From Diagnosis to Inclusion: Strengthening Executive Functioning Through Classroom Interventions for Students with Attention-Deficit/Hyperactivity Disorder

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ABSTRACT

Attention-Deficit/Hyperactivity Disorder (ADHD) is a prevalent neurodevelopmental disorder that impairs attention, impulse control, and activity regulation. Typically diagnosed in childhood, ADHD often persists into adolescence and adulthood, with enduring challenges in sustained attention, organization, and self-regulation. Prevalence estimates suggest that nearly 11% of children in the United States are diagnosed with ADHD, yet these statistics mask significant disparities across gender and socioeconomic status (Data and Statistics on ADHD). Girls, for example, are less frequently identified due to subtler symptom presentation, while students from marginalized communities encounter systemic barriers to timely diagnosis (Data Brief No. 499). These inequities compound the academic and emotional difficulties associated with ADHD, which include lower achievement, higher dropout risk, and reduced postsecondary completion rates (Kuriyan et al.). Although existing interventions such as medication, therapy, and accommodations provide important support, they frequently fail to address executive dysfunction and the diverse manifestations of ADHD. This review examines how classroom-based strategies can more effectively support students with ADHD by targeting executive functioning skills and fostering equitable, inclusive learning environments. Across three primary intervention studies and a supporting technology meta-analysis, benefits were strongest for targeted outcomes such as time processing, organization, planner use, academic autonomy, and attention, while evidence for broader academic gains and demographic generalizability remained more limited.

Keywords: *ADHD, Executive Functioning, Inclusive Education, Educational Equity, Classroom Interventions, Neurodevelopmental Disorders*

BACKGROUND & SIGNIFICANCE

Attention-Deficit/Hyperactivity Disorder (ADHD) is a common neurodevelopmental condition that impacts an individual's ability to regulate attention, control impulses, and manage activity levels. Symptoms begin in childhood, and diagnosis often occurs during the school years; however, ADHD frequently persists into adolescence and adulthood (National Institute of Mental Health). While some symptoms, such as hyperactivity, tend to decrease with age, other difficulties, particularly those with

sustained attention, organization, and self-regulation, often remain. ADHD is categorized into three primary subtypes: predominantly inattentive, predominantly hyperactive-impulsive, and combined presentation. Each subtype is associated with distinct behavioral patterns that significantly influence functioning across academic, social, and home contexts (Warren et al).

According to the Centers for Disease Control and Prevention (CDC), approximately 9.8% of children in the United States have received a diagnosis of ADHD. These statistics, however, obscure significant disparities, particularly among girls and students from marginalized backgrounds. For instance, nearly 13% of boys are diagnosed compared to only 6% of girls (Charlie Health Editorial Team). This discrepancy is partly attributable to gendered differences in symptom presentation. While boys more often exhibit hyperactivity or externalizing behaviors, girls are more likely to display inattentiveness, social withdrawal, heightened emotional sensitivity, or frequent daydreaming. Such traits are frequently misattributed to temperament or personality rather than recognized as clinical indicators of a neurodevelopmental disorder (Charlie Health Editorial Team). Consequently, many girls remain undiagnosed or are referred for evaluation only after years of academic or social difficulties. Parallel challenges exist for children from low-income or marginalized communities, who face systemic barriers to timely diagnosis, including reduced access to healthcare, cultural stigma, and biased interpretations of behavior within educational settings (Rowland et al). This review considers how classroom-based interventions may better support students with ADHD, with particular emphasis on strategies that address executive dysfunction and accommodate diverse learning needs.

Addressing these disparities is essential, as ADHD has a profound impact on learning, academic achievement, and emotional well-being. Core symptoms such as inattention, impulsivity, and disorganization directly conflict with the demands of traditional classroom environments. Students with ADHD frequently struggle with executive functioning, a set of cognitive processes that includes time management, task initiation, planning, and follow-through. These skills are rarely taught explicitly in schools, yet are often assumed. As a result, students with ADHD, despite being equally capable and motivated as their peers, may be perceived as forgetful, disorganized, or disengaged when, in reality, they are navigating environments that do not accommodate their needs. Yet despite the prevalence of these challenges, there is limited research on practical, classroom-based interventions, especially for older students and those from underrepresented backgrounds.

When left unaddressed, the academic and emotional consequences of ADHD can be severe. Students with ADHD are more likely to earn lower grades, repeat a year of school, face disciplinary action, or drop out entirely. National data show that only about 15% of young adults with ADHD complete a four-year college degree, compared to nearly 50% of their neurotypical peers (Kuriyan et al). This stark disparity does not reflect differences in intelligence or potential; neurodivergent students are just as capable as their peers, but instead highlights a systemic failure to provide the tools, structures, and support these learners need to succeed.

While a range of support structures exists, including medication, behavioral therapy, and academic accommodations such as extended time on tests, these interventions often fail to address the root challenges of ADHD. Executive dysfunction, for example, and the diverse ways symptoms manifest across individuals, are rarely accounted for in standardized supports. In a system where nearly one in ten students is affected by ADHD, the question is no longer whether schools should adapt, but how they can do so effectively, equitably, and sustainably(Data and Statistics on ADHD).

METHODOLOGY

This literature review aimed to identify high-quality, peer-reviewed studies evaluating interventions that support executive functioning and school participation in students with ADHD. Searches were conducted in Google Scholar, PubMed, the Education Resources Information Center (ERIC), and PsycINFO using combinations such as "ADHD executive functioning," "behavioral intervention ADHD students," "educational technology ADHD support," and "classroom accommodations for ADHD." Studies were eligible if they were peer-reviewed, published within the last 15 years, focused on school-aged youth with ADHD, and evaluated an intervention relevant to executive functioning or participation in school. Studies focused solely on medication, adult populations, or clinical interventions without a plausible school-based application were excluded. The final primary synthesis included studies conducted in Sweden, Hong Kong, and the United States, representing school systems in which formal educational or disability supports are available.

For each primary study, information was extracted on participant age and sex, reported race/ethnicity, country and setting, intervention components, delivery format and duration, outcome measures, statistically significant findings, and implementation demands. These features were compared in a coding matrix, and recurring intervention components were grouped into four themes: (1) Time Management and Executive Functioning Supports, (2) Environmental and Instructional Adaptations, (3) Cognitive and Behavioral Techniques, and (4) Technology-Based Tools. Three primary intervention studies were used for detailed cross-study comparison, while a broader systematic review of technology-based interventions was used to contextualize the fourth theme. Because race and ethnicity were not consistently reported across the primary studies, demographic gaps were recorded as a limitation rather than inferred from study location.

FINDINGS

The three primary studies differed substantially in participant age, delivery model, and definition of success. Wennberg et al. (2018) studied 38 children aged 9–15 in Sweden; Samuel Wong et al. (2023) studied 138 children aged 8–12 in Hong Kong; and Sibley et al. (2026) studied 72 ninth-grade students in the United States. Demographic reporting was not consistent enough across the studies to support comparisons by race or ethnicity. Accordingly, this review does not infer differential effectiveness across ethnic groups. Because the studies used different outcomes, success was defined as statistically significant improvement on the primary or closely targeted executive-functioning outcomes of each intervention rather than as a single common metric.

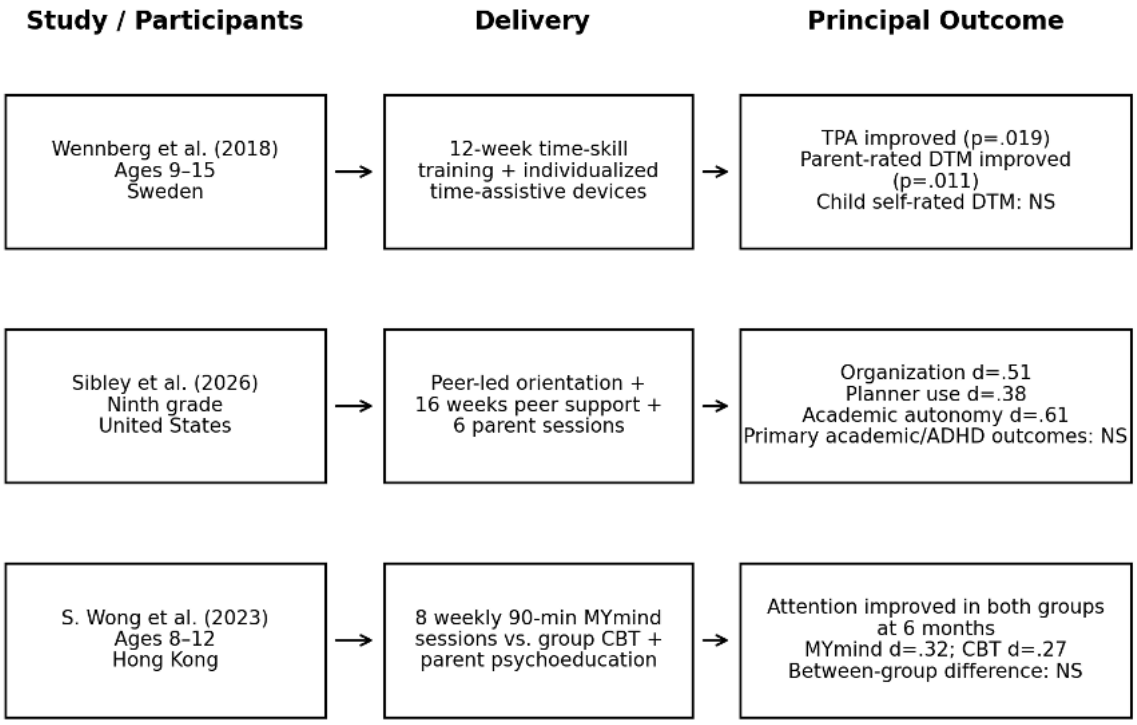


Figure 1. Cross-study synthesis of participant age, intervention delivery, and principal outcomes in the three primary intervention studies.

1. Time Management and Executive Functioning Supports: Wennberg et al. (2018) randomized 38 children with ADHD aged 9–15 in Sweden to a multimodal intervention or an education-only control. Both groups received parent and coach education, while the intervention group also completed approximately 12 weeks of time-skill training with a coach and used individualized time-assistive devices such as visual timers, schedules, and alarms. The sample was 74% boys in both intervention and control groups; race and ethnicity were not reported. At the 24-week follow-up, the intervention group improved significantly more than the control group in overall time-processing ability ($p = .019$), including time perception ($p = .046$) and time orientation ($p = .010$). Parents also reported significantly greater gains in daily time management ($p = .011$), although child self-ratings and the time-management subscale did not differ significantly between groups. These results indicate targeted success for time perception, orientation, and parent-observed daily management rather than uniform improvement across every measure.

2. Environmental and Instructional Adaptations: Sibley et al. (2026) evaluated STRIPES+, a peer-delivered intervention for 72 ninth-grade students with ADHD in the United States. The program combined a one-week peer-led high school orientation with 16 weeks of peer support and six parent-training sessions, shifting much of the organizational coaching away from school staff. Compared with school services as usual, STRIPES+ produced significant gains in school-materials organization ($d = 0.51$), daily planner use ($d = 0.38$), and self-reported academic autonomy ($d = 0.61$), while also reducing

several forms of parent academic assistance (d = 0.34–0.50). However, the study found no acute advantage on primary academic outcomes or ADHD symptoms. The intervention was therefore successful at improving proximal organizational behaviors and autonomy, but evidence for changes in grades, attendance, or core symptoms remained limited.

3. Cognitive and Behavioral Techniques: Samuel Wong et al. (2023) compared MYmind, a mindfulness-based program, with group cognitive behavioral therapy (CBT) in 138 Hong Kong families of children aged 8–12 with ADHD. Children and one parent attended eight weekly 90-minute group sessions. Mean child age was 8.9 years in MYmind and 9.2 years in CBT; 75.4% and 68.1% of participants were boys, respectively. Race and ethnicity were not reported in the main demographic table. At six months, both groups showed significant within-group improvement in attention (MYmind: $\beta = 1.48$, $p = .013$, $d = 0.32$; CBT: $\beta = 1.46$, $p = .008$, $d = 0.27$), but there was no significant between-group difference on the primary or secondary outcomes. Thus, the study supports both approaches as potentially useful for attention and behavior but does not demonstrate that mindfulness is superior to CBT.

4. Technology-Based Tools: A systematic review and meta-analysis by Ka Po Wong et al. (2023), used here as contextual evidence rather than one of the three primary studies, synthesized 19 randomized controlled trials involving 1,843 school-age participants. The interventions included computer-assisted training programs, neurofeedback, and virtual reality. Across studies, technology-based interventions produced small but statistically significant effects in computer-rated inattention (SMD = −0.35), parent-rated overall executive function (SMD = −0.35), disruptive behavior (SMDs = −0.50 and −0.31 across measures), visual attention (SMD = −0.42), and reaction time (SMD = −0.43). These findings suggest that technology can supplement classroom supports, but the modest effect sizes and variation in delivery models argue against treating technology as a stand-alone replacement for human scaffolding.

Across age groups, none of the primary studies directly demonstrated that an intervention worked better for one age group than another. The younger MYmind/CBT sample showed modest attention improvements in both active conditions; the mixed 9–15-year-old Wennberg sample showed gains in lower-level time-processing skills and parent-rated daily time management; and the ninth-grade STRIPES+ sample showed gains in organization and autonomy without corresponding acute academic improvement. These differences may reflect the skills targeted and measures used as much as developmental stage and should not be interpreted as proof that one intervention type is superior for a particular age group. Delivery requirements also varied: Wennberg relied on occupational-therapist input plus a coach and individualized devices; MYmind/CBT required trained group facilitators and parent participation; and STRIPES+ shifted part of delivery to trained peers. Technology-based interventions may reduce some ongoing staffing demands but depend on reliable device access and digital infrastructure. Together, these comparisons show that feasibility depends on staffing, training, family participation, and technology access as well as measured efficacy.

LIMITATIONS

Several limitations emerged across the literature reviewed, highlighting areas where further research is needed to strengthen the evidence base for ADHD interventions in school settings.

1. Limited Study Duration and Single Implementations

The primary intervention studies were conducted in limited settings and with modest samples: 38 children in Wennberg et al., 72 students in Sibley et al., and 138 families in Samuel Wong et al. Although each used a randomized design, the evidence does not provide broad replication across many school systems. Context also differed substantially, with studies conducted in Sweden, Hong Kong, and the United States. These differences restrict certainty that observed effects will generalize to schools with different cultures, staffing models, resource levels, or disability-support structures.

2. Narrow Age Range of Participants

The primary studies covered children and adolescents from ages 8 to 15, but older high school students were minimally represented. Samuel Wong et al. focused on children aged 8–12, Wennberg et al. included ages 9–15, and Sibley et al. focused specifically on ninth graders. None of the studies directly tested whether intervention effects differed by age within the sample. As academic independence and workload increase across high school, evidence remains limited for students in grades 10–12 and for the transition to postsecondary education.

3. Lack of Equity and Demographic Representation

Demographic reporting was inconsistent across the primary studies. Wennberg et al. reported sex but not race or ethnicity, and Samuel Wong et al. reported age and sex but did not include race or ethnicity in the main demographic table. The evidence available across the studies was therefore insufficient to compare outcomes by race or ethnicity. The reported sex distributions were also male-skewed: 74% of the Wennberg sample and roughly 68–75% of the Samuel Wong sample were boys. This limits conclusions about whether the interventions work similarly for girls and for students from racial, ethnic, or socioeconomic groups that are often underdiagnosed or differently identified.

4. Short-Term Focus Without Longitudinal Follow-Up

The studies included follow-up assessments, but the periods were still relatively short for a chronic condition that affects students across developmental transitions. Wennberg et al. assessed outcomes at 24 weeks, Samuel Wong et al. followed participants for six months, and Sibley et al. examined one-year outcome trajectories. These follow-up periods are stronger than immediate post-intervention measurement alone, yet they do not establish whether benefits persist over multiple school years, through later high school, or into postsecondary education.

5. Scalability and Real-World Feasibility

Implementation demands varied considerably. Wennberg et al. used an occupational therapist, a coach, and individualized time-assistive devices; Samuel Wong et al. relied on trained professional facilitators and parent participation; and STRIPES+ reduced some school-staff burden by using trained peers but still required peer training, supervision, and parent sessions. These requirements may be difficult to reproduce in under-resourced schools. In addition, the studies often measured targeted executive-functioning or behavioral outcomes rather than direct academic performance. STRIPES+ did not show an acute advantage on its primary academic outcomes, while the Wennberg and Samuel Wong studies did not

establish improvements in grades or test performance. Thus, improved executive-functioning measures should not automatically be interpreted as improved academic achievement.

Taken together, these limitations highlight the need for larger, more demographically transparent, longitudinal, and implementation-focused studies. Future research should report race, ethnicity, gender, socioeconomic status, and disability characteristics consistently; test whether outcomes differ across subgroups and developmental stages; and measure both executive-functioning changes and concrete academic outcomes. It is also important to distinguish between interventions that improve proximal skills, such as planner use or time processing, and those that demonstrably improve grades, attendance, course completion, or other longer-term educational outcomes.

GAPS & FINDINGS: CROSS-STUDY THEMES AND IMPLICATIONS

Cross-study comparison suggests that the interventions are not interchangeable because each addresses a different point in the executive-functioning chain. Wennberg et al. targeted time perception and orientation, Samuel Wong et al. targeted attentional and behavioral regulation, and Sibley et al. targeted organization, planning, and academic autonomy. The technology meta-analysis suggests that digital tools can support some of these same functions. Rather than demonstrating that blended approaches are definitively superior, the evidence supports a more cautious interpretation: ADHD-related school difficulties span multiple mechanisms, so support may need to be matched to the student's specific executive-functioning challenge. The reviewed studies did not directly compare combined multi-component interventions with single-component approaches in a way that would establish one model as universally superior.

Personalization and autonomy nevertheless emerge as useful design principles. Wennberg et al. individualized time-assistive devices and goals, while STRIPES+ increased self-reported academic autonomy and planner use. MYmind and CBT used more standardized group formats but still taught students strategies they could practice outside sessions. These findings suggest that effective support can combine external scaffolding with opportunities for students to practice independent regulation. However, long-term maintenance after structured support is reduced or withdrawn was not established across the studies, so claims about lasting independence should remain tentative.

RECOMMENDATIONS

1. Schools and Educators

For school educators, flexible support structures should be established with attention to the realities of low-income contexts. Simple practices like posted agendas, breaking down large assignments into smaller, manageable chunks, and using visual timers provide scaffolding without adding cost. Embedding "micro lessons" in existing time frames, such as advising and homerooms, that teach a 5–7 minute "planner routine" ensures that every student participates in this practice weekly and gains organizational planning skills. Schools can implement 10-minute peer mentorship meetings, allowing students to

determine their objectives and next steps, thereby reducing staff workload while ensuring consistent scaffolding.

Also, integrating executive function skill training, such as backward planning or initiating task strategies, combined with environmental reminders like checklists, seating options, and movement breaks, can be helpful for schools to adopt. This would not only be for students with ADHD, but also for every student. Additional methods, such as encouraging students to use planners and create calendars, and initiating morning routines at the start of school, would also be helpful.

2. Researchers

For researchers studying high school students in grades 9-12, whose executive-function requirements are at a peak, it is recommended to conduct long-term studies with more inclusive participants. Researchers should embed trials within typical school courses and schedules, and study all demographics, gender, race/ethnicity, disability, etc. Additionally, they make long-term follow-up strategies that last at least an academic year's length (preferably longer) to gain insight into whether benefits persist after scaffolding wears off and schedules change. This allows for trials to connect outcomes to more academic results, such as GPA, credit accumulation, punctual work, and passing rates in courses, alongside executive functioning behavior. It would also help to report "minimum viable recipe," which includes details like minutes, staffing, materials, and cost per student, so schools may reproduce effective techniques from studies.

3. Policy and Leadership

In addition to guidance for schools and researchers, there are various key recommendations for people working within school policy and leadership. Setting up frequent teacher-parent and student check-ins on planning and assignment completion can provide more structure for students. This can take the form of a 5-minute biweekly briefing on three indicators: missing work, next major due date, and study blocks planned. Additionally, investing in teacher professional development in neurodiversity/ADHD, particularly inattentive and internalizing presentation typical among girls, and matching PD with ready-to-implement tools such as timer routines, checklist forms, cue cards, and coaching can greatly reduce bias and help marginalized students. Finally, redefine ADHD support beyond accommodation of tests by standardizing classroom EF routines through planner instruction, time checks, and visual reminders.

CONCLUSION

This review highlights both the promise and the limitations of current interventions for students with ADHD. Across the primary studies, targeted strategies improved specific domains including time processing, parent-rated daily time management, organization, planner use, academic autonomy, and attention. However, effects were domain-specific and did not consistently extend to broader academic outcomes or ADHD symptoms. Evidence from the technology meta-analysis also suggests that digital interventions can improve selected attention, executive-functioning, and behavioral measures, although effects are generally modest. Taken together, the findings support matching interventions to the student's specific executive-functioning needs rather than assuming that a single universal strategy will be effective for every learner.

At the same time, the limitations of existing research are significant. Most studies were small in scope, short, and rarely replicated, leaving questions about scalability and long-term impact unanswered. Narrow participant samples, especially the underrepresentation of older students and those from marginalized groups, further restrict the generalizability of findings. Without more inclusive, longitudinal research, evidence remains insufficient to guide equitable and sustainable implementation in diverse school settings.

The implications for practice are clear. Schools cannot rely solely on medical treatment or isolated accommodations but must instead adopt holistic, classroom-based approaches that explicitly teach executive functioning skills and adapt to the diverse needs of learners. For researchers, the challenge is to design studies that are larger in scale, inclusive in scope, and attentive to both academic and emotional outcomes. For educators and policymakers, the charge is to translate this evidence into feasible, low-cost interventions that can be sustained even in under-resourced schools. Ultimately, advancing equity in ADHD support requires bridging the gap between research and real-world classrooms, ensuring that all students are given the structures and tools they need to succeed.

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