regarding ADHD. After having elaborated a cross-country analysis of policies and practices, the review discusses the main advantages and disadvantages of the most relevant among such practices. To conclude, the review also proposes – when available – empirical evidence on the effectiveness of the different approaches on the well-being outcomes of students and adults with ADHD. As per the project overall framework, the review interprets well-being as composed by the following four sub-dimensions: i) academic; ii) social and psychological; iii) material; and iv) physical.

1. Conceptualising and defining Attention-Deficit Hyperactivity Disorder (ADHD)

The way in which Attention-Deficit Hyperactivity Disorder, or ADHD, is defined and recognised as a mental health issue shapes the entire system of support for children and adolescents that experience this disorder and its negative effects on their individual outcomes. Hence, outlining the symptoms, treatments and levels of prevalence around the globe is key in understanding how countries approach ADHD and develop policies to support students with ADHD in educational systems and beyond. This first section, after having outlined the characteristics of the disorder, situates it within the discourse on special education needs. The section relies on and contextualises the work on ADHD using the operational definition of special education needs adopted by the *OECD Strength through Diversity Project: Education for Inclusive Societies*, which includes learning disabilities, physical impairments and mental disorders.

Lastly, this section also discusses the emerging empirical trends on ADHD and specifically the intersectionality between this disorder and the categories of diversity that are generally considered by the OECD Strength through Diversity Project, in particular: i) gender; ii) migrant populations, ethnic groups and Indigenous peoples; iii) gifted students; iv) SEN, specifically mental health; under the overarching dimensions of socio-economic status and geographical location.

1.1. Defining Attention-Deficit Hyperactivity Disorder

Attention-deficit hyperactivity disorder, or ADHD, is a chronic disease that affects an increasing number of children worldwide. There currently exist two main sources of formal definitions of ADHD:

1. The DSM-5, the Diagnostic and Statistical Manual of Mental Disorders - 5th edition, which is published by the American Psychiatric Association;
2. The ICD-11's, the 11th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD), a medical classification list by the World Health Organization (WHO).

In general and particularly in Europe, ICD codes are used mostly for statistics on mortality, morbidity and by insurance agencies, whereas DSM is primarily used in clinical practice by licensed mental health care professionals (Kupfer, Kuhl and Wulsin, 2013[2]) (Kooij et al., 2018[3]). For the scope of this review, the ICD-11 will be referred to for definition purposes, while the DSM-5 will be considered mostly in relation to diagnostic issues.

The formal definition of ADHD was recently introduced in the ICD-11 classification in May 2019 and will come into effect in January 2022 (World Health Organization, 2019[4]). In the previous version of this categorisation (or ICD-10), ADHD was not classified as a stand-alone disorder, but rather as a sub-category of hyperkinetic disorders, within the category "Behavioural and emotional disorders with onset usually occurring in childhood and adolescence" (World Health Organization, 2016[5]). The 11th revision, however, has identified and grouped together all the neurodevelopmental disorders. Neurodevelopmental disorders are a group of conditions with onset in the developmental period. These disorders typically manifest early in development, and are characterised by developmental deficits

that produce impairments of personal, social, academic, or occupational functioning. The range of developmental deficits can vary from very specific limitations of learning or control of executive functions to global impairments of social skills or intelligence (American Psychiatric Association, 2013[6]). ADHD, alongside autism spectrum disorders, is one of the most prevalent neurodevelopmental disorders.

Including ADHD in this category represents a significant change, which reflects the current conceptual understanding of these disorders from shared genetic and environmental risk factors that affect neural and biological characteristics (Thapar, Cooper and Rutter, 2017[7]).

1.1.1. The ICD-11 definition of ADHD

The definition of ADHD comprises various elements that need to be concomitant. Attention-deficit/hyperactivity disorder is characterised by;

1. a **persistent pattern** (which has to be observed for at least six months) of inattention and/or hyperactivity-impulsivity;
2. an **onset during the developmental period**, typically early to mid-childhood;
3. a degree of inattention and hyperactivity-impulsivity that is **outside the limits of normal variation** expected for age and level of intellectual functioning and significantly interferes with academic, occupational, or social functioning.

Inattention refers to significant difficulty in sustaining attention to tasks that do not provide a high level of stimulation or frequent rewards, distractibility and problems with organisation. Hyperactivity refers to excessive motor activity and difficulties with remaining still, most evident in structured situations that require behavioural self-control. Impulsivity is a tendency to act in response to immediate stimuli, without deliberation or consideration of the risks and consequences. The relative balance and the specific manifestations of inattentive and hyperactive-impulsive characteristics varies across individuals, and may change over the course of development. In order to make a diagnosis of the disorder, the behaviour pattern must be clearly observable in more than one setting (World Health Organization, 2019[4]).

There are three sub-forms of ADHD, which are classified based on the characteristic that the person shows the most. They can portray this disorder in very different ways, depicting radically different subjects. The three are as follows:

1. *Predominantly inattentive presentation*: people with inattentive ADHD – which are predominantly girls – make careless mistakes because they have difficulty sustaining attention, following detailed instructions, and organising tasks and activities (ADDitude Magazine, 2019[8]). People that have the inattentive form of ADHD often lose focus, are forgetful, and seem to have trouble listening. Children with inattentive ADHD could be skipping questions they know in a quiz, starting a myriad of projects but leaving them unfinished, doodling on their notes or needing to record lectures to absorb all their content;
2. *Predominantly hyperactive - impulsive presentation*: people with hyperactive - impulsive ADHD feel the need for constant movement, and often fidget, squirm, and struggle to stay seated. They also struggle with self-control, interrupting others and blurting out answers. A child with this form of ADHD could be feeling the need to pick up everything and play with it, climbing on things she/he

should not, being unable to speak quietly, or struggling to wait for her/his turn to answer a question in class;

3. *Combined presentation*: people that have a combined form of ADHD show both inattentive and hyperactive-impulsive symptoms.

1.1.2. Causes and heritability

ADHD has not yet obtained "etiological validity", meaning that we do not know with certainty what causes the disorder and why it is developed, in every case. However, this is true for most psychiatric disorders: there are generally clues to causes for the group level, but not as much for the individual one (Nigg, 2006[9]). For ADHD, genes, pre- and perinatal risks, psychosocial factors and environmental toxins are all considered as potential risk factors (Thapar et al., 2013[10]) but no causal evidence has yet been demonstrated. In particular, the genetic component of ADHD has been recognised by various studies, with heritability estimated up to 76%-90% (ADHD Institute, 2019[11]; Thapar et al., 2013[10]). It however remains that no single risk factor can explain ADHD, and that elements such as: low birth weight; smoking during a pregnancy; neurotoxin exposure; infections and child abuse, are believed to increase the risk for a child to develop ADHD.

1.2. Symptomatology and diagnosis

Symptoms of ADHD are generally noticeable at an early age and even more so during school years. Most children are diagnosed with ADHD between ages 6 and 12. However, studies have shown that symptoms recess in roughly one-third of children with ADHD when entering adulthood, while they persist in others (Cherkasova et al., 2013[12]; Mannuzza and Klein, 2000[13]). In particular, symptoms of inattention show greater persistence and slower decline with age than symptoms of hyperactivity and impulsivity, which tend to become more manageable or less severe in adulthood.

1.2.1. Symptoms

There can be great variance of ADHD symptoms from person to person, given that different sub-forms of ADHD exist. The severity of symptoms can also vary with age, gender, and a person's environment. The DSM-5 categorises the symptoms in two groups: symptoms of inattention and symptoms of hyperactivity and impulsivity. Inattention is defined as "not being able to carefully complete a task, pay attention, think about, listen to, or watch someone or something", while hyperactivity-impulsivity as "having an unusually high level of activity or excitement/acting on sudden desires, ideas, or feelings rather than from careful thought" (CDC, 2019[14]). Depending on the ADHD presentation in the single cases, one person may suffer from symptoms of either category or both. The DSM-5 identifies 9 symptoms per category, as summarised in Table 1.1

Table 1.1. Symptomatology of ADHD

Symptoms of Inattention	*Symptoms of Hyperactivity-Impulsivity*
Failing to give close attention to details or making careless mistakes in schoolwork, work, and other activities.	Fidgeting with or tapping hands or feet, or squirming in seat.
Having difficulty in sustaining attention on tasks or play activities.	Leaving seats in situations when seating is expected.
Seemingly not listening when being spoken to directly.	Running about or climbing in situations when it is inappropriate (note: this can translate to *feeling restless* in adolescents and adults).
Having difficulty in following instructions and failing to finish schoolwork or chores.	Being unable to play or take part in leisure quietly.
Having trouble in organising tasks and activities.	Being often "on the go" and acting as if "driven by a motor".
Resisting, avoiding, and procrastinating starting tasks that require mental effort.	Talking excessively.
Losing things necessary for tasks and activities.	Blurting out answers before a question has been completed.
Being easily distracted by extraneous stimuli.	Having difficulty in waiting for their turn.
Being forgetful in daily activities.	Interrupting or intruding in others.

Source: Adapted from American Psychiatric Association (2013[6]), Diagnostic and Statistical Manual of Mental Disorders. Fifth Edition, https://doi.org/10.1176/appi.books.9780890425596.

ADHD symptoms typically change in adulthood. In particular, hyperactivity becomes less visible to the observer, as adults generally have more control over their environment. Hyperactivity may appear as extreme restlessness or wearing others out with their activity. Inattentive symptoms instead usually remain consistent throughout adolescence and adulthood (CHADD, 2018[15]). Interestingly, many have argued that the DSM symptoms are not optimal for the evaluation of ADHD in adults, as they are targeted specifically at children and have been field tested on children (Cherkasova et al., 2013[12]; Solanto et al., 2011[16]).

Moreover, it is not only the presentation of symptoms that varies along a person's life, but also the impact that these symptoms have. While school-aged children with ADHD tend to be impaired in terms of academic achievement, family interactions and peer relationships (Cherkasova et al., 2013[12]), adults with ADHD show poorer occupational rank and job performance with respect to peers without ADHD, may engage in risky sexual practices and early unwanted pregnancies, suffer from relationship and marital problems, and commit traffic violations or cause car accidents (Biederman et al., 2006[17]; Mannuzza, Klein and Moulton, 2008[18]; Chang et al., 2014[19]).

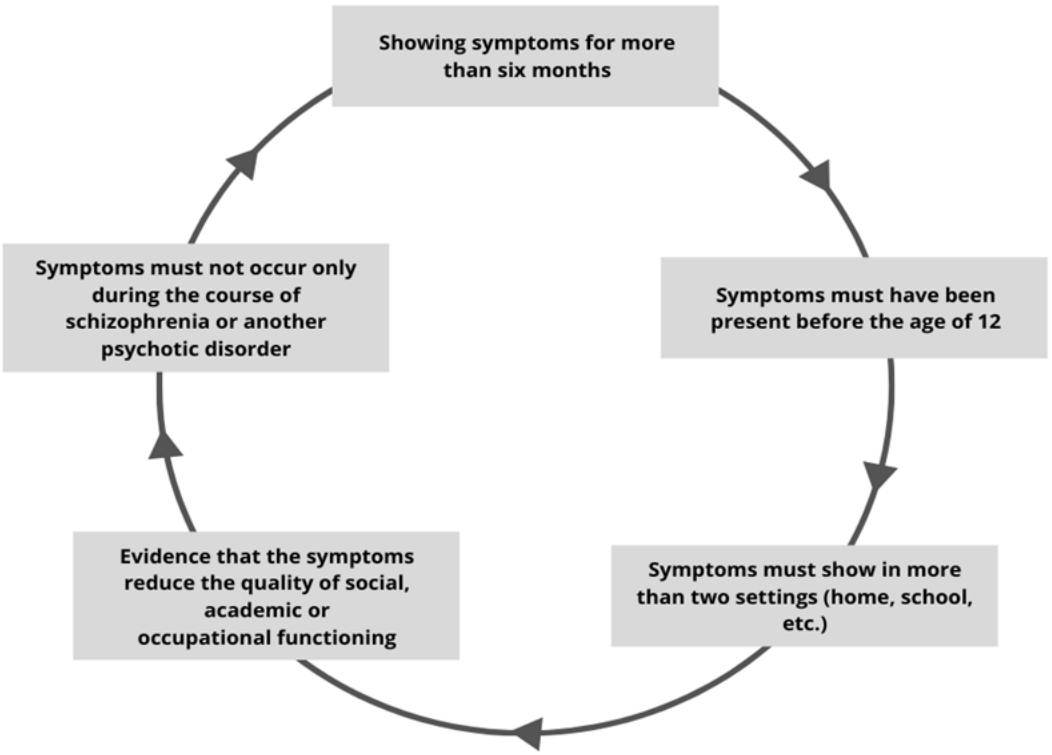
1.2.2. Diagnosis

There is no single medical, physical, or genetic test for ADHD; however, a qualified mental health care professional or physician can provide a diagnostic evaluation. Establishing a diagnosis requires a comprehensive evaluation to rule out other potential causes for symptoms and determine the presence or absence of comorbidities. Diagnosis of ADHD in children depends on a set of criteria, set out by the DSM-5 and internationally applied in different healthcare systems. To be diagnosed with ADHD, a child must show 6 or more symptoms of inattentiveness and/or six or more symptoms of hyperactivity and impulsiveness (Table 1.1).

The following conditions must also be met (National Health Service, United Kingdom, 2018[20]):

1. the child has been displaying symptoms continuously for at least six months;
2. symptoms must have been present before the age of 12;
3. symptoms must show in more than two settings, such as at home and at school. For this reason, teachers are important in recognition and referral of children with ADHD, as they have opportunities to observe the child's behaviour in comparison with that of normative peers (Moldavsky et al., 2012[21]);
4. there has to be evidence that the symptoms reduce the quality of social, academic or occupational functioning; and
5. symptoms must not occur only during the course of schizophrenia or another psychotic disorder and are not better accounted for by another condition.

Figure 1.1. Elements for an ADHD diagnosis



Note: these elements must be present for a diagnosis of ADHD, beyond the six symptoms of hyperactivity/inattentiveness mentioned in Table 1.1. Although these are specifically the ones required by the United Kingdom, they are common to most OECD countries.
Source: Adapted from National Health Service, United Kingdom (2018[20]), ADHD diagnosis, https://www.nhs.uk/conditions/attention-deficit-hyperactivity-disorder-adhd/diagnosis/#:~:text=To%20be%20diagnosed%20with%20ADHD,for%20at%20least%206%20months (accessed 18 November 2019).

Diagnosis in adults is more debated, as there has been some disagreement about whether the list of symptoms used to diagnose children and teenagers also applies to adults. Generally, guidelines suggest diagnosing ADHD in adults if they have five or more symptoms of inattentiveness, or five or more of hyperactivity/impulsiveness (National Health Service, United Kingdom, 2018[20]).

1.2.3. Comorbidities

In the majority of cases, ADHD does not exist in isolation. For this reason, any evaluation for ADHD requires a screening for comorbid disorders, which can complicate the symptoms that children may be suffering of, and would need to be dealt with concomitantly (CADDRA, 2018[22]).

Just like symptoms change in the course of one's life, the same happens to the distribution of the most common comorbidities in different life phases. Table 1.2 summarises the prevalence of comorbid disorders that characterise children and adolescents in scholastic age.

Table 1.2. Prevalence of comorbidities to ADHD among children and adolescents

	Less than 10%	Among 11% and 30%	More than 31%
Children (6-12 years old)	Depression	Anxiety	Learning Disabilities
	Substance Use	Autism Spectrum Disorder	Oppositional Defiant Disorder (ODD)
	Obsessive Compulsive Disorder (OCD)	Conduct Disorder	
		Tic Disorders	
Adolescents (13-17 years old)	Bipolar Disorder	Anxiety	Learning Disabilities
	Obsessive Compulsive Disorder	Autism Spectrum Disorder	Tic Disorders
		Conduct Disorder	
		Depression	
		Oppositional Defiant Disorder (ODD)	
		Substance Use	

Source: Adapted from CADDRA (2018[22]), Canadian ADHD Practice Guidelines, Fourth Edition, https://www.caddra.ca/wp-content/uploads/CADDRA-Guidelines-4th-Edition_-Feb2018.pdf.

According to the Canadian ADHD Resource Alliance (CADDRA (2018[22])), between 50% and 90% of children with ADHD have at least one comorbid condition, and approximately 50% of all children with ADHD have at least two. The conditions that are most present in children and adolescents, as learning disabilities and Oppositional Defiant Disorder (ODD), also have a strong impact on their educational outcomes. In adults, the percentage of patients with ADHD that meet criteria for a comorbid condition rises further, up to 85%.

1.3. Prevalence

The nature of ADHD causes several difficulties in terms of providing a precise estimate of global prevalence of the disorder. As mentioned above, the complex diagnostic process, the evolution of the illness, and the presence of comorbid conditions, make it difficult to estimate how many individuals are living with ADHD around the world. Moreover, as it is often the case with mental illnesses (Mental Health Foundation, 2018[23]), ADHD is

surrounded by stigma in many countries, which further complicates its diagnosis and thus its prevalence estimate (Mueller et al., 2012[24]).

Nevertheless, there have been steady increases in the prevalence estimates of ADHD in many countries over the last 30 years. In the United States, parent-reported ADHD cases of children ages 4-17 have seen an increased prevalence from 7.8% in 2003 to 11% in 2011, to 9.5% for 2011-2013. In Israel, ADHD prevalence, according to the Survey of Mental Health, was estimated at 3% among adolescents in a representative national sample of 14- to 17-year-olds (Davidovitch et al., 2017[25]).

Information on the ADHD incidence rate is published less frequently, but points to an increase that is similar to the published prevalence data (Davidovitch et al., 2017[25]).

1.3.1. Differential prevalence and regional discrepancies

The levels of ADHD prevalence vary significantly worldwide, not only across countries but also within them, at state and region level (Thomas et al., 2015[26]). A recent meta-analysis of 175 studies over 36 years, has estimated – with the due limitations – the overall global prevalence of ADHD to be around 7.2%, and that the characteristic that contributed to the variation in prevalence was the region considered (Thomas et al., 2015[26]). Some studies, however, have suggested that geographic location actually plays a limited role in the variability of ADHD prevalence, while prominent factors appear to be the methodological characteristics of the studies (Polanczyk et al., 2007[27]).

The variation among countries has been exemplified by the French *Haute Autorité de Santé*, which reported prevalence data for various countries, providing an interesting panorama of the variation that occurs worldwide (Table 1.3) (Haute Autorité de santé, 2014[28]). A broader discussion on the role of geographical location for ADHD is mentioned in Section 4. of this paper.

Table 1.3. National ADHD prevalence levels

Country	Prevalence (%)	Population	Method	Bibliographic reference
United States	7%-10%	2800-6000 scholars	Census of diagnostics - Interrogation (medical data base, and/or questionnaires given to parents)	Pliszka, (2007[29])
United States	4.40%	National Comorbidity Survey Replication (3199 adults)	Adult ADHD Clinical Diagnostic Scale (face-to-face interviews)	Kessler et al., (2006[30])
Europe	3%-5%	/	DSM IV criteria	European Guidelines, by Taylor et al. (2004[31])
Finland	6.60%	Children recruited from scholastic registries	Screening with Rutter scale with interviews with children and adults	Puura et al., (1998[32])
Germany	10.90%	5 rural schools, 5 urban schools (1077 children)	DISC-C and DSM III criteria	Baumgaertel et al., (1995[33])
United Kingdom	3%-9%	/	CIM-10 criteria/DSM IV criteria	NICE, (2008[34])
Italy	3.90%	9 schools of 4th Grade (9-10y.o.)	Teacher scale, DSM III-R criteria	Gallucci et al., (1993[35])

Source: Adapted from Haute Autorité de Santé (2014[28]), Conduite à tenir en médecine de premier recours devant un enfant ou un adolescent susceptible d'avoir un trouble déficit de l'attention avec ou sans hyperactivité, https://www.has-sante.fr/upload/docs/application/pdf/2015-02/tdah_argumentaire.pdf, accessed on 16 October 2019.

1.3.2. Gender

Evidence suggests that the prevalence of ADHD is greater in males than females (CHADD, 2018[36]). However, female prevalence, although still lower, has tripled during the last 10 years (Davidovitch et al., 2017[25]). While girls are more likely to have the primarily inattentive subtype of ADHD (Hinshaw et al., 2006[37]), knowledge of ADHD in women at this time is extremely limited as few studies have been conducted on this population.

ADHD in young girls is often overlooked and many females are not diagnosed until they are adults. According to the Non-Governmental Organisation (NGO) Children and Adults with Attention-Deficit/Hyperactivity Disorder (CHADD), women often come to recognise their own ADHD after one of their children has received a diagnosis. Moreover, they report that many clinicians found concerns and co-existing conditions in women with ADHD, such as compulsive overeating, alcohol abuse and chronic sleep deprivation. Compared to women without ADHD, women diagnosed in adulthood are more likely to have depressive disorders, be more stressed and anxious, and have lower self-esteem (CHADD, 2018[38]).

The underdiagnosis or misdiagnosis of ADHD in girls can be partly explained because they show symptoms that are less overt than boys', such as forgetfulness, disorganisation or demoralisation. Moreover, hyperactive symptoms have a different presentation in females, as they are more likely to appear as excessive talkativeness and emotional reactivity (Quinn, 2005[39]). To further complicate the scenario, girls may sometimes work harder to compensate for their symptoms, or spend more time studying. Thus, during their first years of schooling, they may not show the academic difficulties that are usually expected to appear in students with ADHD. However, as they progress through school and academic demands increase, it may become increasingly difficult for them to cope (Ibid.). The misconceptions that surround ADHD and interpretation as "boy-disorder" may also influence teachers, whose perceptions of boys' and girls' behaviours have been shown to contribute to gender differences in ADHD referrals (Sciutto, Nolfi and Bluhm, 2004[40]). As a result, girls that do not receive a correct diagnosis and grow up fully affected by their symptoms become less able to be consistent parents, less able to manage their jobs and households, and at higher risk for divorce and single parenting (Nadeau and Quinn, 2002[41]). The intersection between gender and ADHD is further explored in paragraph 1.6.2.

1.4. Possible choices of treatment

There is no long-lasting cure for ADHD but available treatments can help reduce symptoms and improve functioning, such as pharmacological therapies or behavioural interventions. Various guidelines have been developed that provide different recommendations about specific treatment approaches. These guidelines are continuously updated as new evidence comes to light and new therapies are developed, including updates to the United Kingdom's National Institute for Health and Care Excellence, CADDRA and German guidelines in 2018 and the Spanish guidelines in 2017. Nowadays, most guidelines suggest a comprehensive approach for the management of ADHD, involving both non-pharmacological and pharmacological therapy.

Recommendations for treatment of ADHD vary for children, youth and adults. Generally, multimodal approach incorporating psychosocial interventions together with medication is suggested as the most effective treatment, for different ages. However, most OECD countries suggest an exclusively psychological intervention on pre-school-aged children (generally 4-5 years of age) (Subcommittee on Attention-Deficit/Hyperactivity Disorder,

Steering Committee on Quality Improvement and Management, 2011[42]), with parent behavioural management trainings and behavioural classroom interventions where available (NHS, 2018[43]).

1.4.1. Pharmacological therapy

Medication is recommended by clinical guidelines for ADHD where required and as part of a comprehensive multimodal treatment plan that includes non-pharmacological therapies and is adapted to the specific needs and preferences of the patient. The medications are not a permanent cure for ADHD but may help someone with the condition concentrate better, be less impulsive, feel calmer, and learn and practice new skills (NHS, 2018[43]). However, some may experience side effects or react negatively to medication, which can have a different impact on every individual (Child Mind Institute, 2019[44]).

Available classes of pharmacological treatments for ADHD include stimulants and non-stimulants (NICE, 2018[45]).

1.4.2. Non-pharmacological therapy

Non-pharmacological therapies for ADHD may involve behavioural, psychological, social, educational and lifestyle interventions. Psychosocial interventions play a particularly important role during key life transitions, e.g. the transition between adolescence and adulthood. Treatments should be modified for key developmental stages, reflecting both the most problematic behavioural symptoms at that stage in time, and the patient's level of understanding (ADHD Institute, 2019[46]). The ADHD Institute classifies non-pharmacological therapies in three broad categories:

1. **Behavioural therapy**: it can be parent-led, classroom-led and cognitive behavioural therapy. Behavioural therapy is an effective treatment for ADHD that can improve a child's behaviour, self-control, and self-esteem. Experts recommend that healthcare providers refer parents of children younger than 12 years old for training in behaviour therapy, and that for children younger than 6 years old it is recommended as primary line of care, before medication is prescribed (Centers for Disease Prevention and Control (CDC), 2019[47]);

Psychoeducation: it can be viewed as the provision of information regarding ADHD to individuals with the disorder and their families/people close to them. Psychoeducation programmes are not based on cognitive behavioural therapy (CBT) approaches, or parent-led behaviour training, but are designed to inform patients and relatives about ADHD and its treatment, to help facilitate understanding and handling of the condition (ADHD Institute, 2019[46]); and

2. **Exercise and diet**: Current recommendations, including National Institute of Health and Care Excellence (NICE) guidelines, advocate the importance of regular exercise, a balanced diet and good nutrition for children, adolescents and adults with the disorder. It is not advised to remove specific foods or additives from children's diet, unless the practitioner can recognise a clear causality in the worsening of ADHD symptoms, and after having consulted a nutritionist (NHS, 2018[43]).

1.5. Effects of ADHD on academic and social outcomes as a special education need

ADHD is considered a special education need as it affects the ability of children and adolescents to function effectively in school, and often creates a need for additional support. The Strength through Diversity Project (OECD, Forthcoming[1]) defines special education needs as a term used in many education systems to characterise the broad array of needs of students who are affected by different disorders or issues, which are categorised into three main categories: learning disabilities, physical impairments and/or who suffer from mental disorders.

ADHD is categorised by the Project in the mental health category, due to its nature as a neurological disorder. Moreover, ADHD is a particular interesting case for a case-specific analysis, under the framework developed by the OECD Working Paper "Mapping Policies for the inclusion of students with SEN in education systems" (2020[48]) since it is often associated with learning disabilities (dyslexia, dysgraphia, etc.), to the point that the children who suffer from it often have significant difficulties in academic and social outcomes.

The challenges for schools in providing high quality education to students with SEN relate to the identification of their needs and the organisation and adequate resourcing of responses. These interventions should aim at ensuring that these students develop academically, socially, psychologically and physically and that their long-term material well-being is enhanced by the skills and knowledge they acquire in education. Several factors have been shown to be associated with the low academic achievement of children and adolescents with ADHD in addition to co-occurring learning disabilities, as for example deficits in aspects of executive function, like working memory, planning, organising, and shifting (Wiener and Daniels, 2016[49]).

As a result, individuals with ADHD risk incurring a range of academic complications, such as a higher incidence of failing grades, lower scores on standardised tests (Frazier et al., 2007[50]), greater likelihood of identification for special education and increased use of school-based services (Loe and Feldman, 2007[51]). Further studies have also shown that students with ADHD are also more likely to have a higher absenteeism rate, more likely to be retained during elementary school, at a higher risk of dropping out of high school (Barbaresi et al., 2007[52]), and less likely to pursue a post-secondary education compared to their peers without ADHD (DuPaul and Weyandt, 2009[53]). Moreover, children with ADHD can encounter various social difficulties, which present themselves in different forms. They can incur difficulties with social relationships due to struggles with managing anger or humour, to disruptiveness, disorganisation or competitiveness (Shapiro, 2011[54]). The lack of self-regulation and reduced empathy can also lead to conflicts with family and peers (Classi et al., 2012[55]).

1.6. Emerging empirical trends on ADHD and intersectionality

ADHD, as SEN more in general, often does not exist in individuals as a unique characteristic, but intersects with other dimension of diversity. This section aims at exploring possible interactions among ADHD and some of the different dimensions of diversity taken into consideration by the *Strength through Diversity Project*, under the overarching dimensions of geographic location and socio-economic status (OECD, Forthcoming[1]). Far from attempting a comprehensive analysis of the multiple intersections that can occur among the various dimensions of diversity, the following section will elaborate on the intersection of selected ones that show particular relevance for students

with ADHD. Specifically, after having highlighted the interactions with socio-economic background and geographical location, it will consider gender, giftedness, migration-induced diversity and ethnic or indigenous status.

Students with and without SEN are positioned within complex social situations, which should be acknowledged when analysing these topics. Moreover, special education has been recognised to correlate with factors such as ethnicity, language, and gender (De Valenzuela et al., 2006[56]; O'Connor and Fernandez, 2006[57]), but also socio-economic status (Donovan and Cross, 2002[58]) and geographical location. Thus, to properly contextualise the relationship between policies and achievement of students with ADHD, it is fundamental to account for all of these key variables.

1.6.1. ADHD and interactions with socio-economic background and geographical location

Differences in backgrounds, in particular in terms of socio-economic status and geographical location, have been shown to affect ADHD diagnosis, prevalence and forms of treatment.

Russell et al. (2015[59]) show that there exists a correlation between financial difficulties and housing tenure, and ADHD, such that families either living in financial difficulty or in council housing were more likely to have a child with a research diagnosis of ADHD at age 7. Specifically, financial difficulties appeared to be the strongest predictor of ADHD (Russell, Ford and Russell, 2015[59]), even though the association between socio-economic disadvantage and ADHD is complex and potentially mediated by other factors that may co-occur with low socio-economic status (SES) (Russell et al., 2013[60]). Moreover, more research is needed to identify the components of SES that contribute to risk of ADHD (Rowland et al., 2017[61]). SES is a relevant factor also in terms of remission of ADHD symptoms as children grow up, but appears to be mediated by the level of special education inclusion: Kim et al. (2019[62]) found that students with lower SES had a higher likelihood of remission in states that had more inclusive special education regimes. Their findings thus support the importance of inclusive education for students with ADHD, in particular when considering the issue from an intersectional point of view. Additionally, the socio-economic background of children also influences the take up rates of medication and therapies, and also their effectiveness. Children with lower SES are both less likely to adhere to their prescribed pharmacological therapies and not experience substantial improvements when receiving a combination of medication and behavioural treatment. This gap may partially be explained by the level of parental engagement, which stresses the importance of communication with families and their involvement in therapies (Kim, King and Jennings, 2019[62]).

Geographical location also interacts with ADHD, in particular in relation with prevalence and medical treatment. In different OECD countries, incidence of ADHD varies between more and less populated areas, as cases of ADHD tend to be clustered in densely populated areas (Madsen et al., 2015[63]). Moreover, other countries have shown to have lower rates of diagnosis of ADHD and medication use in rural areas (Knopf et al., 2012[64]). The local variation in diagnoses and treatments of ADHD could also be linked to the fact that the recruitment of doctors to less populated areas is known to be difficult, to the point that this lower incidence of ADHD in rural regions may indicate a differential healthcare access (Madsen et al., 2015[63]). A study found that the geographical variation in treatment prevalence to some extent was attributable to measured socio-economic differences at the population level (McDonald and Jalbert, 2013[65]). This indicates that geographical location

and SES further intersect among themselves, and should be considered together when evaluating ADHD cases and risks.

1.6.2. ADHD and gender

Gender intersects both with mental health issues in general, and with the more specific case of ADHD. Research shows that socially constructed differences between women and men in roles and responsibilities, status and power, interact with biological differences between the sexes and contribute to differences in various elements: the nature of mental health problems suffered, the health seeking behaviour of those affected and the responses of the health sector and society as a whole (World Health Organization, 2002[66]).

Evidence suggests that the prevalence of ADHD is greater in males than females, or at least more diagnosed in the former rather than in the latter (ADHD Institute, 2019[67]). However, a main issue concerning this statement, is that knowledge of ADHD in women is extremely limited as few studies have been conducted on this population. Women have only recently begun to be diagnosed and treated for ADHD (CHADD, 2018[38]), as their diagnosis is reportedly more complicated due to a number of factors: the later age of onset, more subtle clinical manifestation, and limitations associated with the DSM[1] diagnostic schema and nomenclature (Taylor and Keltner, 2009[68]). However, research shows clearly that ADHD is associated with considerable functional and psychosocial impairment in girls, including an increased risk of internalising disorders (eating disorders, depression, suicide), especially in adolescence and young adulthood (Makris et al., 2007[69]; Mikami et al., 2008[70]).

Generally, studies have found more similarities than differences in girls and boys with ADHD, and some others have found no gender differences in the number or severity of ADHD symptoms (Reid et al., 2000[71]). However, some gender variances related to ADHD have been identified, as for example due to the fact that the referral process for boys and girls appears to be different (Kashani et al., 1979[72]). Girls appeared to be usually referred for learning problems rather than behaviour and boys with hyperactive symptoms vice-versa. Thus, gender correlated behavioural patterns may be more frequently identified as ADHD in boys than in girls due to the frequency of disruptive classroom behaviour exhibited (Reid et al., 2000[71]). Moreover, as gender can differentially affect comorbidity of the ADHD subtypes in particular in girls with inattentive symptoms, it is important that clinicians are aware of such differences, as these girls risk having their ADHD overlooked and diagnosed as anxiety (Bauermeister et al., 2007[73]).

Schools also need to develop programmes to help boys with ADHD effectively without resorting to suspension or expulsion as the primary mean of handling school problems. This practice can increase the risk of demoralisation of boys with the disorder and school dropout. Also, the fact that girls are less subject to school suspension should not be misconstrued to mean that girls with the disorder are not impaired and do not need referral to treatment (Bauermeister et al., 2007[73]).

1.6.3. ADHD in migrant populations, ethnic groups and Indigenous peoples

Migrant-induced diversity, ethnicity and belonging to an Indigenous population also have been shown as interacting with ADHD. Economic conditions, family status, non-English

[1] DSM-5, the Diagnostic and Statistical Manual of Mental Disorders - 5th edition, published by the American Psychiatric Association

language in the home and neighbourhood safety factors differentially impacted diagnosed ADHD across ethnic groups, in a study by (Collins and Cleary, 2015[74]). Researchers from different countries have noted disparities in diagnosis in ethnic population subgroups. In the United States, for example, school-aged ethnic minority children in particular may be less likely to receive an ADHD diagnosis than most represented groups (Mehta, Nagar and Aparasu, 2009[75]). There are different hypotheses on the mechanisms for disparities in ADHD diagnosis: i) lower access by minority families to health professionals (Coker et al., 2009[76]); ii) more limited ability to pay for health care, iii) non-English language use, and iv) negative views toward disability and related stigma (Hervey-Jumper et al., 2007[77]; Olaniyan et al., 2007[78]).

All these factors can impact both the diagnosis of ADHD and the treatments administration, as occurs in many OECD countries. In Finland, for example, a study by Lethi et al. (2016[79]) found that the likelihood of being diagnosed with ADHD was significantly increased among children of two immigrant parents and children of an immigrant father. The increased likelihood of ADHD diagnosis among children of immigrants indicated an increased exposure to environmental risk factors, differences in the use of health services, or challenges in diagnosing immigrants' children. Moreover, both in Western Australia and in Sweden, differences were found also in the use of pharmacological treatment. For the former, children and adolescents with parents born in traditionally non-Anglophonic countries were found to be less likely treated with stimulants (Ghosh, Holman and Preen, 2014[80]); for the latter, the utilisation of ADHD medication was lower among immigrant children as compared with natives and their odds of not utilising medication increased as the degree of concentration of foreign-born increased in different areas of Stockholm (Jablonska et al., 2016[81]).

Children from Indigenous populations around the world, too, have specific needs and issues related to ADHD. They have been shown to have a significantly higher prevalence of ADHD compared to the general population in many OECD and non-OECD countries that host them, such as Canada (Baydala et al., 2006[82]), Brazil (Azevêdo et al., 2010[83]; Schmidt et al., 2013[84]) and Australia (Zubrick et al., 2005[85]). According to researchers, these findings indicate either a high prevalence of ADHD in Indigenous children or unique learning and behavioural patterns that may be misleadingly taken for symptoms of ADHD. Others have also pointed to the fact that many of the behavioural problems attributed to Aboriginal students may arise in the clash of cultures, ways of learning and expectations of schooling.

Furthermore, it is not clear what the role of environmental factors is in the rise of these symptoms, which should instead be taken into account (Azevêdo et al., 2010[83]). Additionally, it should be considered how cultural norms might influence the reports of child problems, as parents and teachers could be providing different reports and interpretations of children's behaviour in Indigenous children, who often live under different cultural norms in home and school contexts (Azevêdo et al., 2019[86]). Even more so, different Indigenous groups around the world could strongly differ in their characteristics - as pointed out by Azevêdo et al. (2019[86]) - and so would their perceptions of and approaches to ADHD. When working with and for these populations, it is fundamental for all practitioners to consider that current diagnostic processes and treatments could be not culturally appropriate to assist the Aboriginal community (Loh et al., 2017[87]). This could mean, for example, that teachers should be aware of possible cultural differences or biases that could lead to overdiagnosis in these groups, or inefficient approaches to treatment.

1.6.4. ADHD and giftedness: "twice exceptional" students

The Design and Implementation Plan of the *Strength through Diversity* Project (OECD, Forthcoming[1]) defines gifted students as students who have been classified as having significantly higher than expected intellectual abilities given their age, with intellectual abilities being assessed through psychometric tests of cognitive functioning and/or performance in classroom evaluations. Students can be considered also in domains that are not strictly academic, such as music or arts in general.

Literature, moreover, defines as "twice exceptional students" the children whose demonstrated performance falls in both directions of the learning spectrum: they demonstrate superior ability in one or more areas, and also have one or more special education needs (Neihart, 2008[88]). In practice, it recognises the possible intersection between giftedness in any field and learning disabilities or mental illnesses. Research has shown that having a high IQ does not preclude the possibility that one might have ADHD (Brown, Reichel and Quinlan, 2009[89]), though the co-occurrence of the two remains controversial and under-investigated (CADDRA, 2018[22]). However, some research has hypothesised that children who are more gifted can incur in a greater risk of misdiagnosis, for two reasons: i) their strong intellectual interest and capacity for hyper-focusing on topics and activities of interest; ii) their much greater vulnerability to boredom (Antshel, 2008[90]). Antschel (2008[90]), noting that despite their equally high IQ scores children with ADHD were more likely than control participants to have repeated a grade, concluded that the idea that ADHD symptoms among gifted students were an expression of boredom was not reliable.

1.6.5. ADHD and mental health

As mentioned in previous chapters, people with ADHD often have co-occurring psychiatric disorders, defined as comorbid disorders. In many studies, ADHD has been associated with comorbid depression, anxiety disorders, bipolar disorder, and substance use disorder (Katzman et al., 2017[91]).

Adults with undiagnosed ADHD and comorbidities are likely to seek treatment because of problems associated with a co-occurring disorder, not because of ADHD symptoms (CME Institute, 2009[92]). Moreover, the presence of comorbid psychiatric conditions can affect the presentation and course of ADHD and may require treatment independent from that of ADHD. Therefore, students with ADHD should also be screened for other disorders and vice-versa, so that all their difficulties can be properly addressed.

1.6.6. ADHD and COVID-19

The SARS-CoV-2 (COVID-19) pandemic entails specific risks to individuals with neurodevelopmental disorders, such as ADHD, as they are particularly vulnerable to the distress caused by the pandemic and the physical distancing measures. The loss of structure due to school closures, of hobbies and friends, and the stress and anxiety related to the crisis can cause disruptions in children and adolescents with ADHD and also worsen sleep issues often associated to ADHD. This may also cause an increase in depressive and anxiety symptoms and may lead to increased levels of family conflict (Cortese et al., 2020[93]).

The European ADHD Guidelines Group (2020[93]), a working group of the European Network for Hyperkinetic Disorders (Eunethydis), has developed some guidelines on the management of ADHD during the COVID-19 crisis. They suggest that schools and teachers try to monitor all their students but should include in particular those that have ADHD, and

especially adolescents as a priority group, because of their disorganisation and increased level of risk. For instance, they suggest ensuring that these students are participating in online classes and submitting their homework, but also monitoring their social and emotional well-being. In some OECD countries, such as Italy and France, NGOs or ADHD associations have prepared summaries of these guidelines to distribute them more widely to their populations, as reported by ADHD Europe (ADHD Europe, 2020[94]). Others, such as ADHD Ireland, have provided guidelines targeting specifically parents of children with ADHD to help them manage their children's fears and anxiety during the crisis (ADHD Ireland, 2020[95]). Moreover, in the United States, CHADD has published a list of sources that can help children with ADHD and their parents in managing the situation, with videos, podcasts and articles on topics such as how to get organised while staying at home, which routines to adopt for families in lockdown, how to manage home-schooling and resources to navigate distance learning and homework (CHADD, 2020[96]).

2. Cross-country analysis of policies and practices for ADHD

Although the medical definition of ADHD is generally accepted and recognised, the same does not apply to the categorisation among and within countries' educational legal frameworks. Most education systems in OECD countries offer some form of support to students that have special education needs. However, each country categorises disorders, impairments and disabilities in different ways, to the point that terms used rarely show cross-national comparability and sometimes even national consistency.

This second part of the paper, after an analysis of cross-country definitions and categorisations, reviews the different national policies and practices that are in place in OECD countries for the inclusion of students with ADHD in educational systems. Referring to the Framework of the Strength through Diversity Project, the analysis is structured taking into account the five key policy areas: i) the overall framework for governing diversity, equity, and inclusion of students with ADHD, ii) the use of resources to support students with ADHD in education systems, iii) capacity building to support students with ADHD, iv) school-level interventions and v) monitoring and evaluation of policies on ADHD.

The policy mapping elaborated in this section also serves as a basis for Section 3. , which focuses on relevant advantages and disadvantages of some of the main policy levers.

2.1. The greatest challenge: categorising ADHD

2.1.1. ADHD: learning disorder, disability or difficulty?

The primary difficulty in analysing existing policies that concern ADHD and specifically how students with ADHD are included in education systems is due to the fact that the definition and classification of ADHD around the world varies significantly. Three terms are commonly used, often interchangeably, to classify ADHD: i) learning disorder; ii) learning disability; and iii) learning difficulty. This section will clarify the appropriateness of these definitions.

It is important to acknowledge that these definitions are not per se necessary for an inclusive model of education. A system that focuses on responding to the needs of the students and coherently adapting its educational offer – regardless of any diagnosis or classification – does not need to, nor should, label the children and their disorders. However, in systems that do categorise children according to their needs and disorders in order to assign resources and additional support, it is important to ensure the correct recognition to children with ADHD, as well as other SEN. A progressive shift towards systems that do not rely on labels, in particular for classroom interaction with children (such as in Finland), could entail positive benefits for the students, as discussed more extensively in Section 3.1.

Learning disorders. Learning disorders are medically recognised mental disorders, which are defined by the United States' Centers for Disease Control and Prevention (CDC) as: "having difficulty in one or more areas of learning, even when overall intelligence or motivation is not affected." (Centers for Disease Control and Prevention (CDC), 2019[97]). DSM-5 defines specific learning disorders more generally, as "neurodevelopmental disorders with a biologic origin that is the basis for abnormalities at a cognitive level that are associated with the behavioural signs of the disorder. (…)" (American Psychiatric Association, 2013[6]). Examples of learning disorders include: i) Dyslexia – difficulty with

reading; ii) Dyscalculia – difficulty with math; iii) Dysgraphia – difficulty with writing. Under this definition, ADHD is not a learning disorder, but is often accompanied by one or more of them.

Learning disability. Some countries use the term learning disability to identify certain issues that require additional support. The term learning disabilities, sometimes referred to as specific learning disabilities, is an umbrella term that covers a range of neurologically based disorders in learning and various degrees of severity of such disorders. These disorders involve difficulty in one or more basic psychological processes: i) input (auditory and visual perception); ii) integration (sequencing, abstraction, and organisation); iii) memory (working, short term, and long term memory); iv) output (expressive language); and v) motor (fine and gross motor) (LDA - Learning Disabilities Association of America, 2012[98]).

Learning disabilities are often categorised in three, broad, categories, that tend to align with the ones defined as learning disorders: i) Reading disabilities (often referred to as dyslexia); ii) Written-language disabilities (often referred to as dysgraphia); iii) Math disabilities (often called dyscalculia).

ADHD is *not* considered a learning disability in most OECD systems, but that is not true for all countries. Some countries consider ADHD not as a disability per se, but rather in its effect on children's learning. On the one hand, in countries such as the United States, an individual may qualify for services that cover all students in education with a disability that is defined as "any physical or mental impairment that substantially limits one or more major life activities (including learning)". Thus, children that can demonstrate this level of impairment due to ADHD can qualify for disability services, even if ADHD by itself does not qualify as a learning disability[2]. On the other hand, in countries such as Italy, children with a moderate-severe form of ADHD can receive a certification that directly recognises it as a disability (Italian Government, 1992[99]).

Learning difficulty: the term learning difficulty is less formally defined than disorders and disabilities. The Australian Learning Difficulties Coalition (2015[100]) states that the term "learning difficulties" relates to "significant and unusual difficulties in the acquisition and use of one or more of the following areas: listening, speaking, reading, writing and mathematical skills". In some cases, ADHD is not considered a learning difficulty (Taskforce on Students with Learning Difficulties, 2013[101]) (Richardson and Puri, 2002[102]), while other parties incorporate it in the definition (Foundation for people with learning disabilities, n.d.[103]). The United Kingdom's Foundation for People with Learning Disabilities defines learning difficulties as "having specific problems processing certain forms of information". They also differentiate between learning disabilities and learning difficulties stating that difficulties do not affect general intelligence, in terms of IQ.

The lack of clarity and consistency has been recognised both at national and international levels, and has been at the centre of some governmental attempts of clarification (Taskforce on Students with Learning Difficulties, 2013[101]), as a number of problems arise from this issue. Firstly, the estimate of prevalence rates can vary significantly on the basis of the different definitions, and the qualification of ADHD for different national programmes of assistance can be complicated by this lack of clarity in its definition. Moreover, inconsistent definitions have resulted in data collection being extremely difficult, which led the Council

[2] In the United States, ADHD is considered under IDEA (Individuals with Disabilities Education Act) in the category of "other health impaired".

of Australian Governments to work on a model for collecting nationally consistent data on school students with a disability or difficulty (Taskforce on Students with Learning Difficulties, 2013[101]). As mentioned, even though international data comparability and resource allocation often depend the existence of a shared and clear categorisation of ADHD, its definition is not as relevant for instructional goals and should not be imposed on children (Section 3.1).

In this context, ADHD has more problems in being categorised than other learning difficulties. Pathologies such as Dyslexia or Dysgraphia, which are learning disorders, are generally included in every educational system, whether they are considered learning disabilities – in most of the cases – or learning difficulties.

2.2. Structures for inclusion: from regulatory frameworks to curricula

This section will build on the Design and Implementation plan for Phase II of the Strength through Diversity Project (OECD, Forthcoming[1]). The cross-country analysis will be organised along five main elements: the overall framework for governing diversity, equity, and inclusion for SEN; the use of resources to support SEN in education systems; capacity building on SEN for all stakeholders involved in education systems; school-level interventions; and evaluation and monitoring. Each field of analysis will present diverse country approaches to provide knowledge of policies and practices across OECD countries.

2.2.1. Regulatory framework

The OECD (2019[104]) defines regulatory policy as a policy related to achieving governmental objectives through the use of regulations, laws, and other instruments to deliver better economic and social outcomes. In this review, regulatory frameworks concern national laws on the inclusion of students with ADHD and overall regulatory systems of education provision for students with SEN at a country-level.

Regulation concerning the inclusion of children with ADHD in education systems is generally included in the overall regulation for students with SEN. As mentioned in Section 2.1.1, ADHD can be included in the general regulation for disabilities, included in the regulation if its symptoms qualify as disabilities, or not included.

Moreover, different countries have different, formal, requirements for the admission of children with ADHD into support systems. Specifically, countries such as the United States and Canada[3] require a formal diagnosis of ADHD before a child can be granted support in school (CHADD, 2019[105]). On the contrary, countries such as Finland (Jahnukainen and Itkonen, 2010[106]), provide in-class support to children that show learning difficulties, regardless of whether they have or not received a diagnosis. Also in Sweden, it is not necessary for children to receive a diagnosis for placement in a remedial class: while in the past economic resources to the school were strictly related to a diagnosis, nowadays support can be provided also to children without a diagnosis (Brodin, 2012[107]).

Similarly to Sweden, the Netherlands is currently transitioning between the two systems. Despite a long-standing tradition of separated schools for children with special education needs, the country has introduced a change in its legislation in 2018, removing the need for

[3] Canada's Regulations on the topic vary according to the different States. Ontario, for instance, recognises "exceptional" students after a formal evaluation conducted by the "Identification, Placement, and Review Committee", according to Regulation 181/98.

a formal diagnosis of ADHD for children to qualify for additional support (Wienen et al., 2019[108]).

In general, it is not always straightforward to understand how ADHD is classified within different systems and which services are available for students that have this disorder. This fact can complicate not only the collection of data and monitoring and evaluation of policies, but also and foremost a full access to information and support for students with ADHD and their families, in contexts that do require a categorisation of SEN for access to extra support and services.

2.2.2. Education provision: diversity of learning settings

Many schools offer programmes for children with ADHD and other related disorders, either mainstreaming or specialising the offer for students with ADHD. The different types of offers can be classified into six categories, on the line of the comprehensive model that is offered in Ontario, Canada: i) Dedicated schools, ii) Dedicated classes, iii) Regular classes with indirect support, iv) Regular classes with resource support, v) Integrated classes, vi) Withdrawal classes. The characteristics of these models are summarised in Table 2.1.

Table 2.1. Types of learning settings

Full/Part time	Placement	Description
Full time	Dedicated schools	The student can apply to specific schools, dedicated to students with moderate/severe learning disabilities.
	Dedicated classes: Special education class full time	The student is placed in a special education class, where the student-teacher ratio conforms to the standards, for the entire school day.
	A regular class with indirect support	The student is placed in a regular class for the entire day, and the teacher receives specialised consultative services.
Full/Part time	A regular class with resource support	The student is placed in the regular class for most or all of the day and receives specialised instruction, individually or in a small group, within the regular classroom from a qualified special education teacher.
Part time	Integrated classes: Special education class with partial integration	The student is placed in a special education class where the student-teacher ratio conforms to the standards, for at least 50 per cent of the school day, but is integrated with a regular class for at least one instructional period daily.
	A regular class with withdrawal assistance	The student is placed in the regular class and receives instruction outside of the classroom for less than 50 per cent of the school day, from a qualified special education teacher.

Source: Adapted from Ontario Public Service (2017[109]), Special Education in Ontario, http://www.edu.gov.on.ca/eng/document/policy/os/onschools_2017e.pdf.

OECD countries rely either on different combinations of these services, or in some cases select a single model to offer. Canada, as mentioned, offers the entirety of the models presented in the table, even if not all district school boards, and consequently, not all schools, offer all placement options for their students with SEN. Similarly, the placement options for one type of exceptionality may be different from the placement options for another type of exceptionality offered within a district school board (OurKids, 2019[110]).

2.2.3. Curriculum policies and individual education plans

Most OECD countries offer individualised plans to children with ADHD in order to facilitate the programmes or offers of schools based on the child's difficulties and needs for flexibility. These programmes are most often referred to as "Individual Education

Plans" (IEPs), but are variously termed in different countries as 'Negotiated Education Plans', 'Educational Adjustment Programmes', 'Individual Learning Plans', 'Learning Plans', 'Personalised Intervention Programmes', and 'Supervisory Plans' (Mitchell, Morton and Hornby, 2010[111]). Generally, these plans are documents tailored on the individual children and their needs, and comprise different elements, such as a child's present level of performance, the individualised instruction and related services, supports offered like accommodations or assistive technology, and the annual goals set for the child (Undestood, 2019[112]).

Most OECD countries rely on IEPs, which vary mostly in terms of the elaboration process for each plan. Some countries, such as the United States, France, the United Kingdom, Ireland and Italy, do not rely only on teachers or principals for the drafting of the IEPs, but also involve – or take into consideration - in the process others actors, such as neuro-psychiatrists or clinical psychologists, parents and sometimes the children themselves (Sandri, 2014[113]; Cavendish and Connor, 2017[114]). On the other hand, countries such as Spain, offer curricula adaptations for their students, which are the exclusive competence of the tutor or teacher of the specific subject (Ministerio de Educación y Formación Profesional, 2015[115]).

Further differences can be identified in the legal status of the documents, which can carry force of law or not, as it occurs respectively in the United States and in Canada. Moreover, while various countries have set the content of the IEPs by law (Räty, Vehkakoski and Pirttimaa, 2018[116]), others - such as the United Kingdom - have opted for a more elastic document that can be routinely amended and updated on the basis of the needs and eventual progress of the child.

As mentioned in Section 2.2.1, some countries require children to have received a formal diagnosis of SEN, or ADHD, to have instructional support in schools, which also applies to the assignment of an IEP. An interesting approach to overcome the limitations that can occur for children who struggle to obtain a diagnosis is the one that has been implemented by Finland. The country differentiates between two types of plans: Learning Plans and IEPs. The two are very similar in terms of structure and content, but while the IEP is a more formal document that can be requested only by those who have an official SEN status, the Learning Plan is designed to support students to learn, regardless of any diagnosis, and to make it easier for teachers to differentiate the lessons. The latter can be thus developed for any student, be he/she a child with special needs, an immigrant student or a gifted one (Mitchell, Morton and Hornby, 2010[111]).

A further interesting element that is often included in IEPs is Transition Plans. In general, transition to tertiary education and to work depends on the bridges between secondary education and the labour market developed by upper secondary schools as well as the support provided to students throughout the transition process (OECD, 2011[117]). Particularly vulnerable in this context are young adults with SEN, who may face many barriers hindering their transition to tertiary education and to employment (Ebersold, 2012[118]). IEPs, or other plans such as the United States' Individual Learning Plans (ILPs)[4], can support college readiness efforts by helping students create a transition plan that includes their intentions to participate in specific post-secondary education and training opportunities that support their career goals (Solberg et al., 2011[119]). Most OECD countries include transition planning in their IEP guidelines, as for example Ireland,

[4] The United States offers different plans to their students with SEN, specifically IEPs for the access to the curriculum, and ILPs for the curriculum itself.

Scotland (United Kingdom), Canada, various European countries, and New Zealand (Mitchell, Morton and Hornby, 2010[111]).

Lastly, IEPs make explicit measures to be undertaken in order to accommodate the students' needs that have been initially depicted in the document. To make the curriculum more accessible, several interventions can be offered to students, giving consideration to different alternatives in terms of content, teaching materials and responses expected from learners. Modifications (e.g. enlarging the font of a text), substitutions (e.g. Braille for written materials) or omissions of complex work are all possibilities for SEN (Mitchell, Morton and Hornby, 2010[111]). However, in the case of ADHD, IEPs generally offer two types of adjustments for students with special needs that allow them to complete the same work as their peers: accommodations and modifications. These two categories differ as accommodations concerns *how* students learn, while modifications rather involve *what* students learn (Understood, 2019[120]). Accommodations are intended to help students with ADHD learn the same information as other students, through changes to the structures and the environment that provide support. They are most effective when tailored to the specific needs of the children, which relate in particular to their presentation of ADHD (inattentive, hyperactive, inattentive-hyperactive) (CHADD, 2018[121]). In cases where accommodations do not sufficiently provide for the needs of children with IEPs, modifications must be made. General examples of common accommodations that are offered to students with ADHD are: i) Extra time on tests; ii) Instruction and assignments tailored to the child; iii) Positive reinforcement and feedback; iv) Using technology to assist with tasks; v) Allowing breaks or time to move around; vi) Changes to the environment to limit distraction; and vii) Extra help with staying organised (CDC, 2019[122]). In contrast, modifications can involve a structural change in the children's curricula, which can mean learning different material, getting graded or assessed using a different standard than other students, or being excused from particular projects (Morin, 2019[123]). Whereas accommodations allow students to learn the same content as their peers, modifications are actual changes to assignments or the curriculum that make it easier for children to stay on track (Sands, 2016[124]).

2.3. Resourcing the system

In some OECD countries, children with ADHD can be considered eligible for special needs education funding, in case their symptoms cause a clear need for additional support. Some countries provide additional teaching resources to schools so that they can make appropriate provisions for children who are eligible for learning-support teaching, as for instance students with learning disabilities or disorders such as ADHD. This used to be the case, for example, of the Irish "General Allocation Model (GAM)" (Ware et al., 2011[125]), which has been discontinued since 2017. Ireland has since moved to an input-based model called "SET Allocation Model", where resources are linked to the needs of the schools, which can then deploy resources according to their students' individual needs, without the requirement of a diagnosis (that was necessary in the GAM) or label, nor the administrative burden to resource and submit assessments (Department of Education & Skills of Ireland, 2017[126]).

Similarly to the Irish model, all schools in Australia receive general funding to support every student with special needs. These funds are meant to finance teacher training and changes in classrooms to help children with special needs, including ADHD. Moreover, all schools – Government, Catholic and independent schools – can get extra funding for students with a 'moderate to severe' disability. In government schools in Victoria, for example, this is called 'Programme for Students with a Disability' funding, or PSD funding.

In specialist schools, these funds help cover the costs for schooling of students with SEN, while in mainstream schools, the funds can be used in a broader way, depending on children's needs (Association for Children with a Disability, 2015[127]).

However, since ADHD is not considered a learning disability in most countries, often it does not qualify students for the additional or specific funds that education ministries devote to this category. Schools generally receive funding for special educational needs, or are required to dedicate part of their current funding to SEN. Further information on general resourcing and allocation models for SEN can be found in the OECD Working Paper "Mapping Policies for the inclusion of students with SEN in education systems" (Brussino, 2020[48]).

2.4. The sooner, the better? The role of early assessment for children with ADHD

Children spend a significant portion of their time in school, which makes teachers and education systems particularly relevant and influential for the diagnosis of ADHD (Hamed, Kauer and Stevens, 2015[128]). Teachers are often the first ones to recognise or suspect ADHD in their students, also because its symptoms typically affect school performance and can cause disruption within classes. Indeed, being used to work with many children, it is easier for them to notice something outside the norm, which can lead them to speak with the school psychologist or the parents about their concerns (WebMD, 2019[129]). For these reasons, in the medical assessment of ADHD, a teacher report of a child's behaviour is often sought.

Obtaining a correct medical assessment at the beginning of school age might be very relevant for the children with ADHD since they face a greater risk of incurring academic and social difficulties compared to their peers without ADHD (Hamed, Kauer and Stevens, 2015[128]).

The current Official Clinical Practice Guidelines for the Diagnosis, Evaluation, and Treatment of ADHD of the American Academy of Pediatrics (AAP) concern children from 4 to 18 years old of age, while there are no existing guidelines for younger children (Subcommittee On Children And Adolescents With Attention-Deficit/Hyperactive Disorder, 2019[130]). However, it can be possible to identify early signs of ADHD also in such cases. Pre-schoolers with ADHD are more likely to have difficulties in day-care or school, including problems with peer relationships, learning, and a higher risk of injuries. Symptoms related to these problems can signal the need for a diagnosis.

While it is important to intervene on pre-school children showing severe ADHD symptoms, it is not recommended to use medication as a first line of treatment. Wigal et al. (2006[131]) have shown that pre-schoolers are likely to have more adverse effects to doses of medication that older children, in particular in the presence of co-existing disorders. Early behavioural interventions designed to reduce symptoms of ADHD in pre-schoolers are therefore recommended as first line of treatment or an effective addition to medication treatment when the latest appears necessary (Kollins et al., 2006[132]). Medication can be prescribed in case behavioural interventions are not successful in reducing children's symptoms and difficulties (CHADD, n.d.[133]).

A further problematic that may rise from an early diagnosis of ADHD is the risk of overlooking other learning disabilities. In particular, since the comorbidity between ADHD and learning disorders is high, there is a risk that a child who receives an ADHD diagnosis in pre-school continues to have learning challenges as he/she progresses in school. In this case, a further evaluation of the symptoms is necessary, the child could be struggling due

to dyslexia or dysgraphia, for example. Since these disorders are diagnosed once a child enters school, it is fundamental to monitor children with a pre-school diagnosis of ADHD for additional problems (Braaten, 2016[134]).

2.5. Building capacity: researching, training and raising awareness

The effectiveness of policies and practices to support students with ADHD depends on the correct alignment between students' needs and system's competences and skills. This section investigates OECD countries' practices in raising awareness and fighting the stigma on ADHD and in preparing teachers to support students. These elements play an important role in ensuring that all stakeholders are collaborating for the inclusion of students with ADHD, and that prejudices do not hinder efforts for supporting the children within the education systems. Moreover, this section reviews the current status of research in this field and the involvement of non-governmental actors.

2.5.1. Promoting awareness and fighting the stigma

Raising awareness on ADHD, providing the public with relevant and factual information, and fighting the stigma that surrounds it, are all fundamental steps to ensure that children, families and teachers are engaged in the interventions necessary to support students with ADHD. Since children with ADHD may be stigmatised by others, in particular their peers, their low self-esteem can be a barrier to the effectiveness of therapies and management of the disorder (Richardson et al., 2015[135]). Muller and colleagues (2012[24]) state that stigma associated with ADHD is an underestimated risk factor, which can affect various aspects of the life of a child with ADHD, such as their treatment adherence, treatment efficacy, symptom aggravation, life satisfaction, and mental well-being. Furthermore, stigma can create further barriers for teachers, by focusing their attention on stereotypical beliefs about ADHD rather than on the person, creating a negative relationship between the teachers and their students. This can lead to the selection of inappropriate strategies or interventions for ADHD and marginalising further the students (Richardson et al., 2015[135]). Various studies have demonstrated that ADHD is a highly stigmatised disorder. For example, some studies have found that attitudes towards ADHD tend to be more negative than attitudes towards autism spectrum disorders and that many students with ADHD are rejected by their peers (de Boer and Pijl, 2016[136]). For these reasons, it is important to explain ADHD to children's peers to attempt to increase their understanding and acceptance of the disorder.

Furthermore, it has been recognised that teachers may need a period of reflection on this condition for their personal development, even after having acquired more awareness on the topic. Some teachers reported that they accepted ADHD only after a period of personal re-elaboration, which then led also to changes in their teaching styles. The more knowledge the teachers have about ADHD, the more successful interventions will be. This concept also applies to children, who too need greater knowledge on the disorder, in order to better advocate for themselves (Richardson et al., 2015[135]).

For these reasons, it is important to raise awareness about this disorder among children with ADHD and their families, teachers and classmates. Different non-profit organisations and associations are involved in raising the awareness on the issue, both at national and international level. For example, a number of American groups concerned about ADHD and mental health have established the ADHD Awareness Month – in October – as a time to recognise the progress made in ADHD education and advocacy, understand the work that still needs to be done, and raise awareness about the importance of early diagnosis and treatment (Low, 2019[137]). Partners of this movement include the Attention Deficit

Disorder Association (ADDA), the ADHD Coaches Organization (ACO), and Children and Adults with Attention-Deficit/Hyperactivity Disorder (CHADD). In addition, dozens of other health-related groups and government agencies recognise and celebrate ADHD Awareness Month, sharing information on this disorder. This movement is not only located in the United States, but is actually present globally. Efforts for awareness are also conducted in Europe, in particular under the umbrella organisation ADHD Europe, which includes individual members or patients, parents, caregivers, families who belong to self-support patient ADHD advocacy NGOs (Non-Governmental Organisations comprising of charities, family support groups, and other grass roots organisations) within Europe.

2.5.2. Preparation of teachers and teaching staff

The results from OECD's TALIS 2018 reveal that across OECD countries, a significant portion of teachers do not feel prepared to deal with students who have special education needs and that they would like to have more occasions to develop competencies for this scope (OECD, 2019[138]). Moreover, on average across the OECD, 32% of school principals report that delivery of quality instruction in their school is hindered by a shortage of teachers with competence in teaching students with special education needs. This topic ranks among the most frequent resource issues reported by school principals (OECD, 2019[138]).

Several studies reviewed by the United Kingdom's NHS have further shown that teachers' lack of guidance and knowledge are perceived as barriers to effective treatment of students by them, and that teachers from many countries report that they are working in schools that do not have ADHD-specific guidance (Richardson et al., 2015[135]). Other countries have experienced similar results, as for example Finland, where teachers show a lack of confidence in their ability to reach and support in practice students with special education needs. Unsurprisingly, special educators, due to their particular knowledge, are more confident of being able to meet children's special needs. Thus, additional training and in-service training would help teachers and teaching assistants acquire the necessary knowledge and skills while also stimulating their interest in teaching every pupil (Paju et al., 2015[139]).

The efforts for educating and training teachers can come from different governmental levels. On the one hand, various education ministries across the OECD have developed and published teachers' guides, meant to inform them of good practices to support students with learning disabilities, difficulties and disorders. The Ministry of Education of the Province of British Columbia in Canada, for example, has elaborated a "Supporting Students with Learning Disabilities" guide for teachers (Ministry of Education of the Province of British Columbia, 2011[140]), and the US Department of Education has also published a "Teaching children with Attention-Deficit/Hyperactivity disorder: Instructional strategies and practices" guide in 2008.

On the other hand, sub-national and local entities sometimes establish training paths for teachers. For example, the Italian Region Lombardy has implemented "Teacher training" courses for professionals who have one or more students diagnosed as ADHD in class (Box 2.1).

Box 2.1. Lombardy's teacher training

The teacher training courses are part of the interventions offered from the NPI ("Neuropsichiatria Infantile e dell'Adolescenza", i.e. Territorial Service of Child and Adolescent Neuropsychiatry) of the Italian Region Lombardy, for the care-taking of children with ADHD. The teacher training is a group training aimed at teachers who have one or more students diagnosed as ADHD in their class.

This path aims to provide three main skills to the teachers:

1. **Ability to observe and interpret correctly the behaviour of the child in the classroom**. Teachers are presented with the disorder and its main symptoms, with attention being placed on classroom manifestations of ADHD and on the difficulties that the child with this disorder can present in learning tasks. The aim is to clarify the nature of this disorder and avoid the creation of false beliefs in children.

2. **Ability to structure spaces, times and tasks in a way that supports them learning about children with ADHD**. Suggestions are provided on how to create an environment that can be supportive for the child, and at the same time apt for the establishment of a good teacher-student relationship. The aim is to show how to intervene in the environment to promote changes in behavioural manifestations of the child.

3. **Ability to effectively use tools and strategies to favour the integration of the child with ADHD in the class group**. Some strategies for managing students in the classroom are presented to the teachers, in particular to explain how to face relational difficulties that could occur due to impulsive behaviours of the child with ADHD. The goal is to provide the teachers with tools to intervene in the classroom context and increase the chances of relational success and inclusion of the child.

The teacher training paths are periodically activated by the local NPI present and attendance is free for the teachers invited by parents on the advice of the reference psychiatrist/psychologist.

Source: Regione Lombardia (2013[141]), ADHD - Guida per gli insegnanti, http://www.istruzione.lombardia.gov.it/sondrio/wp-content/uploads/2013/11/ADHD_Guida-per-l_insegnante.pdf

Traditional teaching roles are not the only professional figures that can support children with special learning needs, as well as ADHD. Several systems have introduced other professional roles surrounding this task: (learning) support teachers and special educational needs teachers. Support teachers focus on the provision of supplementary teaching to students who require additional help. Their works emphasises the needs of individual students' school priorities, and evidence-based programmes to assist students with additional learning and support needs (New South Wales Department of Education, 2019[142]). They are closely linked with and may share duties with special educational needs teachers. SEN teachers work with children and young people who have special educational needs or disabilities (National Careers Service, n.d.[143]). A SEN teacher can work in a mixed class, a special class in a mainstream school, or in a special school. They can teach individual children or work in small groups. They can often be supported by teaching assistants.

The collaboration between teachers and special education teachers is generally referred to as "collaborative team teaching" or "co-teaching". This approach is used in countries such as the United States, where general education and special education teachers work together to plan lessons, teach, monitor student progress and manage the class. It is an approach that aims at simplifying teaching to all students the same content and hold them to the same educational standards. For children with ADHD, and more in general SEN, being in a co-taught classroom can be beneficial: students can spend more time with the teachers and get more individual attention (Morin, 2019[144]).

2.5.3. Research in the field and involvement of non-governmental actors

Most of the research and provision of information in this field, in particular related to the current practices and the suggestions for teachers and families on how to approach and support children with ADHD, comes from non-governmental and non-profit actors. In most OECD countries, there are institutions that aim specifically at raising awareness on ADHD and providing support to all relevant stakeholders. However, various Education or Health Ministries from OECD countries have also published guidelines on ADHD treatment and management. Regardless, most of the up-to-date research comes from civil society actors. Examples of prominent national and international actors and research centres are mentioned in Table 2.2.

Table 2.2. Non-governmental actors involved in ADHD research

Institute	Mission	Country/ies	Relevant Publication(s)/Content
ADHD Europe	The Association promotes ADHD awareness and information on a European level, promoting evidence-based treatment and supporting the efforts of its members throughout Europe, in an effort to combat ignorance, stigma and intolerance with regard to ADHD	European Union	ADHD - Europe Survey of Member Organisations in 19 Countries: Diagnosis and Treatment of AD/HD in Europe - Differences, Problems and Progress (2009)
ADHD Foundation	"We are committed to the participation agenda and the right of those who use services to have a voice and be responsible for their own life plan and the change they want to achieve for themselves." The ADHD Foundation works in partnership with relevant stakeholders to improve emotional well-being, educational attainment, behaviour via a better understanding and self-management of ADHD and related learning difficulties	United Kingdom	They provide assessment for ADHD (in Liverpool), but also guidance for different stakeholders, and organise trainings and events
ADHD Institute	ADHD Institute is an educational platform[5]	United States	In-depth analysis on the disorder on their website
CADDRA (Canadian ADHD Resource Alliance)	CADDRA is an independent, not-for-profit, resource organisation for medical, healthcare and research professionals with an interest in the field of ADHD	Canada	Canadian ADHD Practice Guidelines, 4th Edition, 2018
CHADD (Children and Adults with Attention-Deficit/Hyperactivity Disorder)	"We believe in improving the lives of people affected by ADHD." CHADD is part of a social movement that seeks to shape the conversation on how society treats, accommodates, and views people affected by ADHD	United States	Attention Magazine (bi-monthly publication)
World Federation of ADHD	The World Federation of ADHD is an international professional association of clinicians, scientists, and other healthcare professionals who are interested in ADHD and all psychiatric syndromes in which ADHD may be a feature	Global	Journal of the World Federation of ADHD Attention Deficit and Hyperactivity Disorders

2.6. Practical support: from classrooms to homes

Although it is generally acknowledged that most children with ADHD do not require special educational services and therefore can attend mainstream schools, nearly all are likely to benefit from individualised and informed adjustments to the organisation and monitoring of their learning process throughout school (Liontou, 2019[145]). As a result, school-level interventions are important policy levers to promote inclusive education settings for students with and without ADHD or SEN more in general. Main school-level interventions refer to distributing teaching, learning and classroom strategies, the practice of physical activity, the deployment of assistive technology and the engagement of families and community.

2.6.1. Classroom strategies

As mentioned, schools have a key role in the effective management of ADHD symptoms and in supporting the students to overcome their difficulties in learning. Thus, implementing the correct teaching strategies and organising effectively the environment is fundamental for unlocking the full potential of these students.

OECD countries implement a number of school-based management strategies, though sometimes denominating or classifying them differently. Some of these strategies are

[5] Developed and funded by Takeda, the largest pharmaceutical company in Asia

included in countries' IEPs modifications or accommodations, while other are generally not formally prescribed.

For the purpose of this review, the possible interventions are grouped in the following sub-categories: i) academic instruction, ii) behavioural classroom management; iii) environmental interventions; iv) executive function interventions; and v) social skills interventions. These interventions are generally targeted to primary and secondary students, though some can also be implemented at a post-secondary level, and are here analysed at the end of this section.

Academic instruction. Teachers can help prepare their students with ADHD to achieve by applying the principles of effective teaching when they introduce, conduct, and conclude each lesson (U.S. Department of Education, 2008[146]). A student's academic success can be greatly fostered by their teacher's ability to adapt and differentiate teaching methodologies so support the learning needs of their students (HADD Ireland, 2013[147]). The interventions should be differentiated with respect to the timeline of the lessons, involving the introduction, conducting and the closing of the lesson. These moments all require particular attention, to better respond to the needs of children with ADHD. Students with ADHD are more likely to learn best when they are situated in a structured lesson, where the teacher is able to clearly explain what s/he wants children to learn and what s/he expects from them, both from an academic point of view and from a behavioural one. In this phase, a number of teaching practices can be helpful, such as preparing the students for the day's lesson, both summarising the order of various activities planned and reviewing the content that was studied during the previous lesson. In addition, teachers should specify how they expect the children to behave and act, such as speaking with a low tone to their classmates to work on an assignment or raising hands before speaking, and anticipate all the material that they will need for the class. Then, while holding the lesson, teachers should in particular: keep track of the children's understanding of the material by asking questions; divide work into smaller tasks that can foster the concentration; and provide follow-up directions both orally and in written form. Moreover, teachers should maintain that children with ADHD generally struggle with transitions between lessons, so then preparing them for transitions from one lesson to the other can help them stay on task. Lastly, closing up lessons effectively requires professors to notify students in advance, verify whether the assignments have been completed and instruct students on how to start preparing for the following lesson. Table 2.3 summarises further academic instruction interventions that can be implemented to support the students with ADHD as described earlier.

Table 2.3. Academic Instruction Interventions

Academic Instruction	
Introducing lessons	Provide an advance organiser
	Review previous lessons
	Set learning expectations
	Set behavioural expectations
	State needed materials
	Explain additional resources
	Simplify instructions, choices, and scheduling
Conducting lessons	Be predictable: maintain structure of the lessons
	Support the student's participation in the classroom
	Use audio-visual materials
	Check student performance

	Ask probing questions
	Perform ongoing student evaluation
	Help students correct their own mistakes
	Help students focus
	Follow-up directions (oral/written)
	Lower noise level
	Divide work into smaller units
	Highlight key points
	Eliminate or reduce frequency of timed tests
	Use cooperative learning strategies
	Use assistive technology
Concluding lessons	Provide advance warnings
	Check assignments
	Preview the next lesson

Source: US Department of Education (2008[146]), Teaching Children with Attention-Deficit/Hyperactivity Disorder: Instructional Strategies and Practices, https://www2.ed.gov/rschstat/research/pubs/adhd/adhd-teaching.html.

Behavioural classroom management. This approach encourages a student's positive behaviours in the classroom, through a reward systems or a daily report card, and discourages their negative behaviours. This teacher-led approach has been shown to influence student behaviour in a constructive manner, increasing academic engagement (Evans, Owens and Bunford, 2013[148]). Students with ADHD are more responsive to consistent and immediate positive reinforcement (CADDRA, 2018[22]). It can then be beneficial to boost the students' self-esteem by providing them with verbal recognition of their progress or good behaviour and with tangible rewards, having identified incentives that are meaningful for the individual. Likewise, children with ADHD react well to positive reinforcement that is specific enough to define the appropriate behaviour for them to follow. For example, it can be constructive for teachers to provide students with specific feedback such as "thank you for putting your hand up to ask a question" and thus shape their idea of appropriate classroom behaviour.

A further, important, element can be to allow the symptoms of hyperactivity to find their own "escape valve". It can be helpful to create opportunities for students to move around in a controlled and purposeful manner in class, such as while handing out supplies, collecting papers or delivering messages for teachers (ADDitude, 2019[149]). Similarly, children with ADHD often have the need to fidget, in order to maintain their concentration. Allowing them to do so in a way that is not distracting for their classmates, such as quietly manipulating an object or doodling, can be beneficial for their focus. Further possible behavioural interventions, grouped as i) positive reinforcement, ii) generalised techniques and iii) behavioural prompts, are developed in Table 2.4.

Table 2.4. Behavioural classroom interventions

Behavioural Interventions	
Positive reinforcement of appropriate behaviour	Define the appropriate behaviour while giving praise, being specific
	Give praise immediately
	Vary the statements given as praise
	Provide students with positive feedback and encouragement more frequently than negative feedback
	Be consistent and sincere with praise
	Token economy systems

	Tangible rewards
Generalised behavioural intervention techniques	Selectively ignore inappropriate behaviour
	Remove nuisance items
	Provide calming manipulatives
	Allow for "escape valve" outlets such as acceptable opportunities for movement
	Activity reinforcement
	Hurdle helping
	Parent conferences
	Peer mediation
Behavioural prompts	Visual cues in the classroom or on the desk (for transitions, etc.)
	Use visual prompts/pictures or lists
	Hand gestures

Source: Adapted from US Department of Education (2008[146]), Teaching Children with Attention-Deficit/Hyperactivity Disorder: Instructional Strategies and Practices, https://www2.ed.gov/rschstat/research/pubs/adhd/adhd-teaching.html and CADDRA (2018[22]), Canadian ADHD Practice Guidelines, Fourth Edition, https://www.caddra.ca/wp-content/uploads/CADDRA-Guidelines-4th-Edition_-Feb2018.pdf.

Environmental interventions. Students with ADHD can require interventions that counteract the fact that they get easily distracted and have trouble focusing. Moreover, these interventions should allow for more opportunities for teacher monitoring and interaction (CADDRA, 2018[22]). These issues can be tackled, for example, by seating the student in an area with little distractions, such as near the teacher or seating the student next to positive role models, such as classmates who are likely not distract them and can help them stay on task (CHADD, 2018[121]). Specific environmental interventions are listed in Table 2.5.

Table 2.5. Environmental Interventions

Environmental Interventions	
Strategies	Preferential seating away from distractions
	Proximity to the teacher
	Providing low-distraction work areas
	Being seated beside a student role model
	Rule reminders and visual cues
	Allowing them to take tests in a different room, which should be quieter and less distractive
	Limiting repetitive assignments and providing time for breaks

Source: CADDRA (2018[22]), Canadian ADHD Practice Guidelines, Fourth Edition, https://www.caddra.ca/wp-content/uploads/CADDRA-Guidelines-4th-Edition_-Feb2018.pdf and CHADD (2018[121]), Classroom Accommodations, https://chadd.org/for-educators/classroom-accommodations/.

Executive Function Interventions. As students with ADHD progress in their academic path and meet increasing demands in classrooms, they often struggle with organisation, time management, prioritisation and task completion. Due to the executive function deficits that characterise ADHD, children and adolescents can suffer negative impacts on academic progresses and productivity. The accommodations generally offered by education systems are not designed to improve specific skills for students with ADHD, but rather to adapt expectations to better permit the student to advance against these new targets. However, teachers can support the executive functioning of their students by establishing a structured classroom and a routine, teaching time management and awareness, requiring the use of an organisation notebook or suggesting a graphic organiser for projects. More broadly, education systems as a whole can support this process by

providing these students with an academic coach or a tutor. More suggestions are listed in Table 2.6.

Table 2.6. Executive Function Interventions

Executive function interventions	
Strategies	Assign a tutor or academic coach
	Seek a structured classroom
	Establish a routine
	Set up an assignment notebook
	Suggest the use of a personal organisation notebook
	Teach awareness of time and time management
	Suggest the use of graphic organisers for long-term projects

Source: CADDRA (2018[22]), Canadian ADHD Practice Guidelines, Fourth Edition, https://www.caddra.ca/wp-content/uploads/CADDRA-Guidelines-4th-Edition_-Feb2018.pdf.

Social skills interventions. Considered that ADHD can have negative impacts not only on academic performance, but also on students' social well-being, group activities led by the teacher can help in improving socialisation (Seay, 2019[150]). For example, class meetings are a possible way to organise students' social time, which can be held aside regular class time and can provide more opportunities to create special social settings for students with ADHD to learn new kinds of social behaviour and experience themselves as positive social beings (Armstrong, 1999[151]). Other activities that can be constructive for children's social well-being and interactions concern the promotion of self-awareness, as in asking students to describe an eventual problem they have incurred, its reason and how to change their behaviour accordingly; giving opportunities for group or paired learning, which can offer a structured setting for students to interact with classmates; while also providing opportunities for other students to see their classmates with ADHD in a positive light, to improve their interactions and reduce the risk of stigma and social exclusion (CHADD, 2018[121]). Table 2.7 provides a more comprehensive list of possible interventions.

Table 2.7. Social skills interventions

Social skills interventions		
Positive Social Interactions	Peer and Cross-Age Tutoring	Pairing up a student labelled ADD/ADHD with a younger child (cross-age tutoring) to help with a specific activity (e.g. a reading or math skill), so that the student with ADHD has to act as the responsible member of the relationship
	Class Meetings	Class meetings provide opportunities to create special social settings within which students with ADHD can learn new kinds of social behaviour and experience themselves as positive social beings
	Other strategies	Let students with ADHD share a special interest with a class or teach the class something they know how to do well
		Group together students that are compatible with children with ADHD to work together on a task during classes
		Establish a positive rapport between the teachers and the students with ADHD, in order to create a reliable positive relationship
		Promote self-awareness, by asking students to describe the problem or issue they are having, why they think it is happening and how they can change their behaviour
		Provide opportunities for other students to see peers with ADHD in a positive light. For example, asking the student to help with a task or giving them a leadership role in the classroom for a day

	Provide feedback in one-on-one settings, in order to preserve self-esteem by providing feedback privately, reinforce positive behaviour and also have the student practice having a conversation to improve social skills

Source: Adapted from Armstrong (1999[151]), Strategies to Empower, Not Control, Kids Labelled ADD/ADHD in ADD/ADHD Alternatives in the Classroom, and CHADD (2018[121]), Classroom Accommodations, https://chadd.org/for-educators/classroom-accommodations/.

The needs for learning accommodations for students with ADHD can extend beyond primary and secondary school, as symptoms do not disappear with the children's growth. For this reason, students can still need accommodations in tertiary education in order to fulfil their potential. Moreover, tertiary students with ADHD can face increasing challenges in the transition to higher education, as it often entails more distraction, less external structure, more responsibilities, and new friends and teachers. These factors may contribute to college students with ADHD taking more time than their peers do to graduate (Oliveira and Dias, 2015[152]). While some universities and colleges can provide students with arrangements that can serve these needs, tertiary education still tends to understand inadequately ADHD and its resulting impairments (CADDAC, 2018[153]). The institutions that do provide accommodations to their students with ADHD generally require students to have proof of their diagnosis and of the actual disability that their ADHD causes them. In countries such as the United States, for example, universities allow accommodations, as they are required to make them available for eligible students with disabilities. However, universities are not required to provide an accommodation or modification that would result in a fundamental alteration of their programmes. This applies to course requirements, graduation requirements, and the admissions process: colleges can decide to make substantial exceptions for students with ADHD that had, for example, a reduced curriculum in high school due to their IEP, but are not required to do so. Moreover, universities are not required to provide any specialised instruction or support, such as access to a learning disabilities specialist or any special tutoring arrangement, even though some may choose to do so. There still are, however, accommodations that do not require substantial alterations course or degree requirements. Often, students will find available some of the most common accommodations, such as: extended time for exams, breaks during exams, reduced-distraction sites for exams, permission to use a laptop, a spellchecker or a calculator, or note-taking accommodations (Hamblet, 2018[154]). Other OECD countries offer accommodations for students with ADHD at the tertiary level. In Italy, for example, a law from 1999 requires every university to have appointed a Rector's Delegate with competence and responsibility for students with disabilities and learning disabilities (Box 2.2).

Box 2.2. The case of the Italian Rector's Delegate for Disabilities and Learning Disabilities

The Italian Legislation introduced the role of the Rector's Delegate for Disabilities as mandatory in all universities in 1999. A few years later, with Law 170 of 2010, the Rector's Delegate was also provided with competence on and responsibility for Learning Disabilities.

The delegates from all Italian universities take part in the CNUDD ("Conferenza Nazionale Universitaria dei Delegati per la Disabilità", i.e. National University Conference of Delegates for Disabilities and learning disabilities) and many regions require and provide coordination of their university delegates.

For what concerns specifically students with ADHD, the measures that are normally provided are: extra time in the written tests, which, if requested and feasible on an organisational level, can be held in a separate classroom and a support of hours of reception or tutorship to be agreed with the delegate.

Source: Italian Government (1999[155]), Legge 17/1999. Integrazione e modifica della legge-quadro 5 febbraio 1992, n. 104, per l'assistenza, l'integrazione sociale e i diritti delle persone handicappate (Integration and amendment of the framework law 5 February 1992, n. 104)

2.6.2. Benefits of physical activity

Besides common classroom practices, different forms of interventions can also support the management of ADHD – in and outside of schools– as it is the case of physical activity. Although considerable treatment development has focused on cognitive training programmes, evidence indicates that intense aerobic exercise enhances brain structure and function, and as such, might be beneficial to children with ADHD (Berwid and Halperin, 2012[156]). The rationale for treating symptoms of ADHD with exercise relies on the fact that physical exercise can cause profound effects on the brain. In particular, exercise's effect is explained largely by the increase in norepinephrine and dopamine levels, which are also the most common chemicals targeted by ADHD medications. Scientists have found that moderate to intense exercise actually provokes changes in many of the same neurochemicals and brain structures as popular prescription ADHD medications (Lara, 2012[157]). Notably, in a survey on 4,400 subscribers to ADDitude Magazine, exercise is rated as the most effective treatment option for ADHD and is the least mentioned as "Treatments Found Not Very or Not At All Effective". Yet, only 13% of survey respondents said their doctor recommended it (Frye and Rodgers, 2018[158]).

Different forms of physical activities have shown promising results for ADHD management. For example, studies on cardio exercises impacted positively on various executive functions such as impulsivity, response time and several physical measures (Den Heijer et al., 2016[159]). Meßler et al. (2016[160]) have found that high intensity training improves variables related to physical fitness, motor skills, certain aspects of quality of life such as self-esteem and friends, competence, and (at least from the parents' point of view) attention in boys diagnosed with ADHD (Meßler, Holmberg and Sperlich, 2016[160]).

Furthermore, physical activity can also improve the school-related outcomes of students, such as improving their school performance (Silva et al., 2015[161]), reducing incidents of conduct and oppositional problems, and helping them modify their disruptive classroom behaviours (Mulrine, Prater and Jenkins, 2008[162]).

However, the traditional setting for physical education in schools can be problematic for children with ADHD, as they are exposed to more distractions, in a less structured and organised environment, and spend time with more peers than in the regular classroom. All these factors may worsen some ADHD-specific behaviours or traits, in terms of inability to sustain attention, impulsivity, hyperactivity or disruptive behaviours, but also social issues. For example, organised sports can exacerbate situations of potential embarrassment for children who struggle to remember multi-step directions, are not comfortable with physical contact or are not coordinated as their peers (Jacobson, 2019[163]). Nonetheless, strategies exist that can be implemented to reduce these issues, namely: i) equipment management; ii) class organization; iii) cooperative learning and peer tutoring; iv) classroom management, discipline and rewards; and v) routines and structure (Higgins et al., 2018[164]).

2.6.3. Assistive technology

Care delivered through technology is used in many areas of mental health services, including for people with ADHD (Benyakorn et al., 2016[165]). Technology can be an asset for both children and adults with ADHD. As people with ADHD commonly struggle with time management, organisation, completing tasks, and failure to pay attention to details, technology can support them in the difficult task to stay focused in a school or work environment (Hurley, 2018[166]).

Benyakorn et al. (2016) have analysed the current state of technology-care for ADHD, considering six specific traits that can be helped through technology (Benyakorn et al., 2016[165]). Results are shown in Table 2.8.

Table 2.8. Traits' interventions through technology

Trait	Issue	Technological Intervention
Reward-related processing	Individuals with ADHD have an altered response to reward that is reflected in impaired motivation.	Gamification is a technique used to increase motivation and interest by adding game play elements. Behavioural reinforcement apps that use gamification can be effective at increasing motivation in ADHD.
Inhibition	Children with ADHD underperform in tasks that require inhibitory control. Challenges with inhibitory control may underlie symptoms of hyperactivity, impulsivity, and inattention.	Self-monitoring through tactile and verbal prompts has been shown to improve academic and on-task behaviours in children with ADHD. Thus, technology for self-monitoring may lead to improved response inhibition.
Sustain attention	Sustained attention, a common challenge in ADHD, is the ability to maintain attention over time.	Some studies suggest that repeated presentation of distractors temporarily enhances the performance of those with ADHD on attentional tasks, possibly by optimising arousal. Thus, technologies that systematically present distractors may target distractibility symptoms in ADHD.
Timing	Individuals with ADHD are commonly impaired in three major timing domains: motor timing; perceptual timing; and temporal foresight. Time perspective impacts one's ability to plan and organise.	Several programs target perceptual timing, which may facilitate the ability to estimate time intervals among individuals with ADHD. Thus, apps that create to-do-lists and show time spent, can result improve time management skills.
Arousal	Both hyper-arousal and hypo-arousal can be found in individuals with ADHD.	Technologies that can both increase and decrease arousal might be useful in modulating the symptoms of the disorder. Applications aimed at regulating brain's arousal can be helpful in stabilizing the feelings of people with ADHD.
Emotion lability	Mood changes among individuals with ADHD are often characterised by quick transitions to excitability or depression.	This lability may be decreased by technologies that train users in emotional regulation.

Source: Benyakorn et al. (2016[165]), Current State and Model for Development of Technology-Based Care for Attention-Deficit/Hyperactivity Disorder, Telemedicine and e-Health, http://dx.doi.org/10.1089/tmj.2015.0169.

The use of technology to support children and adults in fulfilling their potential and improve their outcomes is not the only possible application of technology in relation to ADHD. In recent years, some studies have focused on implementing the use of technology to fasten the process of diagnosis of ADHD, which currently requires months of observations and follow-ups. There exist thus few examples of very specific technological tools related to ADHD that are under development. One of these is a next-generation eye tracking software, called Braingaze[6] (Chris, 2016[167]). According to the company, their technology, using eye movements as tracking mechanism of the person's attention span, could give an object indicator of ADHD within 10 minutes. This instrument, along with others, still need to be perfected and to undergo further research. Moreover, these can usually be a support to the traditional diagnosis process, rather than a substitute, at least for the time being.

2.6.4. Engaging and supporting families of students with ADHD

Educating parents about ADHD and how to manage its symptoms is an important part of a child's treatment plans. As already mentioned, the levels of parental engagement may have

[6] A spin off created in 2013 from the University of Barcelona (UB) and The Catalan Institute for Research and Advanced Studies (ICREA).

an effect on children's adherence to medical therapies and on their outcomes with respect to behavioural interventions.

Education for parents may include learning parenting skills to help the child manage his or her behaviour. Moreover, parents' socialisation with other parents and facilitation of the child's peer interactions can foster good peer relationships, which can be fundamental for children with ADHD to overcome their social difficulties (Mikami et al., 2010[168]). Lastly, in some contexts, such as the United States, parents can actively help determine what services and placements their child receives in an Individualised Education Plan or Section 504 plan. For these reasons, it is key for children with ADHD and their development that their families engage with medical professionals, schools and teachers to form a network of treatment and support.

The means through which parents and families of children with ADHD can be included are numerous. Support groups can be organised, schools can enhance communications with families and keep them updated daily on their children's progresses or struggles, and trainings can be provided by private or public entities. One example of public training for families is represented by the State of Queensland in Australia (see Box 2.3), which provides a parenting and family support system to prevent and treat behavioural and emotional problems.

Box 2.3. Queensland Government's Triple P - Positive Parenting Programme

The Triple P – Positive Parenting Programme ® - is a parenting and family support system designed to prevent and treat behavioural and emotional problems in children and teenagers. It aims to prevent problems in the family, school and community before they arise and to create family environments that encourage children to realise their potential.

The online Programme was firstly developed by the University of Queensland, Australia, and it has shown to alleviate children's attention deficit hyperactivity disorder (ADHD) symptoms and parents' stress (Franke, Keown and Sanders, 2016[169]). Professor Sanders, co-author of the study – declared in 2016 that the study lent support to international clinical guidelines advocating that families of pre-school children with signs of ADHD should access evidence-based parenting programmes before medication is prescribed. Other studies have found further evidence to support the validity of the programme, for example with respect to the prevention of or decline in secondary problems such as depression and anxiety disorders in mothers who have children with ADHD (Noorbakhsh, Zeinodini and Rahgozar, 2014[170]).

The Triple P programme is interesting for four main reasons: it is evidence based, as it is most extensively researched parenting program in the world; it has been designed as a population-based health approach to parenting; it ca be easily monitored both on a personal level and across a population, as it provides tools for practitioners to measure "before" and "after" results with parents and computerised scoring applications can be adapted to collate results across a region to show effects community-wide or within a target group; and works to prevent over-servicing and wastage, with its range of programs able to cater to the diversity of parents' needs, whereas it also promotes self-regulation and self-sufficiency, as it gives parents the skills they need to become problem solvers and confidently manage issues independently (Triple P, n.d.[171]).

This programme is available for free to parents of children up to 16 years old in Queensland, as funded by the Queensland Government, and has also been exported internationally to 25 different countries.

Sources: University of Queensland (2016[172]), Triple P international and The University of Queensland (website), accessed 30 October 2019

Services exist not only for parents, but also for siblings of children with ADHD and SEN in general. Data has shown that siblings may feel victimised by their ADHD sibling (Kendall, 1999[173]), that they perceive differential treatment by parents in the forms of attention provided to children, of discipline being applied, and sometimes highlighted the phenomenon of the "parentified child" (King, Alexander and Seabi, 2016[174]). All these negative effects on non-ADHD siblings suggest that there is a need for support systems that includes them too. One example of this practice is a United Kingdom's online support service – called YoungSibs – for siblings under 18 who have a brother or sister who is disabled or has special educational needs or a serious long-term condition including ADHD. This online service, run by a charity, provides information, answers to questions and allows siblings to get in touch and exchange messages with others that have experienced their same struggles and difficulties, due to their sibling's disorder (YoungSibs, 2019[175]).

Trainings and psychological/social support are not the only means that countries have for supporting families of children with ADHD. In some countries, there is the possibility for people with ADHD and their families to receive financial support outside the scholastic system. For example, Canada offers a "Disability Tax Credit for ADHD or ADD" meant to support families for the costs that they can incur for the treatment of the disorder (Disability Credit Canada, 2017[176]). Similarly, in New Zealand, families with children with ADHD may be eligible for Child Disability Allowance depending on the severity of the disability caused by the disorder (Ministry of Social Development, 2019[177]).

3. Advantages and disadvantages of different policy options for the inclusion of students with ADHD

This section investigates the advantages and disadvantages of some of the policy approaches that have been defined in Section 2. , concerning the inclusion of students with ADHD in education systems. The advantages and disadvantages of each of the policies analysed in this review should always be accounted for, together with context specific factors and information, when designing and implementing policies to support the inclusion of students with ADHD in education systems.

This section focuses specifically on the policy issues that are most relevant for, and debated in, the international discourse. These include the ramifications of a diagnosis of ADHD, the risks that are related to the use of IEPs, the implications of an early diagnosis, the pros and cons of different learning settings and the constructive or disruptive effects that technology may have on children with ADHD.

3.1. Labelling ADHD: ramifications of a diagnosis in school settings

Medical diagnosis of ADHD (Section 2.4) is crucial. The main consequence of ADHD not being diagnosed is a subsequent lack of treatment. Untreated ADHD can then cause a great amount of psychological, financial, academic and social burden not only for the individual, but also for society (Hamed, Kauer and Stevens, 2015[128]). Moreover, in various OECD countries, it is necessary for students to receive a formal diagnosis of ADHD in order to access support services within the education systems. Thus, a lack of diagnosis can further increase the risk of children without a diagnosis underperforming academically, if it causes them to be left out from support systems.

However, there can be some disadvantages in classifying children as having ADHD within educational systems. In particular, interviews with teachers have shown that a classification, with or without medication, is negatively associated with academic expectations, which in turn causes lower achievement, motivation and self-confidence in children (Batzle et al., 2009[178]). Moreover, teachers may show less tolerance towards children with a classification than towards children without a classification (Kos, Richdale and Hay, 2006[179]).

A.W. Wienen et al. (2019[108]) recently analysed the advantages and disadvantages that Dutch teachers perceive in the classification of children with ADHD, as schematised in Table 3.1. Recently, as education researchers have started to point out, inclusive forms of education have been developing the tendency to focus less on what a child has, then what a child needs in school, thus reducing the need for classifying children (Wienen et al., 2019[108]), as for example is common practice in Finland. However, it appears that according to the aforementioned teachers, advantages seem to outnumber the disadvantages. Still, one of the critiques is that the classification per se has no value for educational practice. This point suggests that teachers could use more training and information sharing on the nature of ADHD and the learning/classroom practices best suited at managing children with this disorder.

Table 3.1. Teachers' opinions on classification of children with ADHD

	Category	Theme
Disadvantages	Fundamental critique of classification	Principled criticism of the very idea of classification
	Classification offers no clear benefits	Classification has no value for educational practice
		Classification entails no financial benefits
Advantages	Classification brings explanation and confirmation	Classification explains why regular practice does not suffice and legitimates a different approach
		Classification explains the causes of behaviour
		Classification explains why the pupil does not meet expectations
		Classification confirms that a student is rightly seen as different from other students
		Classification confirms prior suspicions
	Classification is a vehicle for some other goal	Classification effectuates an agreed starting point for teachers and parents
		Classification removes guilt
		Classification brings empathy
		Classification offers resolution
		Classification triggers new solutions, ideas, medication, right to support in the classroom

Note: the analysis of the paper is based on the Netherlands' context; it might not be fully reflective of other countries' situations.
Source: adapted from (Wienen et al., 2019[108]), The advantages of an ADHD classification from the perspective of teachers, European Journal of Special Needs Education, http://dx.doi.org/10.1080/08856257.2019.1580838.

A study conducted in Iceland (Einarsdottir, 2008[180]), interviewing pre-school and primary school teachers, reports a more positive view of the diagnosis of ADHD. The pre-school teachers felt mostly positive about the diagnosis, as they were under the impression that children were better understood and supported – by them and others - if they had been diagnosed. Similarly, primary school teachers reported that an accurate diagnosis benefits a child who really is having difficulties, since the children can then be better understood by their teachers and their environment. Another advantage of the diagnoses was that the school would receive more money to hire extra staff, as the islandic system requires a diagnosis for the provision of assistance and special education. However, the teachers also recalled the importance of not rushing into a diagnosis and ensuring that the issues they noticed persist over time and are not solved as the child grows (Einarsdottir, 2008[180]).

A further problem that can co-exist with a diagnosis is the use of negative labels for children that are struggling with ADHD. The negative effects of labelling can formalise or institutionalise the negative experiences of the students. For this reason, Armstrong (Armstrong, 1999[151]) suggested avoiding the ADHD labels as much as possible, and to be particularly careful in how to use them where necessary, as for example for administrative purposes.

3.2. Risks of individualised education plans: watering down the curriculum

According to some researchers (Ellis, 1997[181]; Sitlington and Frank, 1993[182]), various practices associated with providing students with accommodations incur in the risk of "watering down" the curriculum and expectations of students. These accommodations' underlying logic is to enable students to acquire the necessary credits to graduate and enable them to understand and retain the knowledge necessary to attain course credits. However, these accommodations do have some limitations: emphasis on memorising loosely related

facts, reduced opportunities for learning content, fewer opportunities to develop thinking skills, inhibited "learnability" of subject matter, and reduced investment in learning (Ellis, 2002[183]).

Moreover, a study by Spiel et al. (2014[184]) conducted in the United States on IEPs has shown that many of the most commonly used services for students with ADHD have very little research support, and the most empirically-validated approaches were rarely included on the IEPs of students with ADHD. It was found that only around one-fourth of the interventions implemented for students with ADHD have evidence of efficacy in literature. For example, the most common supports - which have been identified in extended time on tests and assignments, progress monitoring, and case management - have no reported evidence of efficacy in improving performance among ADHD students. Similarly, additional test time does not appear to provide more benefits to students with ADHD than students without ADHD (Lewandowski et al., 2007[185]), but actually impacts their ability to stay focused and maintain a correct behaviour for the whole duration of the test, as can be expected to their difficulties in sustaining attention for longer time periods (Pariseau et al., 2010[186]).

Overall, researchers have identified a need for further research to evaluate the effectiveness of the more frequently-used services for students with ADHD, as most of them were never systematically evaluated (Spiel, Evans and Langberg, 2014[184]). These results should be generalisable at the international level since, as mentioned in previous chapters, the type of interventions that are offered to students with ADHD tend to be very similar across countries.

A further side issue that was noted concerning IEPs' curricula and offers is that the range of services offered can vary greatly between specialised schools and mainstream classrooms. The latter tend to have a smaller number of accommodations available for their students with ADHD, which indicates a generalised need to strengthen such programmes (Murray et al., 2014[187]).

3.3. Early assessment: a head start or a delayed one?

Early interventions can be successful in reducing behavioural problems and subsequent negative outcomes — the earlier they are implemented, the better. Long-term outcomes for people with treated ADHD have proven to be better compared to those of peers with untreated ADHD. This is true for different categories of outcomes, including: academic, antisocial behaviour, driving, non-medicinal drug use or addictive behaviour, obesity, occupation, self-esteem, and social function outcomes (Shaw et al., 2012[188]). In particular, the greatest improvements are generally associated with academic, self-esteem, or social function outcomes (Arnold et al., 2015[189]). Thus, it can make sense to support assessment and identification of students with ADHD in schools, to serve their needs and help them fulfil their potential.

However, it may not always be the case to push for an early assessment. While coordinated school-wide identifications and interventions for children can increase the likelihood of increased outcomes, there are also risks entailed in a too early identification of ADHD. Firstly, as mentioned in Section 2.4, children that are diagnosed early, in particular before they start elementary school, incur in the risk of not having eventual learning disabilities diagnosed too: disorders such as dyslexia or dysgraphia cannot be assessed at pre-school level, when the children have not developed their learning skills properly, so they could easily be overlooked by professionals (Braaten, 2016[134]). For this reason, when students

who are receiving treatments for ADHD still show significant struggles in reading or learning more in general, educators should notify these issues so that professionals can go more in depth in the diagnosis. It has been recognised that in various OECD countries – among them the United States, Canada, the Netherlands, Sweden, Iceland, and Germany (Schwandt and Wuppermann, 2016[190])- there exist correlations between the age of enrolment in primary school and diagnosis of ADHD. In particular, children born in the month that preceded the cut-off date for entry to school – who are the youngest and least mature within their classes – are at a higher risk for diagnosis and treatment of ADHD (Morrow et al., 2012[191]). This can indicate that younger children in a school grade may be more likely to receive a diagnosis of ADHD than their older peers, as the variation in their behaviour could be attributed to ADHD symptoms rather than to the fact that they are at an earlier step in their development (Layton et al., 2018[192]). Over-diagnoses and misdiagnoses can have harmful consequences for the children that receive them. Firstly, unnecessary medical treatments can have negative impact on children that do not have ADHD, in terms of adverse effects on sleep, appetite and growth, in addition to an increased risk of cardiovascular issues (Gould et al., 2009[193]). Inappropriate diagnosis of ADHD might lead parents and teachers to treat children differently or adversely change their own self-perceptions (Morrow et al., 2012[191]). Since estimates suggest that teachers play a key role in decisions to refer children to evaluation and diagnosis, it is especially important that they are aware of the existence of this bias, to avoid unnecessary – or wrong – assessments of their students (Elder, 2010[194]).

In systems where both teachers and parents can influence ADHD diagnosis, Schwandt et al. (2016[190]) have suggested that this issue may be driven by teachers and parents in an attempt to facilitate and improve the educational outcomes of the children. On the one hand teachers could interpret the relative immaturity of younger students – which becomes more apparent in difficult schooling environments – as connected to ADHD. On the other hand, well-educated parents may be particularly concerned about their children's education and outcomes and try to counteract the possible disadvantages in performance if their children are particularly young for their grade level (Schwandt and Wuppermann, 2016[190]). It is however not clear whether the potential ADHD overtreatment can actually lead to improvements in educational outcomes for a misdiagnosed child.

Thus, while coordinated school-wide identification and interventions for children with behavioural problems can increase the likelihood of improving their outcomes (O'Shaughnessy et al., 2003[195]), it is also necessary to exercise due diligence in the assessment processes.

3.4. Advantages and disadvantages of different learning settings

Classroom-wide approaches are typically to be preferred over child-centred approaches that single out individuals. Education researchers have consequently started to point to decreasing need for classifying children, on the approach that inclusive forms of education, in particular, tend to foreground much less what a child has then what a child needs in order to learn (Vehmas, 2009[196]; Honkasilta, Vehkakoski and Vehmas, 2016[197]).

However, nowadays, special education policy implementation is often grounded in the assumption that educating students with disabilities in separate settings is typical practice for many children, despite the body of research suggesting students with disabilities benefit academically and socially from being educated alongside their peers without disabilities (Cosier, Causton-Theoharis and Theoharis, 2013[198]). Research suggests that for children with various types of disabilities, inclusive special education has positive effects on

academic achievement, social functioning, affective gains, and behavioural outcomes. In particular, inclusive education has a positive impact for the outcomes of children with ADHD that have a low socio-economic status, compared to their peers in non-inclusive environments (Kim, King and Jennings, 2019[62]). Kim and colleagues have found that children with lower socio-economic status have a greater likelihood of remission of symptoms of ADHD in states that have more inclusive special education regimes. In contrast, for more advantaged children, it appears that the odds of remission do not depend on the level of special education inclusivity. Providing more inclusive education could reduce disparities for children with ADHD and it would be particularly important for less advantaged children, even though the positive effects of inclusive education mentioned earlier in this paragraph still hold at different levels of socio-economic status.

More generally though, students with ADHD can incur the same advantages and disadvantages that students with SEN encounter in special education settings, as elaborated in OECD's Education Working Paper "Mapping Policy Approaches and Practices for the Inclusion of Students with special education needs" (Brussino, 2020[48]). The pros and cons of these settings are elaborated more in detail in Table 3.2.

Table 3.2. Advantages and disadvantages of special education settings

Advantages	Disadvantages
Full-time specialised support to meet the individual needs of students with SEN.	Special education settings can lower academic expectations of students with SEN.
Typically, lower student-teacher ratios in special settings allow students to receive higher and more individualised support.	Special education settings are usually costlier and transition to mainstream schools from special settings can entail academic and socio-emotional challenges for students.
All teachers working in special education should be specialised.	Lack of integration with students without SEN. Risks of stigma and lack of societal inclusion in school and later in life.
Students interact with peers with similar challenges.	

Sources: D'Alessio, Donnelly and Watkins (2010[199]), Inclusive education across Europe: the move in thinking from integration for inclusion; European Agency for Development in Special Needs Education (1999[200]), Financing of Special Needs Education. A seventeen-country Study of the Relationship between Financing of Special Needs Education and Inclusion; Keslair and Mcnally (2009[201]), Special Educational Needs in England; OECD (2005[202]), Students with Disabilities, Learning Difficulties and Disadvantages: Statistics and Indicators, https://dx.doi.org/10.1787/9789264009813-en; WHO (2011[203]), World Report on Disability.

3.5. Technology: constructive and disruptive effects

As technology is on the rise both in the classrooms and for personal use, it is particularly timely and relevant to discuss whether digital tools are a resource or a distraction for a person with ADHD. There have been many debates on the advantages and disadvantages that technology use can entail for students with ADHD, which are elaborated throughout the following paragraphs.

3.5.1. Advantages

On the one hand, it can be beneficial both to utilise the available software to help people with ADHD to increase productivity, and to decrease their tendency to distraction and hyper-focus (Hurley, 2018[166]). As people with ADHD struggle with time management, organisation, completing task and paying attention, apps and computers can support them in staying organised and reaching goals.

Technology can also have a positive impact directly on learning and academic outcomes. It has brought tools that can make any topic more visual, which holds attention and support the learning processes of children with ADHD. Mobile device apps that are meant to make the curriculum topics interactive can be designed to better engage students: some offer specific interactions that provide choices and decisions to be taken on the content of the lesson, while others engage students by enabling them to create their own visualisations of topics in order to show what they know (Sweeney, 2017[204]).

Concerning academic performance per se, Mautone et al. (2005[205]) found that some students with ADHD improved their math performance and increased on-task behaviour with computer-assisted instruction. Technology brings tools that can make any topic become visual, and visuals hold attention, providing opportunity for verbal exploration, connections in learning, and application through strategies.

3.5.2. Disadvantages

On the other hand, as children with ADHD tend to indulge in watching television, playing video games and Internet use while being reluctant to engage in tasks requiring sustained mental effort, concerns have been raised on the appropriateness of digital tools for them. A South Korean study by Yoo et al. (2004[206]), for example, has found a significant association between the level of ADHD symptoms and the severity of Internet addiction. In particular, their results suggest that the presence of ADHD symptoms could be an important risk factor for Internet addiction. Also, children with ADHD can have more difficulties in turning off games and transitioning from video game time to other activities (Gold, 2014[207]). For this reason, it could be helpful for them to have established time limits and not rely on timers are embedded in their technological devices (bur rather physical timers).

Moreover, technology could be exacerbating some of the symptoms of ADHD, in particular those related to working memory. According to Robinson (2019[208]), since children with ADHD already have deficits in working memory, they could be overwhelmed by the excessive stimuli provided by technology and consequently even more affected by ADHD symptoms. Technology also increases the number of distractions for students, and since they are already burdened by difficulties in maintaining attention, it can be detrimental for their learning processes. Robinson (2019[208]) then suggests that they would be more time efficient and focused on their assignment if they were to complete them writing by hand, rather than using computers or tablets.

There are further risks related to the Internet in particular, which firstly stem from their tendency for impulsive behaviour that can be transferred also to the online world. For example, adolescents with ADHD can incur in oversharing personal or sensitive content online or sexting practices (Gold, 2014[207]). Furthermore, another negative effect that online technology can have for children with ADHD relates to cyberbullying. Research shows that students with ADHD who are cyber-victims and students with ADHD who are cyber-witnesses report on greater feelings of emotional loneliness and a lower belief in their social self-efficacy than the students without ADHD (Heiman, Olenik-Shemesh and Eden, 2014[209]).

4. Empirical evidence of effectiveness of policies for the improvement of outcomes of students with ADHD

This section of the paper outlines the empirical evidence that exists on the effectiveness of policies and practices on the improvement of outcomes of individuals with ADHD. The individual outcomes taken into consideration are based on the Project's definition of dimensions of well-being: i) academic; ii) social and psychological; iii) material; and iv) physical (OECD, Forthcoming[1]). Moreover, this section also elaborates on labour market outcomes of adults with ADHD, in line with the Project's framework which recognises individuals' labour and non-labour outcomes as fundamental in their engagement in diverse societies. In particular, the focus of this section will be on the first three dimensions, as they are the aspects of well-being more generally affected by ADHD.

The majority of the existing body of research on ADHD and socio-psychological and material well-being focuses on identifying the issues caused by ADHD, rather than on the effectiveness of policies to counterbalance these issues. For this reason, sections 4.3, 4.4 and 4.5 will focus mostly on the existing evidence on *which* challenges are caused by ADHD on these outcomes, with the scope of highlighting areas that require further research in terms of policy analysis and evaluation.

4.1. Effectiveness of policies on overall well-being for students with ADHD

The Strength through Diversity Project defines well-being as "a dynamic state characterised by students experiencing the ability and opportunity to fulfil their personal and social goals. It encompasses multiple dimensions of students' lives, including: cognitive, psychological, physical, social and material. It can be measured through subjective and objective indicators of competencies, perceptions, expectations and life conditions" (Borgonovi and Pál, 2016[210]). Some of the well-being dimensions covered by the Project, and specifically analysed here are: i) academic; ii) social & psychological; iii) material. The dimension of physical well-being will not be specifically analysed with respect to ADHD, as the outcomes that are related to it are not the most impacted by this disorder. While individuals with ADHD can suffer effects on their academic and socio-psychological outcomes during their scholastic journey, and later on in life on their material well-being, they are generally not as impacted from a physical well-being point of view. The definitions of the different dimensions are based on the selection in the Design and Implementation Plan of the Strength through Diversity Project (OECD, Forthcoming[1]).

4.2. Academic well-being

The academic dimension of student well-being refers to the skills and foundations individuals have to participate effectively in today's society, as lifelong learners, effective workers and engaged citizens. It comprises students' cognitive proficiency in academic subjects, their ability to collaborate with others to solve problems and their sense of mastery of in-school subjects. It incorporates actions and behaviours that may promote the acquisition of knowledge, skills or information that may aid them when they are faced with new, complex ideas and problems (Pollard and Lee, 2003[211]).

Children with ADHD often show significant academic underachievement, in terms of poor grades and increased grade retention (Loe and Feldman, 2007[51]; Frazier et al., 2007[50]).

Often, students with ADHD perform worse than their peers in standardised tests, both in math and reading. A meta-analysis by Frazier et al. (2007[50]) has found particularly strong effects in the difference in achievement in standardised tests between students with ADHD and controls. These results could be affected by the high co-occurrence of learning disabilities or by specific characteristics of ADHD. They argue that standardised achievement tests may be sensitive to both the general effects of ADHD symptoms on day-to-day learning and knowledge retention and to the specific effects that ADHD can have on test performance. For instance, they suggest, students could be performing poorly on standardised mathematics tests simply as a consequence of errors due to the inattentive symptoms of ADHD, which are also present in their day-to-day activities (e.g. rounding mistakes, simple math problems) (Frazier et al., 2007[50]).

Students with ADHD also appear to be more likely to have a higher absenteeism rate and at a higher risk of dropping out of school (Barbaresi et al., 2007[52]). Moreover, they are more likely to be expelled, suspended, and to receive special education compared with their peers without ADHD (LeFever et al., 2001[212]). These issues are persistent throughout an individual's development. Adolescences with ADHD have been shown to fail more grades, achieve lower ratings on all school subjects, have lower class rankings, and perform more poorly on standardised academic achievement tests than their peers. They show a need for more years to complete high school, lower rates of college attendance, and lower rates of college graduation (Loe and Feldman, 2007[51]; DuPaul and Weyandt, 2009[53]). This translates in further issues during tertiary education, with college students with ADHD that tend to have reduced averages and are less likely to graduate than students without ADHD (DuPaul et al., 2009[213]).

The interventions on academic outcomes can be either non-pharmacological or pharmacological, and their effectiveness will be analysed separately in this section.

4.2.1. Non-pharmacological interventions

Evidence on the effectiveness of different forms of non-pharmacological interventions on the academic outcomes of children with ADHD is mixed. Its results depend largely on the type of intervention that is taken into consideration. A summary of the existing evidence on the effectiveness of such interventions is available in Table 4.1.

Adjustments

As mentioned in previous chapters, most IEPs and education systems offer adjustments for students with ADHD. However, there is little empirical evidence on the effectiveness of such adjustments in improving children's academic outcomes. Esposito Pritchard et al. (2016[214]) found that commonly administered academic testing accommodations for students in elementary and middle school with ADHD did not imply better performance on reading or math testing, and in general may offer little benefit to students. Specifically, the adjustments studied were: i) extended time, ii) more frequent breaks, iii) a reduced-distraction environment, iv) oral presentation of written information, v) opportunity to use a calculator.

The most common adjustment offered to students with ADHD is that of time-extension, which has consequently been studied more in depth in literature. Still, it appears that there is little empirical evidence supporting its effectiveness. Various studies doubt the efficacy of this approach, either noting a non-existing differential improvement between students with ADHD and control groups (Lewandowski, Cohen and Lovett, 2012[215]), no change in performance for both students with and without ADHD (Jansen et al., 2018[216]), or a full

decrease in performance (Pariseau et al., 2010[186]). Empirical evidence of peer tutoring as an effective measure exists (Raggi and Chronis, 2006[217]; DuPaul et al., 1998[218]). Such measure has shown effects on improving on-task behaviour and smaller but still significant ones on academic productivity. Raggi and Chronis (2006[217]) have also identified some characteristic of academic interventions that contribute to the increase of students' academic performance. They have found that academic interventions that require active engagement from the student with ADHD typically result in better performance compared to those with passive attentional requirements: this is the case of oral reading versus silent reading or peer tutoring versus traditional instruction. Active engagement may improve the length of attention spans for the students and allow for a deeper level of information processing. However, Esposito Pritchard and colleagues (2016[214]) did not find a confirmation in their results on the effectiveness of oral presentation of written information, so evidence on such interventions is mixed. A further goal of interventions could be to decrease distractions or non-relevant stimuli, while providing enough stimuli to maintain attention on task. This is for example the case of computer animation (as already mentioned in Section 3.5), which may cause more of a detriment than a benefit due to a too great level of task stimulation, contrary to computer activities provided in game format that were found beneficial for attention and performance (Raggi and Chronis, 2006[217]).

Behavioural interventions

Behavioural interventions for ADHD, including for example behavioural classroom interventions or positive reinforcement, have shown to be effective in reducing core ADHD symptoms (Loe and Feldman, 2007[51]). However, the great majority of studies that have evaluated behavioural interventions focus on classroom behaviour such as on-task and disruptive behaviour, and have not focused on academic outcome measures (Raggi and Chronis, 2006[217]). It may also be the case that behavioural techniques could be more limited in their ability to address academic performance, unless the behaviour that is being focused on the intervention, as could be for example the accuracy in assigned work, is targeted directly (DuPaul et al., 1998[218]). Nevertheless, a more recent review by Daley et al. (2014[219]) has found evidence that behavioural interventions decrease conduct problems in children with ADHD and improve their academic performance and social skills, though there is still need for corroborating research.

Cognitive treatment

A meta-analysis by Cortese et al. (2015[220]) found limited evidence for the clinical value of cognitive training for children with ADHD outside of the confines of specific targeted neuropsychological processes, as for example working memory training improved working memory function. The trials they reviewed did not find significant effects on either reading or arithmetic, but there was a very low number of studies they could analyse, so further research in the field is needed.

Loe et al. (2007[51]) suggest that, given the chronic nature of ADHD and its impact on multiple domains of function, multiple treatment approaches are needed. However, the impact of such combined treatments - medication and behavioural treatment - on long-term academic and educational outcomes has not been well studied. A 14-month randomised control trial (RCT) has found that combined treatment was better than behavioural treatment and community care for reading achievement, but the differences observed were small and of questionable significance (The MTA Cooperative Group, 1999[221]).

Another effect that has been studied is that of classroom interventions on classmates of children with ADHD. In a meta-analytic review, Gaastra et al. (2016[222]) analysed a small number of studies that provided such information, finding that classmates who received the same intervention as participants with ADHD as well as classmates who did not receive any intervention themselves, showed an improvement in behavioural and academic outcomes. This implied that behavioural interventions for children with ADHD can have both direct - improvement of classmates' behaviour - and indirect effects on classmates - profit from less classroom disturbance by children with symptoms of ADHD.

Table 4.1. Summary of evidence on non-pharmacological treatments on academic performance

	Category	Specific	Effect	Sources
Non-pharmacological interventions	Adjustments	Extended time	Absent or negative	Esposito Pritchard et al. (2016[214]); Jansen et al. (2018[216]); Lewandowski et al. (2007[185])
		Paced item presentation	Absent	Lee et al. (2008[223])
		More frequent breaks	Absent	Esposito Pritchard et al. (2016[214])
		Reduced-distraction environment	Absent	Esposito Pritchard et al. (2016[214])
		Oral presentation of written information	Absent	Esposito Pritchard et al. (2016[214])
		Opportunity to use a calculator	Absent	Esposito Pritchard et al. (2016[214])
		Peer tutoring	Positive	Raggi and Chronis (2006[217]); DuPaul et al. (1998[218])
	Behavioural interventions	Behavioural classroom interventions or positive reinforcement	Positive	Loe and Feldman (2007[51]); Daley et al. (2014[219])
	Cognitive treatment		Limited, more evidence needed	Cortese et al. (2015[220])

Note: For information on the limitations of the sources mentioned, please check paragraph 4.1.1. or the relative papers.

4.2.2. Pharmacological interventions

Pharmacological or medical treatments reduce the core symptoms of ADHD in terms of body functions, but it is unclear whether they have significant effects on academic improvement, which is amongst the most common targets when prescribing medication to children with ADHD.

Some of the recent studies are pointing to the fact that medication generally offers limited effects for academic outcomes, which differ in size between productivity and accuracy (Kortekaas-Rijlaarsdam et al., 2018[224]). Medication has been shown to improve academic productivity as indicated by improvements in the quality of note-taking, scores on quizzes and worksheets, the amount of written-language output, and homework completion (Evans et al., 2001[225]), though these results have limitations related to the possible interaction between medication and behavioural interventions applied in the study. In most cases, while medical treatment has been associated with increased academic productivity, it has not been recognised to improve standardised test scores or ultimate educational attainment (Loe and Feldman, 2007[51]). Academic accuracy has not shown large improvements, which

on the contrary appeared to be small and in some cases circumscribed to math (Kortekaas-Rijlaarsdam et al., 2018[224]). However, evidence is not uniform on this issue. A few recent studies have identified beneficial effects of medical treatment on short or long-term individual academic performance of children diagnosed with ADHD (Jangmo et al., 2019[226]), (Keilow, Holm and Fallesen, 2018[227]). Overall, the actual effectiveness of medication on academic outcomes should further be studied, as it is one of the key results that children and their families are striving for.

4.3. Social and psychological well-being

On the one hand, the social dimension of students' well-being refers to the quality of their social lives (Rath and Harter, 2010[228]) including their relationship with their family, their peers and their teachers (positive or negative), and how they perceive their social life in school and beyond (Pollard and Lee, 2003[211]). On the other hand, the psychological dimension of students' well-being includes students' evaluations and views about life, their engagement with school, the extent to which they have a sense of agency, identity and empowerment, and having the possibility of developing goals and ambitions for their future.

Contrary to the previous section, which analysed the effects of policies aimed at improving the academic outcomes of students with ADHD, this section will focus mostly on the analyses of the impacts that ADHD can have on social and psychological outcomes of students. This will be necessary due to the fact that most of the analysis so far has almost uniquely aimed at uncovering the effects that the disorder has, rather than on the effectiveness of policies' interventions in the field. Thus, in the impossibility of studying policies' effectiveness, this section will analyse the challenges encountered by individuals with ADHD in their social and psychological well-being, with the aim of highlighting some of the issues that should be taken into account when developing policies in this regard.

Social problems are common among children with ADHD, as mentioned in Section 1.5, and they are profound, highly intractable to intervention, and persistent across time and situations (Humphreys et al., 2015[229]). Research has shown that children with ADHD are generally not particularly liked or accepted by their peers, and often rejected socially (Hoza et al., 2005[230]). Moreover, children with ADHD are more socially intrusive, have fewer reciprocal friendships, and are rated by teachers and peers as being less socially competent relative to peers without ADHD (Frankel and Feinberg, 2002[231]; Gresham et al., 1998[232]; Ronk, Hund and Landau, 2011[233]; Humphreys et al., 2015[229]). They tend to be involved in bullying situations, both as victims and as perpetrators, and as they grow into adolescence, they tend to develop psychological issues such as alcohol dependency (Vasko et al., 2019[234]) or depression (Humphreys et al., 2013[235]).

Among children with ADHD, difficulties in social functioning can predict long-term negative outcomes, which implies that social functioning per se is a key problem to be tackled for people that are diagnosed with ADHD (Humphreys et al., 2015[229]). Even though there is clear evidence of the existence of these social and psychological issues as consequences of ADHD, there has been little research on interventions focused on improving the related outcomes. Thus, the evidence presented in the following section focuses more on the identification of issues, rather than on their solution. More research should be undertaken on effective ways to tackle these issues.

A summary of the different impacts that ADHD has on social and psychological well-being, along with material well-being and labour market outcomes is available in Table 4.2.

4.3.1. Bullying and being bullied

Students who reported taking medication for ADHD were at increased risk for bullying as well as victimisation by bullies (Unnever and Cornell, 2003[236]). Unnever and Cornell (2003[236])'s findings identify low self-control and ADHD as potential risk factors for bullying and victimisations. Literature identifies several possible explanations for why children with ADHD are more likely to engage in bullying behaviour and being bullied by their peers. On the one hand, core ADHD symptoms interfere with skills necessary for successful peer interaction, and these behaviours are likely to frustrate and annoy peers and may increase their risk of bullying (Erhardt and Hinshaw, 1994[237]). On the other hand, children with ADHD have also have impaired social information processing (Crick and Dodge, 1994[238]) which can result in a tendency to assume that peers have hostile intents. This response pattern can increase the likelihood for children with ADHD to engage in bullying behaviour, and possibly in subsequent victimisation in the future. Moreover, children with ADHD as well as autism spectrum disorders frequently behave in aggressive ways, which increases the probability that they might perpetrate bullying behaviours (Kowalski and Fedina, 2011[239]). The prevalence rates of bullying victimisation appear to be higher in mainstream settings as opposed to special education settings (van Roekel, Scholte and Didden, 2009[240]).

Sciberras et al. (2011[241]) have found evidence that adolescent girls with ADHD are more socially impaired compared to their peers, which resulted in them experiencing more social problems and more relational and overt victimisation than adolescent girls without ADHD. Bullying behaviour, instead, appeared to be related more to ODD symptoms rather than to ADHD ones.

Bullying and being bullied can have a significant impact on children's psychological well-being. Children that engage in bullying tend to drop out of school, have social difficulties and are more likely to engage in smoking, alcohol or drugs. The victim, on the other hand, can often have low self-esteem, feel miserable, insecure or helpless and have anxiety. Moreover, persistent bullying can lead to self-harm and depression (ADHD Foundation, 2017[242]). From a scholastic point of view, bullying can have serious consequences on school success. Children who are bullied tend to have lower grade point averages (known as GPAs), lower standardised test scores than their classmates and they tend to participate less in and outside of class (Understood, 2019[243]).

Furthermore, Danckaerts et al. (2009[244]) have found evidence of elevated bullying between siblings in families with a child with ADHD. The siblings report lower happiness with life overall and with their family, even when controlling for the siblings own ADHD symptoms. Evidence shows that the reduction in quality of life caused by ADHD is experienced by the child with ADHD and their siblings (Danckaerts et al., 2009[244]).

4.3.2. Adulthood developments

As symptoms of ADHD persist in one's life and develop throughout it, the social and psychological complications that stem from them evolve too. Research suggests that tertiary students with ADHD experience greater emotional distress and psychological difficulties than other students, although evidence is mixed on the topic (Green and Rabiner, 2012[245]). A worrisome trend among university students with ADHD is that of reportedly elevated rates of alcohol abuse and dependence (Vasko et al., 2019[234]): these students incur more drinking-related consequences, such as memory loss, hangover or injuries, even when consuming the same amount of alcohol of peers without ADHD

(Rooney, Chronis-Tuscano and Yoon, 2011[246]) (Rooney, Chronis-Tuscano and Huggins, 2012[247]).

In adulthood, difficulties for people with ADHD in social relationships can be a product of difficulty with impulse control, which can be manifested as talking too much, interrupting others, and making discourteous comments (Weiss and Weiss, 2004[248]). Adult ADHD can have negative consequences for individuals' self-esteem and the quality of interpersonal relationships (Katzman et al., 2017[91]). Research on ADHD in old age has shown relations with loneliness, being divorced or never married and having fewer family members in one's network (Michielsen et al., 2013[249]).

4.4. Material well-being

Material well-being refers to the material resources that make it possible for families to better provide for their children's needs and for schools to support students' learning and healthy development (Borgonovi and Pál, 2016[210]). Households who live in poverty find it difficult to ensure that their children have access to the educational and cultural resources they need to thrive in school and to realise their potential. In general, material well-being can be defined as the material living conditions that determine people's consumption possibilities and their command over resources (OECD, 2013[250]). It can be measured through income, consumption patterns or assets/wealth.

4.4.1. Income levels and wealth

The impact of ADHD on daily functioning in most life domains has been studied extensively in the fields of academic and social well-being, but much less so in relation to individuals' economic statuses and finances. However, similarly to children that struggle in managing academic work or turning in assignments on time, adults with ADHD may experience similar issues in making payments on time or keeping track of their spending (Altszuler et al., 2015[251]). Moreover, a reduced impulse control may lead adults with ADHD to more impulsive buying, and to spending more money than earned (Ibid.). The Pittsburgh ADHD Longitudinal Study (PALS) evaluated financial outcomes of 25-years olds with ADHD relative to peers without ADHD. In this study, Altszuler et al. (2015[251]) found significant difference between the group with ADHD and the control group. Specifically, young adults with ADHD showed greater financial dependence, in terms of being more likely than comparisons to receive financial support from their parents, including housing and "emergency" and regular funding from parents and other relatives. Moreover, the participants with ADHD self-reported fewer personal financial resources, with earnings 25% lower per year compared to the control group. Lastly, the participants with ADHD had lower projected lifetime earnings.

Their findings add to a small body of literature documenting the effect of mental health problems on earnings. Kessler et al. (2008[252]) estimated that adults with serious mental illness earn 42 % less annually than those people without.

4.4.2. Risky behaviours: incarcerations rates, incidents, etc.

The various damaging effects of ADHD on overall health and safety provide additional impulse to appropriately recognise and manage this debilitating disorder. There exist different examples of such effects, such as: i) association between ADHD and poorer driving and higher incidence of traffic citations and motor vehicle accidents (Barkley et al., 2002[253]), ii) an increased number of related problems, which span from an increased

number of visits to physicians, higher rates of emergency rooms visits and hospitalisations (Kirino et al., 2015[254]); iii) a lower life expectancy and higher risk of death – mostly attributed to accidental deaths related to their risk-prone behaviour (Dalsgaard et al., 2015[255]).

Furthermore, ADHD has been associated with increased criminality. Various studies in OECD countries have found that a significant part of the criminal or inmate population had a diagnosable ADHD. The number were as high as 35% of prisoners in Australia (Moore et al., 2016[256]) and 40% of long-term inmates of a prison in Sweden (Ginsberg, Hirvikoski and Lindefors, 2010[257]) having ADHD, and also a sample of Norwegian patients with ADHD in which 47% of them had at least one criminal sentence (Torgersen, Gjervan and Rasmussen, 2006[258]). When considering this correlation, it is important to study the factors that may underlie it. Specifically, impulsivity and the other ADHD symptoms could be influencing it, along with environmental predictors such as substance abuse and poor educational outcomes, as well as a correlation between psychiatric comorbidities and crime (Almazan Sanchez, 2019[259]). Studies on medical treatment targeted at decreasing criminality have identified a potential link between stimulant treatment and the desired decrease. It is suspected that different links contribute to this reduction in criminality raters, such as the fact that stimulant medication reduces the core symptoms of ADHD (Jensen, Hinshaw and Swanson, 2001[260]), where symptoms by themselves lead to some of the risk of increased offending (Young, 2007[261]). In addition, it has been found that adults with ADHD that have been treated pharmacologically in their youth have a lower 'Index of Burden'[7], in terms of alcohol abuse, substance abuse, criminality, global severity index and functioning of life (Goksøyr and Nøttestad, 2008[262]). Lastly, there is some evidence that the use of stimulant medication for ADHD leads to a decrease of both overt or physical aggression and covert aggression behaviours such as vandalism, cheating, shoplifting (Connor et al., 2002[263]). Behavioural therapy should also accompany medical treatment to reinforce these positive effects, as for example with substance abuse rehabilitation programmes (Almazan Sanchez, 2019[259]).

4.5. Labour market outcomes: unemployment and societal costs

Adults with ADHD experience challenges with time management, organisation, and self-regulation, which can result in employment and financial problem (Das et al., 2012[264]), which may be contributing to the fact that adults with ADHD are less likely to be employed full-time than adults without ADHD (Biederman and Faraone, 2006[265]). Additionally, a longitudinal study conducted in the United States has found childhood ADHD to be related to an employment reduction between 10 and 14%, an earnings reduction of approximately 33%, and an increase in social assistance by 15% (Fletcher, 2013[266]). Fletcher's results also show important differences in labour market consequences by family background and age of onset, underlying the importance of treating childhood ADHD to foster human capital (2013[266]).

Besides its substantial burden at the individual level, adult ADHD is often associated with considerable societal costs. Some studies have analysed the loss of workforce productivity, estimated to cost 67 to 116 USD billion annually in the United States (Biederman and

[7] In Goksøyr & Nøttestad (2008[262]) the "Index of Burden" is a measure that combines five measures: i) alcohol abuse; ii) substance; iii) criminality; iv) Global Severity Index; and v) functioning of life. This index ranges from zero to five, where zero denotes low levels and five denotes high levels of comorbidity and social problems.

Faraone, 2006[265]). These results were derived from the finding that average household incomes were significantly lower among individuals with ADHD compared with controls, regardless of academic achievement or personal characteristic. Thus, the individual income among adults with ADHD contributes to substantial loss workforce productivity.

Table 4.2. Summary of the impact of (untreated) ADHD on various dimensions of well-being

Dimension of well-being/outcome	Issue	Source
Social and psychological well-being	Social rejection	Hoza et al. (2005[230])
	Considered socially intrusive and less socially competent	Humphreys et al. (2015[229]), Frankel and Feinberg (2002[231]), Gresham et al. (1998[232]), Ronk, Hund and Landau (2011[233])
	Higher involvement in bullying situations, both as victims and perpetrators	Vasko et al. (2019[234]); Unnever and Cornell (2003[236]); Kowalski and Fedina (2011[239]); and others
	Alcohol dependency and depression	Vasko et al. (2019[234]); Humphreys et al. (2015[229])
	Self-esteem issues and lower quality of interpersonal relationships	Katzman et al. (2017[91])
Material well-being	Lower income levels and projected lifetime earnings	Altszuler et al. (2015[251])
	Greater financial dependency	Altszuler et al. (2015[251])
	Fewer personal financial resources	Altszuler et al. (2015[251])
	Issues in timeliness and money management	Altszuler et al. (2015[251])
	Higher incidence of traffic citations and motor vehicle accidents	Barkeley et al. (2002[253])
	Increased number of visits to physicians higher rates of Emergency Room visits and hospitalisations	Kirino et al. (2015[254])
	Lower life expectancy and higher risk of death (due to risk-prone behaviour)	Dalsgaard et al. (2015[255])
	Increased incarceration rates	Moore et al. (2016[256]); Ginsberg and Lindefors (2010[257])
Labour market outcomes	Reduction in earnings	Fletcher (2013[266])
	Increase in social assistance	Fletcher (2013[266])
	Lower employment rates	Biederman and Faraone (2006[265])
	Loss of workforce productivity	Biederman and Faraone (2006[265])

5. Conclusions: a good start, a long road ahead

Within the range of special education needs, ADHD represents a particular challenge for education systems and their efforts towards inclusion. ADHD, as a mental health disorder, is often comorbid with learning disabilities, such as dyslexia or dysgraphia, and can thus pose a double burden on children and adolescents that suffer from it. Often, students with ADHD have lower outcomes compared to their peers, both from an academic point of view and from social and psychological ones, also due to the stigma generally associated with mental disorders. Moreover, later life outcomes such as income levels, employment and incarceration rates have been shown to be worse for adults with ADHD than their peers'.

Considering that the current approach to the education of students with ADHD has been shown to have its limits in supporting them and helping them fulfilling their potential, a more holistic and inclusive approach could provide positive results for these students. Based on the evidence discussed throughout the paper, a further focus on some key areas and topics could be key in fostering the inclusion of students with ADHD in education.

5.1. A fine balance between defining and labelling

Contrary to the most well-known and accepted learning disabilities, such as dysgraphia or dyslexia, ADHD is not coherently and consistently defined within and between education systems, which constitutes a great challenge in the creation of well-structured support systems for students. The main source of confusion lies in the adoption of an array of terms to categorise ADHD, such as learning disability, learning difficulty and learning disorder, with each entailing different implications.

However, it is worth noticing that labels and strict categorisations are not per se fundamental for an educational system to be inclusive. On the contrary, a system can be fully inclusive without labelling its students and focusing on removing barriers to all children's learning needs, regardless of a diagnosis or categorisation. It is increasingly suggested, in literature and through countries' policies, that it is not necessary to relegate children in specific categories of disorders to respond to their learning needs. In particular not within classes, which allows the avoidance of any bias or stigmatisation from both educational personnel and classmates. Some education systems, in fact, use categorisation exclusively for administrative purposes, such as to provide adequate resources, but avoid their application within classrooms to avoid all the negative effects related to the labelling of students.

Nevertheless, in countries that do rely on a system of categorisations also within classes for the attribution of resources or provision of additional support, the lack of clarity in definitions produces fragmented regulatory systems that are not always able to incorporate fully ADHD in their policies and practices. This fragmentation, in turn, causes severe problems from the individual to the system level.

Firstly, it complicates the processes of resourcing of and within schools for students with ADHD and the provision of additional support. Students with ADHD are not systematically eligible for additional resources (both material and instructional) but often require a severe enough diagnosis or the presence of a comorbid learning disability in order to qualify for them. Secondly, the lack of a clear-cut system of recognition within schools can complicate the understanding of students and parents of the support they are entitled to, and how they

can request it. The involvement of both parents and children, instead, is often crucial in the development of Individual Education Plans that are suited to the students' needs and capacities. Lastly, the lack of clarity and consistency in definitions also produces a scarcity of data on students with ADHD. On the one hand, the lack of data complicates the development of rigorous systems for monitoring and evaluation of policies. On the other hand, it makes international comparability extremely difficult, if not impossible. Further attention and work on harmonisation of definitions could help the streamlining of services for students with ADHD and the efforts for data collection and monitoring of policies.

5.2. The key role of teachers

Furthermore, schools and education systems are the main source of support and inclusion for students with ADHD. Their role is two-folded: on the one hand, teachers often have a key role in the diagnoses of students; on the other hand, a considerable part of the non-medical interventions for the management of ADHD and its symptoms rely on school settings and classroom applications. The key role that education systems play as a whole, however, is still hindered by issues and challenges that are common to most OECD countries. For instance, despite the importance of their role in the inclusion and support of students with ADHD and SEN more in general, a significant proportion of teachers, does not feel prepared to deal with students who have special education needs. They also would like to receive more opportunities to develop competencies for this scope. Furthermore, studies have shown that teachers, even after having acquired more information on the topic, may need a period of personal re-elaboration to change their teaching style accordingly. When teachers are not aware of the disorders' implications for students' behaviour and learning patterns, this may hurt the inclusion of these children in education and hinder their potential. Hence, the topics of awareness and teacher training require further attention in the future, to improve the inclusiveness of students with ADHD in schools.

5.3. The lack of evidence-based practices

One of the greatest challenges for in-class interventions is the fact that there exists little to no evidence on the effectiveness of interventions on students' well-being outcomes. While most of the practices for supporting students with ADHD are quite established and shared across countries, they are often not supported by empirical evidence and rigorous studies of their impact. Practices such as the provision of additional time during exams or more frequent breaks have little or no support in literature but are widely applied within classrooms, while others such as peer-to-peer learning that have been found effective by researchers are less frequently applied. For this reason, it would be important to dedicate further attention to evaluating the actual impact of the interventions, in order to provide children with support structures that can best help them thrive and achieve their potential. This research should focus on both academic outcomes and socio-psychological ones, whereas the latter are currently overlooked in literature and empirical analyses.

5.4. A way forward

Much progress has been made for the inclusion of students with ADHD in education systems in the last decades. Countries have been recognising their struggles, started to provide support systems and integrating them in mainstream education. Nevertheless, there is still room for the improvement of policies and soundness of the research, design and monitoring of interventions. Further efforts should target the streamlining of the processes

for students with ADHD, expanding teachers training, the researching of evidence on effective interventions, and a careful collection of data for a sound process of monitoring and evaluation of policies and practices for their inclusion in education systems.

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