Group-Based Intervention for Elementary School Children with Attention and Executive Function Difficulties: A Single-Case Pilot Study

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Abstract:

The prevalence of attention and executive function difficulties extends well beyond children formally diagnosed with attention-deficit/hyperactivity disorder (ADHD). These difficulties often manifest in a classroom setting, negatively impacting academic achievement and classroom behavior. The present pilot study employed a single-case design to investigate the effects of the Fokus+ intervention on elementary school students with attention and executive function difficulties. Nine children participated in the study, of which five participants were included in the final analyses. As a primary outcome measure, the children's classroom behavior was observed using the Direct Behavior Rating-Single Item Scales (DBR-SIS) to assess intervention effects in three domains: academic engagement, respectful behavior, and disruptive behavior. Additionally, teachers completed the Attention and Executive Function Rating Inventory (ATTEX) as a secondary measure. The results from the visual and statistical analyses revealed mixed effects on academic engagement and respectful behavior. However, notable improvements were found in disruptive behavior, with four out of five participants demonstrating a statistically significant positive response. Analysis of the secondary measure showed a reduction in attention and executive function difficulties in all participants, with three demonstrating a significant improvement. The final study design limited inferences of a strong causal relationship between the intervention and behavioral change. Nevertheless, this study provides insight into the intervention's effectiveness while emphasizing the need for continued development and further investigation in subsequent studies. Implications include contributions to Finnish school-based intervention research and the introduction of DBR-SIS as a progress monitoring tool in a school setting. Consistent with prior research, variability in effects highlights the individualized nature of response to behavioral interventions.

Keywords: attention-deficit/hyperactivity disorder (ADHD), executive functions, behavioral intervention, DBR-SIS, single-case design

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Abstrakt:

Förekomsten av svårigheter med uppmärksamhet och exekutiva funktioner sträcker sig långt bortom barn som uppfyller de formella diagnostiska kriterierna för aktivitets- och uppmärksamhetsstörning (adhd). Dessa svårigheterna tar sig ofta uttryck i en klassrumsmiljö och har en negativ inverkan på skolframgång och klassrumsbeteende. I denna pilotstudie användes en single-case design för att undersöka effekterna av Fokus+ -interventionen på lågstadieelever med svårigheter med uppmärksamhet och exekutiva funktioner. Nio barn deltog i studien, varav fem deltagare inkluderades i de slutgiltiga analyserna. Som ett primärt utfallsmått observerades barnens klassrumsbeteende med hjälp av Direct Behavior Rating-Single Item Scales (DBR-SIS) för att bedöma interventionseffekterna inom tre domäner: akademiskt engagemang, respektfullt beteende och störande beteende. Utöver detta fyllde klasslärarna i Keskittymiskysely som ett sekundärmått. Resultaten från de visuella och statistiska analyserna visade blandade effekter på akademiskt engagemang och respektfullt beteende. Anmärkningsvärda förbättringar observerades i störande beteende, med fyra av fem deltagare som visade en statistiskt signifikant effekt. Analysen av sekundärmåttet visade en minskning av svårigheter med uppmärksamhet och exekutiva funktioner hos alla deltagare, därav tre visade en signifikant förändring. Det slutgiltiva upplägget begränsade etableringen av ett starkt orsakssamband mellan interventionen och beteendeförändring. Studien ger insikt i effekterna av interventionen och betonar samtidigt behovet av fortsatt utveckling och ytterligare utredning i efterföljande studier. Studien bidrar till finsk skolbaserad interventionsforskning och inför DBR-SIS som ett potentiellt mätverktyg för att följa upp elevernas respons på stöd. Variationen i effekterna understryker den individualiserade karaktären i respons på beteendeinterventioner, vilket överensstämmer med tidigare forskning.

Nyckelord: aktivitets- och uppmärksamhetsstörning (adhd), exekutiva funktioner, beteendeintervention, DBR-SIS, single-case design	
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Group-Based Intervention for Elementary School Children with Attention and Executive Function Difficulties: A Single-Case Pilot Study

Attention and executive function difficulties affect many children and adolescents worldwide, significantly impacting their academic performance, social functioning, and overall well-being. According to meta-analytical data, the worldwide prevalence of Attention-deficit/hyperactivity disorder (ADHD) ranges between 3.4 and 7.6%, with some variability in estimates across countries, time, and the diagnostic criteria applied (Polanzyk et al., 2015; Salari et al., 2023; Thomas et al., 2015). However, the incidence of attention and executive function difficulties certainly extends beyond the actual diagnostic threshold, affecting a considerably higher number of children (Faraone et al., 2015).

Children with ADHD exhibit the core symptoms of inattentive and/or hyperactive and impulsive behavior (Polderman et al., 2010). Furthermore, evidence indicates that ADHD is associated with fundamental deficits in executive functions (Shephard et al., 2022; Silverstein et al., 2020). Executive functions are a collection of higher-order cognitive processes needed for purposeful and goal-oriented behavior, including attention, inhibition and interference control, working memory, and cognitive flexibility (Diamond, 2013; McKenna, Rushe & Woodcock, 2017). These processes are essential for academic achievement, classroom and on-task behavior, which involve sustaining attention, adhering to instructions, and actively participating without being distracted or engaging in other activities (Caci et al., 2014; DuPaul et al., 2014). Consequently, ADHD has been shown to predict various difficulties, such as academic problems and underachievement across the developmental spectrum (Daley & Birchwood, 2010; Erskine et al., 2016; Holmberg & Bölte, 2014). Even though ADHD is a heterogeneous condition, a single core symptom may increase the risk of academic problems and the need for educational support (Holmberg & Bölte, 2014). Symptoms disrupt learning both during class and independent tasks. It is also worth emphasizing that children without diagnoses may experience moderate difficulties with executive functioning, which can negatively impact their daily activities, academic performance, and social interactions (Loe & Feldman, 2007; Moore et al., 2018). Furthermore, ADHD symptoms frequently extend their impact into several functional domains and aspects of well-being. They can be associated with poorer cognitive, motor, and language development, emotional difficulties, impaired social functioning, and relationships across multiple settings (Barkley et al., 2008; Caci et al., 2014;

Daley & Birchwood, 2010; Shephard et al., 2022). Therefore, early recognition of challenges and developing and implementing effective intervention strategies are essential.

The low threshold policy can be considered one of the strengths of the Finnish special education system, where the main objective is to identify difficulties in children at an early stage and intervene without delay. The Amendment of the Basic Education Act (ABEA, 2010) and the ADHD-CCS (Attention-deficit/hyperactivity disorder, children and adolescents: Current Care Summary, 2019) emphasize supporting children exhibiting ADHD symptoms in schools, where a formal diagnosis is not required. Support measures should be initiated as soon as problems related to attention or hyperactivity that affect functioning or learning are identified. Subsequently, many interventions for ADHD and executive function difficulties have been developed in psychology, special education services, and related fields. While improvements in core ADHD symptoms are important, functional improvement requires the opportunity to develop and apply new skills. Considering that attention and executive function difficulties influence academic achievement negatively in early grades, interventions that promote basic skills essential for learning and positive interactions with teachers and peers during primary school are of utmost importance.

Further, group-based interventions and their potential benefits for children with attention and executive function difficulties have received less attention than individual interventions in the literature. Group-based interventions have the potential to provide a supportive and dynamic learning environment, offering opportunities for social interaction and peer support (Evans et al., 2014). Enabling children to benefit from group discussions and shared experiences provides further learning opportunities and may enhance the overall effectiveness of the intervention.

In this context, the present pilot study aimed to examine the effects of Fokus+, a multi-component school- and group-based intervention that fosters executive skills and on-task behavior in children exhibiting attention and executive function difficulties.

Etiology and Neuropsychology of ADHD

When considering the etiology of ADHD, the multiple causal pathway model is well established and consistent with the disorder's heterogeneity and complex behavioral phenotypes. The model assumes that genetic, neurobiological, psychosocial, and environmental factors interact in complex and dynamic ways and cause deviations in neural networks. These deviations, in turn, lead to changes in core neuropsychological functions that

are significant in developing symptoms and increased susceptibility to ADHD (Maniadaki & Kakouros, 2018; Thapar & Cooper, 2016). Twin, adoption, and genetic studies indicate a high heritability, with estimates ranging from 0.76 to 0.88 (Biederman & Faraone, 2005; Langner et al., 2013; Larsson et al., 2013). While some candidate genes have been identified, no causal connection between any single gene and ADHD has been confirmed. Additionally, pre- and perinatal environmental risk factors, such as fetal exposure to maternal stress, nicotine, alcohol, drugs, low birth weight, preterm birth, and obstetric complications, have been identified as contributing to the phenotype. Furthermore, post-natal factors, including depression, various neurotoxins, food additives, and psychosocial adversity, have been implicated (Anderson et al., 2018).

Different neuroimaging methods have obtained information about structural changes, functional alterations, and neural pathways that distinguish individuals with ADHD from controls. However, research so far has not been able to clarify the pathophysiology of ADHD fully, and recent research has shifted focus toward studying the functionality of neural networks and their interactions. Dysregulation of the frontal/subcortical/cerebellar catecholaminergic circuitry and abnormalities in the dopamine transporter system appear to play a central role in ADHD (Faraone et al., 2015). Additionally, research findings suggest dysregulation in other neural networks involved in higher-level cognitive functions, sensorimotor functions, emotion, default-mode networks, and compensatory mechanisms in alternate regions. They suggest that children with ADHD engage a more diffuse network of neural systems during tasks (Cortese, 2012; Cortese et al., 2012) and expand the scope beyond earlier models primarily focused on prefrontal-striatal circuits.

Deviation in executive functions is also considered to be causally involved in the pathogenesis of ADHD. Impairments in at least some subsamples of individuals with ADHD are predominantly executive and primarily seem to be related to inattention rather than hyperactivity/impulsivity (Nigg, 2005; Willcutt et al., 2005; Wåhlstedt et al., 2009). Meta-analytic research on the mental architecture of executive functions in children and adults generally supports the integrative model, which describes executive functions as a set of related but separable cognitive functions within a superordinate executive functions network located primarily in the fronto-cingulo-parietal cortices (McKenna et al., 2017; Miyake et al., 2000; Niendam et al., 2012). The current conceptualization of ADHD has gradually shifted from simple causal models towards the recognition of more comprehensive theoretical frameworks, acknowledging the complexity and heterogeneity of this syndrome.

Theoretical Explanatory Models of ADHD

Manifestations of ADHD are heterogeneous, and underlying neurological and cognitive mechanisms are challenging to comprehend. From an intervention standpoint, understanding the cognitive features associated with ADHD is critical, and various theories have been developed to explain these. The models that have dominated ADHD research have primarily emphasized deficits in executive functions, particularly inhibition (Executive dysfunction theory/Inhibition model; Barkley, 1997), difficulty regulating energetic factors leading to inattention and hyperactivity (Cognitive-Energetic Model; Sanders, 1983; State Regulation theory; Sergeant, 2000), or the role of reinforcement sensitivity and motivation (Delay aversion theory and the Dual Pathway Model; Sonuga-Barke et al., 1992; Sonuga-Barke, 2002). Over time, many theories and hypotheses have transformed or been refined to include new data.

The main idea of the Executive Dysfunction theory is that essential symptoms of ADHD arise from a general weakness in executive functioning and mainly a deficit in response inhibition (Barkley, 1997). Executive dysfunctions are associated with a wide range of behavioral manifestations in ADHD. However, deficits in executive functions are neither necessary nor sufficient causes of ADHD, nor are they universally present. Building upon the Cognitive-Energetic model, the state regulation hypothesis (Sergeant, 2000, 2005) agrees with the Executive Dysfunction theory that ADHD symptoms reflect executive function difficulties. However, instead of a primary inhibitory deficit, it postulates that children with ADHD symptoms have difficulty regulating their energetic states or maintaining an optimal activation level. Poor state regulation incorporates factors such as arousal, activation, and effort and is believed to result in increased intraindividual variability in reaction times due to attentional fluctuations.

The Delay aversion theory hypothesizes that children with ADHD prefer readily available or immediate rewards over delayed ones, even if the delayed rewards are higher. During externally imposed delay periods, such as during long and monotonous tasks, children with ADHD display negative responses and show more heightened activity and inattentiveness than their peers, leading to poor task performance (Sonuga-Barke, 2002). This theory has been further refined and extended into the Dual Pathway model based on empirical evidence (Sonuga-Barke, 2002, 2003, 2005). The Dual Pathway model explains neuropsychological heterogeneity in ADHD through two independent pathways of dysfunctions, each affecting specific groups of children. The first pathway involves cognitive

impairments and poor inhibitory control, resulting in difficulties with general self-regulation. The second pathway relates to motivation and delay aversion, involving alterations in reward mechanisms. The symptoms of children following the second pathway may predominantly manifest in delay-rich environments. Experimental research supports the Delay Aversion theory and the Dual Pathway Model (Sonuga-Barke et al., 1992) as they highlight the motivational features of ADHD. Considering the inherent heterogeneity of ADHD among children, no single model may be sufficient to provide a comprehensive explanation. Therefore, in intervention research, it may be more beneficial to apply a multi-theoretical perspective and consider approaches that have been shown to be effective.

Non-Pharmacological Interventions for ADHD

Previous intervention studies in ADHD have primarily been conducted among individuals with a formal diagnosis. However, research indicates that children exhibiting inattentive, hyperactive, and impulsive behaviors, even without a diagnosis, are at risk for poor academic outcomes (Loe & Feldman, 2007; Moore et al., 2018). Multi-component interventions appear to be more effective in improving long-term outcomes, and such effects have been particularly evident when some form of behavioral and pharmacological approach is combined (Arnold et al., 2015; Hinshaw et al., 2015). However, the need and order of different intervention approaches should continuously be assessed individually, as some individuals may not derive significant benefits from medical treatment (Daley et al., 2014), and not all individuals require the same combination of treatments. Thus, combining and implementing multiple approaches is common and often necessary, and treatment at different ages may differ.

Behavior management treatments represent well-established evidence-based interventions for children with ADHD, supporting the efficacy of school-based interventions for ADHD symptoms or behaviors consistent with ADHD (Chronis et al., 2006; DuPaul et al., 2012; DuPaul et al., 2014; Evans et al., 2018; Lambez et al., 2020). Moreover, a recent comprehensive meta-analysis of psychosocial interventions and treatments for ADHD highlighted the efficacy of behavioral interventions as key components of school-based interventions (Fabiano et al., 2021). In a systematic review with a meta-analysis of single case design studies, Harrison et al. (2019) evaluated the effectiveness of school-based interventions implemented explicitly in the classroom. They found an overall moderate effect on behavior and academic performance. Notably, self-management and instructional

interventions yielded large effects, while behavioral interventions showed moderate effectiveness (Harrison et al., 2019). This study also found that instructional interventions were more effective in a special education setting than a general classroom, indicating that these settings may be more beneficial for learning for students who need specialized services and limited distractions.

Cognitive training has been investigated as a potential treatment for ADHD, drawing from findings within developmental neuroscience and brain plasticity research. Cognitive training operates on the premise that the key brain networks associated with ADHD can be strengthened and their processes improved (Cortese et al., 2015). It aims to reduce ADHD symptoms by targeting neuropsychological deficits linked to ADHD. Currently, such training is typically delivered through computer-based programs. A meta-analysis of randomized controlled trials examining the effects of cognitive training on ADHD symptoms, neuropsychological deficits, and academic skills in children and adolescents with ADHD found significant positive effects on total ADHD and inattentive symptoms when all types of training were considered together (Cortese et al., 2015). The meta-analysis did not find statistically significant effects on hyperactivity, impulsivity, or academic performance. However, interventions targeting multiple neuropsychological deficits showed large effects on ADHD symptoms, suggesting that multi-process approaches targeting more than one neuropsychological domain may optimize the transfer of effects.

A recent meta-analysis by Lambez et al. (2020) sought to investigate the effects of behavioral and cognitive interventions on cognitive symptoms among individuals with ADHD. The analysis revealed that several interventions, including physical exercise, cognitive-behavioral therapy, neuro- and biofeedback, and cognitive training, effectively addressed cognitive symptoms, particularly enhancing inhibition and flexibility, regarded as executive functions. Furthermore, basic attention and working memory functions showed moderate improvement. These findings align closely with the Executive function theory of ADHD, further supporting its validity. The meta-analysis excluded behavioral interventions such as classroom interventions or parent training that have demonstrated some efficacy, as none of the studies included cognitive tasks as outcome measures.

Effective psychosocial interventions often draw upon behavioral and cognitive models that shape behavior. Specifically, children exhibiting inattentive and impulsive symptoms may need interventions focusing more on skill-building than traditional behavioral interventions (Pfiffner et al., 2014). Strategy training and early executive skills training have shown promising results in enhancing academic performance and preventing the development

of ADHD symptoms or reducing already elevated symptoms (Raggi & Chronis, 2006; Sonuga-Barke & Halperin, 2010). Overall, there is a pressing need to develop comprehensive approaches that address both behavioral and academic challenges experienced by children with attention and executive function difficulties that interfere with their school performance.

The Fokus Intervention Program

The Fokus intervention (Finnish Maltti; Paananen et al., 2011) developed at the Niilo Mäki Institute is a group-based training program for attention and executive skills. The program uses a multi-channel model containing parts based on various theoretical models described earlier. The reason for problems in attention and executive functions can vary, and the different tasks and exercises complement and support each other to address the academic, behavioral, and executive function difficulties exhibited by children with ADHD symptoms. Moreover, the intervention incorporates elements from several interventional approaches to approach these difficulties more effectively than any single intervention strategy alone. The program combines cognitive and behavioral interventions with skills training, which involves teaching school children to use strategies that specifically address the demands of an academic situation.

The emphasis lies in improving school-related on-task behavior and skillsets children can use and modify in different learning contexts. The program consists of three parts, with tasks and exercises fostering executive control and targeting various aspects of attention and inhibition. More precisely, the objective is to improve children's ability to direct and maintain their attention, reduce the number of impulsive reactions and behaviors in on-task situations, promote executive skills in on-task situations, create conditions for and enable experiences of success, and promote children's social skills.

Paananen et al. (2017) examined the effects of the Fokus intervention in a regular elementary school setting with children presenting attention and executive function difficulties identified by their teachers. The study found preliminary evidence for positive effects on both attention and executive functions as well as on academic skills. However, the initial severity of the symptoms moderated the effects of the intervention on attention and executive functions, and a positive outcome was only found among children in the group with moderate symptom severity. To conclude, the authors claim that the intervention could improve functioning and behavior in a classroom setting for children with moderate symptoms of problems in attention and executive function. The intervention effects were

maintained in a follow-up assessment, but no further symptom reduction was evident. An additional finding was that the more collaboration was established between the intervention group supervisor and the class teacher, the more the children benefited from the support in the classroom.

Behavioral Consultation in Schools

Evans et al. (2014) argued that intervention delivery alone is insufficient for achieving long-term improvement in ADHD symptomology, and collectively, previous research has consistently found that standard interventions often do not result in sustained improvement. The authors propose seven principles to enhance intervention effectiveness, including facilitating alliances within and between systems, promoting engagement, providing ongoing practice support, and incorporating progress monitoring to evaluate treatment effects. Collaborative behavioral consultation is one approach aimed at addressing barriers to sustained effects, such as limited communication between key stakeholders. Behavioral consultation is a commonly implemented low-resource model for delivering academic and behavioral interventions in schools, and promising results have been achieved for children with attention difficulties (Fabiano et al., 2009; Jitendra et al., 2007). While several differences exist across consultation models, they all share a focus on delivering interventions or services through a collaborative relationship involving a consultant (e.g., special educator, school psychologist), consultee (e.g., teacher, parent), and client (e.g., student) (Hagermoser Sanetti et al., 2015). In behavioral consultation, the joint conceptualization of the child's difficulties, observational data collection, intervention planning, progress monitoring, and treatment evaluation are typically included (DuPaul et al., 2006).

The Aim of the Study

This pilot study examined the effects of the Fokus+ intervention, a multi-component school- and group-based intervention for attention and executive functions combined with a simultaneous collaborative consultation model. The consultation model was incorporated to investigate whether it could intensify the effects of the Fokus intervention, hence the name Fokus+. This study employed a single-case design methodology, and each student's response to intervention was assessed utilizing direct behavior rating in class. In accordance with existing evidence, it was anticipated that implementing the Fokus+ intervention would be associated with increased academic engagement and respectful behavior and decreased

disruptive behavior in class. Unlike many studies where an immediate change upon implementing a behavioral intervention could be expected, no immediate changes in the children's behavior were anticipated in this study. Instead, it was hypothesized that positive behavior change would occur progressively throughout the intervention phase. Subsequently, in agreement with the study by Paananen et al. (2017), it was also anticipated that students' overall problems with attention and executive functions in a school setting would decrease in response to the intervention.

Methods

Participants and Setting

The study was conducted at three Swedish-speaking public elementary schools in Southern and North-Western Finland. Data were collected during the 2020/21 school year. Nine children (two girls and seven boys) aged 8–11 years participated in the study. Selection criteria included symptoms of attention and/or executive function difficulties in a classroom setting, where these difficulties cause problems in school routines and learning situations. The teachers who had registered for the intervention had selected the particular children to be included in the study in collaboration with the intervention provider. Thus, the participants were selected based on the need for support, and no official diagnosis was required. The children selected should not present any substantial behavioral difficulties or conduct problems. All observations conducted by school personnel were administered in the children's classroom. The intervention group sessions took place in a quiet classroom setting.

Ethical Considerations

The study received ethical approval from the University of Jyväskylä Ethics Committee. Municipality-specific research permits were also obtained from each city where recruiting took place. The parents were asked to sign an informed consent form to allow the children to participate in the study and the research team to use and process the accumulated information and data for research. Participation in the study was voluntary, and the children selected could choose to only participate in the intervention group without participating in the study. Participating teachers were also asked to sign a consent form.

Design

A series of single-subject AB designs were implemented to assess change in behavior in the context of the intervention. Repeated and frequent measures of the progress of the same subject over time were undertaken during a baseline phase (phase A) and an intervention period (phase B). Thus, by comparing baseline and intervention phase observations, participants essentially served as their own controls. The design is best labeled as concurrent, as the participants were recruited and participated in the intervention simultaneously. There were nine individual baseline phases but only three different intervention starting points. The design was replicated across participants, but no intervention onset was randomized for practical reasons. Due to the nature of the intervention, it was not feasible to blind the participants or the observers. The same limitation applied to the questionnaire assessors, as the ATTEX measure relied on informant ratings.

The present setup would typically enable a multiple baseline setting. However, this study was eventually only able to incorporate a series of single-subject AB designs due to a later exclusion of study participants from the final analyses. The final design features allowed for examining two temporally distinct demonstrations of an effect, one fewer than required to conclude a functional relation within single-case research methodology (Kratochwill et al., 2013; What Works Clearinghouse, 2020). This report follows best practices for reporting single-case research using the Single-Case Reporting guideline In BEhavioural interventions (SCRIBE) Statement checklist (Tate et al., 2016, 2019).

Measures

DBR-SIS. One way to assess whether an intervention is helpful for a particular child is to collect and analyze progress monitoring data, and this study utilized Direct Behavior Rating Single-Item Scales (DBR-SIS; Chafouleas, 2009) as the primary measure to monitor how the children responded to the intervention. For data collection, DBR is efficient and can be administered repeatedly and completed in the individual's natural environment, with minimal modifications to the typical classroom routines. Teachers or other school personnel provided the DBR-SIS behavior ratings following a predetermined observation period for the sample of students participating in the study. The primary outcome measures were the three target behaviors: academic engagement (AE), disruptive behavior (DB), and respectful behavior (RB) (See Table 1 for the operational definitions). The children's classroom behavior was planned to be followed up three times a week, and the observers were instructed

to mark the percentage that best described the total part of the observation time during which the child exhibited the particular behavior. The DBR-SIS was also used across the baseline phase to indicate baseline functioning.

Table 1

Operational definitions of target behaviors in DBR-SIS

Target behaviors	Definition	Example
Academic engagement	Actively or passively participating in classroom activities.	Writing, raising a hand, answering questions, discussing relevant things during class, listening to the teacher, reading, or looking at instructional materials.
Respectful behavior	Compliant and polite behavior in response to instructions and/or interactions with other students and adults.	Following the teacher's instructions, pro-social interactions with classmates, responding positively to adult requests, verbal or physical disruptions without a negative tone or connotation.
Disruptive behavior	Student action that disrupts regular school or classroom activity.	Being out of the seat, playing with things, fidgeting, behaving aggressively, talking or shouting about subjects unrelated to the class subject.

Note. Definitions are adapted from the V1.4 DBR-SIS Standard form created by Sandra M. Chafouleas, T. Chris Riley-Tillman, Theodore J. Christ, and Dr. George Sugai.

A broad range of evaluation studies focusing on the performance of DBR and the applied use of DBR-SIS targets for progress monitoring under different conditions has supported the psychometric qualities of DBR-SIS (e.g., Chafouleas, 2012; Huber & Rietz, 2015; Smith et al., 2018). To collect reliable and valid data, adequate training in DBR procedures is necessary (Briesch et al., 2016). Evidence shows that some people may be more stringent in behavior ratings (Briesch et al., 2016). However, results from generalizability analyses have demonstrated reliable data when a single rater completes the DBR-SIS rating across different occasions (Chafouleas et al., 2010). Hence, when engaging in progress monitoring of a child, it is crucial to maintain consistency with the same rater across different time points and phases, as ratings from multiple observers cannot be assumed to be interchangeable.

ATTEX. As a secondary measure, the teachers completed the Attention and Executive Function Rating Inventory ATTEX (Kesky; Klenberg et al., 2010) to assess the children's problems in attention and executive functions in a school setting. ATTEX consists of 55 items and yields scores for ten clinical subscales. The items include a three-point scale to assess the frequency of attention and executive function difficulties, and the highest possible total score is 110. ATTEX has been shown to have solid psychometric properties and has been sensitive in identifying children with ADHD when different cut-off scores for boys and girls are applied (Klenberg et al., 2010). As with many other teacher ratings, the ATTEX is time-efficient and is frequently used in clinical practice. The teachers were to complete the ATTEX questionnaire three times: once during the baseline measurement, once after the last intervention session, and once in a follow-up approximately six months after the intervention period.

Intervention

Intervention program for the children. The children participated in the Fokus program in small groups organized as part of everyday school life. The intervention is a theory-driven and manualized program that provides detailed and structured guidelines for twenty sessions, which are meant to be completed over six to eight months. The group sessions include five components: a) a check-in and review of the previous week, b) first exercise, c) second exercise, d) feedback and reward, and e) game or play practice. A more detailed account of two of the exercises is provided in Appendix A. In the groups, the children practiced skills related to attention, concentration, and working methods. Trained tutors conducted the program, either special education teachers or school psychologists. Before the start of the research process, the tutors had comprehensive training in the intervention model and received ongoing support from the research team.

A collaborative consultation model. In addition to the group-based support, this study used a multi-component approach. It simultaneously offered behavioral consultation to the teachers who did not function as Fokus tutors for their own pupils. The tutors had training in the consultation model and how to provide collaborative consultation. The collaborative consultation model used in the present study is based on a model developed at the Niilo Mäki Institute (Peitso & Närhi, 2015) and has previously been tested and streamlined in a preschool setting. A pilot study, part of the project above, yielded promising results as the provided support measures significantly increased the self-assessed competence of daycare personnel and reduced the number of children exhibiting problematic behavior (Kulonen et al., 2010).

So far, no results from studies using the consultation model in elementary schools have been reported.

As previously mentioned, results from Paananen et al. (2017) suggest that the more collaboration was established between the supervisor and the class teacher, the more the children benefited from the intervention. The objective of the consultation model was to strengthen the intervention effect by increasing the class teachers' awareness of evidence-based working methods to apply in the classroom, thereby producing effects that possibly generalize across settings, from a small group setting to the classroom. The intervention providers were trained in the consultation model and how to deliver collaborative consultation. The consultation model consisted of three structured meetings between the intervention provider and the students' teacher. It progressed in a step-by-step manner and began by jointly defining and analyzing the student's problem, then planning and implementing adequate support measures, and concluded with evaluating the provided support.

Procedure

The parents completed a background form with questions about children's development, learning, and difficulties. The teachers were asked permission to collect information and conduct observations for research. They were further asked to complete a form with questions regarding the children's schooling, such as delivered special education services. Following their selection, all raters were trained to complete the DBR-SIS ratings. The research team utilized an online training module at www.directbehaviorratings.org/training to train individuals to conduct ratings of the three core behaviors and orient them to the measurement approach using a DBR-SIS form. The form was translated and adapted from the DBR Standard Form created by Chafouleas et al. (2009). It provided quantitative anchors of the values ranging from 0 to 10 and a scale from 0 to 100% to estimate the percentage of the time a student was engaged in the target behavior. In addition, qualitative anchors were provided, where the extremes and midpoint of the scale were labeled as Never, Sometimes, and Always, respectively. The online training offers modeling, practice, and feedback on conducting the ratings and is designed for individuals with varying degrees of previous training in behavioral observation and assessment (Briesch et al., 2016). Once the raters had been trained and had obtained all the required information, they established a plan for the data collection.

The participants from each school were studied simultaneously with somewhat different start points of the baseline phase, in keeping with each school's possible intervention

start point. The intervention providers participated in continuing education regarding the collaborative consultation model. In one of the schools, the children's class teacher also functioned as the intervention provider and could naturally apply the intervention principles in the classroom. In the other two schools, the teachers had separate training by collaborating with the intervention provider on applying the principles in the children's home class. These consultations were offered during the intervention period, and the sessions were 45–60 minutes long. The intervention providers then arranged consultation meetings with the class teacher, after which they were asked to fill out questionnaires at the end of each consultation and eventually provide feedback to the researchers. The consultation meetings occurred on intervention weeks 16, 19, and 24 in one of the schools, while the teacher in the second school was only provided with two consultations on intervention weeks 17 and 20. In the latter case, the third session was never held because of an accelerated intervention design due to non-compliance with the study protocol.

Procedural fidelity. Adherence to session content, whether the tutors completed the intended intervention components of each session in the intervention manual, was evaluated using a Fidelity Checklist. The intervention provider filled out these electronically or by hand at the end of each group session and returned them to the research team.

Inter-observer reliability. Research team members conducted independent and simultaneous classroom DBR-SIS ratings alongside the primary observer to ensure inter-rater reliability. According to research standards, at least 20% of the total observations should be collected within each study phase and for each student (What Works Clearinghouse, 2020). Due to the COVID–19 social distancing measures that prohibited any outsiders from entering the schools, the observations were conducted remotely using the videoconferencing software Zoom (Zoom Video Communications, Inc., 2020).

Procedural changes. In the current study, due to some non-compliance to study protocol and technical problems, a change to the original methodological design, namely the abandonment of the multiple baseline design, was made, impacting the interpretation of the results and will be further elaborated in the discussion.

Data Analysis

Descriptive statistics were calculated to reveal overall performance levels and variability. Most single-case researchers advocate using visual and statistical analysis to calculate intervention outcomes (e.g., Brossart et al., 2014; Shadish et al., 2015). The current study evaluated the intervention outcomes using these methods, consistent with established

standards for single-case data analysis (Kratochwill et al., 2013, 2021; What Works Clearinghouse, 2020). A Microsoft Excel® tool created by Fingerhut et al. (2021) was used to support the decision-making process of the appropriate effect size measure.

Visual Analysis

Systematic visual analyses were conducted by complementing naked-eye analysis with several visual aids to meet existing standards (e.g., Kratochwill et al., 2010; Tate et al., 2016). The analysis was conducted with the SCDA plug-in (Bulté & Onghena, 2013) in R-Commander and by implementing R codes by Manolov (2014, 2015) and Manolov et al. (2014), which were designed for visualizing and analyzing single-case AB data sets. This study also utilized a procedure for rotating the graph to deal with a positive baseline trend (Parker et al., 2014) and one for estimating slope and level change after controlling for a linear baseline trend, as Solanas et al. (2010) suggested. The visual analysis allows assessing several data features to identify an intervention effect, such as changes in level, trend, variability, and immediacy of the effect (for details of the protocol, see Kratochwill et al., 2013). Considering the context when accounting for level, trend, variability, and immediacy is essential. In this study, the immediacy of effect was noted but not included as a critical factor in determining the success of the intervention. Instead, upon implementing the intervention, a progressive improvement in behavior was anticipated, and therefore level, trend, and variability were considered more important.

By fitting the split-middle trend to the data and projecting it into the intervention phase, one can explore whether the projected and actual data are similar, taking baseline variability into account (Manolov et al., 2014). If actual data in the intervention phase differ from what could be expected based on baseline measurements and trend, an intervention effect could be established. When the baseline is stable, it is recommended to construct standard deviation bands around the mean of the baseline data and project them into the intervention phase (Manolov, 2014). This study used a standard deviation of ±2SD to construct the bands.

Manolov (2018) pointed out that accounting for baseline trend does not necessarily imply detrending and transforming the data. Deciding when to detrend the data in the visual and statistical analysis may be difficult since the ensuing data correction could sometimes be excessively strong (Parker et al., 2011) or insufficient (Tarlow, 2017). Detrending data sets should always be used cautiously, and it has been recommended to consider slope changes to assess possible intervention effects (Manolov, 2018; Pustejovsky et al., 2014).

Statistical Calculation of Phase Contrast and Within-Phase Trends

Various statistical effect size indices have been developed for single-case designs, and one type of the more commonly used ones is the nonoverlap indices. These measures indicate the amount of data overlap and/or nonoverlap between the baseline and intervention phase. Nonoverlap measures are valuable when the outcome data are expected to exhibit considerable variability, and the difference in means between phases is less suitable for accurately representing the data. The Tau-*U* family of indices (Parker et al., 2011) represents a quantitative approach for analyzing single-case experimental data, and due to its nonparametric approach, it has become one of the more commonly used measures of effect size today. The indices were developed to improve upon earlier nonoverlap indices by merging trend and nonoverlap data. They are less sensitive to ceiling effects, in addition to accounting for possible trends in the data. Trend patterns in the baseline phase suggest that the targeted outcome is unstable and would threaten internal validity due to extraneous variables (Chen et al., 2019; Fingerhut et al., 2021). This makes it more challenging for the researcher to determine if an effect is due to the intervention, external variables, or a naturally occurring trend, and ignoring the baseline trend can negatively impact the calculation and result in an overestimation or underestimation of the intervention effect (Chen et al., 2019; Fingerhut et al., 2021). Tau-*U* allows the researcher to examine intervention or treatment effects on both across-phase differences and within-phase trends. Tau-*U* has strong statistical power with short data series, performs well in the presence of autocorrelation, and may provide adequate control over type 1 error rate when exploring changes in AB designs (Brossart et al., 2014; Giannakakos & Lanovaz, 2019; Parker et al., 2011).

Furthermore, the calculation provides confidence intervals and p-values and captures trends in baseline and intervention phases. An essential indicator of intervention improvement is a positive trend in academic and respectful behavior during the intervention phase and a negative trend in disruptive behavior. These trends suggest gradual responsiveness over time, aligning with the predicted outcomes of the intervention.

Selecting the appropriate Tau-*U* index is recommended to be based on a theoretical rationale, such as a hypothesized trend in any of the phases, and an empirical rationale, such as a statistically significant one (Brossart et al., 2018). In this study, the approach to trend correction was conservative, selectively applying it only to moderate trends (Tau–$U \geq 0.20$, negative for disruptive behavior) that were statistically significant. This methodological approach adheres to the guidelines outlined by Brossart et al. (2018).

This study calculated all effect size indices using the Scan package (Single-Case Data Analyses for Single and Multiple Baseline Designs; Wilbert & Lüke, 2021) in RStudio (RStudio Team, 2021). Consistent with prior research, Tau-*U* values of 0.20 or below were interpreted as a small effect, 0.20–0.60 as a moderate, 0.60–0.80 as a large effect, and ≥ 0.80 as a very large effect (Vannest & Ninci, 2015).

The change in ATTEX scores was analyzed using a percentual change approach, considering the measurement points of pre-intervention, post-intervention, and follow-up. This method allowed for an assessment of the magnitude of change over time for each participant. Only the total score was presented and accounted for in the analysis since ATTEX was a secondary measure.

Fidelity, Reliability, and Social Validity Characteristics

Each session's treatment integrity score was calculated to assess procedural fidelity in each school. To assess inter-observer agreement, the intra-class correlation coefficient (ICC) was computed using the Procedures for Psychological, Psychometric, and Personality Research (psych; Revelle, 2022) package in RStudio (RStudio Team, 2021) for academic engagement, respectful behavior, and disruptive behavior, respectively. Based on the 95% confidence interval of the ICC estimate, values less than 0.5 indicate poor reliability, between 0.5 and 0.75 of moderate reliability, between 0.75 and 0.9 of good reliability, and greater than 0.9 of excellent reliability (Koo & Li, 2016). Rather than the absolute agreement between ratings, this study was interested in consistency, which refers to the degree to which a rater's score could be equated to another rater's score plus a systematic error (Koo & Li, 2016). Simply put, consistency studies indicate that the assessments between raters are moving in a similar direction.

Acceptability of the intervention model was assessed with a six-point Likert scale questionnaire for the intervention providers and class teachers. The questions were used to evaluate the perception of the reduction of problem behavior, improvement of school performance, the ease of implementation of the intervention, the effort required to carry out the intervention, and whether the person would recommend the intervention to others.

Results

Both visual analyses and statistical effect size calculations were performed on five AB single case studies. Four children (n = 4) were excluded from the analyses of intervention effects because of an insufficient number of baseline measurement points and a change in the

DBR-SIS rater between conditions. Table 2 illustrates the participant characteristics essential for this study.

Table 2

Background Information for Participating Children

Participant	Sex	Age (grade)	Formal diagnostic information	Medication use (CNS agents)
Cosmo	Male	9 (third)	ADHD	Yes
Leo	Male	10 (third)	AP, LD, SLDD	No
Atlas	Male	8 (third)	MID, BP, Other	Yes
Pluto	Male	9 (third)	AP	No
Luna	Female	9 (third)	AP	No

Note. ADHD = attention-deficit/hyperactivity disorder; AP = attention problems; LD = learning disabilities; SLDD = speech and language development delay; MID = mild intellectual disability; BP = behavioral problems; Other = other neurodevelopmental disability.

Treatment Integrity and Inter-Observer Agreement

Overall adherence to the intervention protocol was rated as 78% (the school for Cosmo, Leo, and Atlas) in one of the schools and 96% (the school for Pluto and Luna) in the other. The self-assessment fidelity form provided evidence that intervention providers completed all the sessions.

Inter-observer agreement data were assessed for 41% of the observational sessions. Using a two-way mixed effect model and ”single rater” unit, the analysis revealed poor consistency between the two raters for academic engagement (kappa = 0.46, $p<.001$) and respectful behavior (kappa = 0.31, $p = .001$) and a moderate consistency between the raters for disruptive behavior (kappa = 0.51, $p<.001$).

Intervention Effects on the Primary Outcome Measure (DBR-SIS)

Academic Engagement

Time-series data were graphed for each participant (Appendix B), and a visual inspection of each participant’s data was completed to determine changes in level, trend, and

variability. The means and standard deviations across participants and phases are presented in Table 3 to demonstrate the level change and variability. The Tau-*U* family of coefficients was used to quantify the intervention effect by comparing DBR-SIS values in the baseline and intervention phase and considering possible trends. Results from the Tau-U analysis for the three DBR-SIS domains are provided in Table 4.

Table 3

Means and Standard Deviations for the Three DBR-SIS Domains Across Baseline and Intervention Phases

		AE	RB	DB
Participant	Phase	*M* (SD)	*M* (SD)	*M* (SD)
Cosmo	Baseline	5.67 (3.98)	6.17 (4.26)	5.33 (4.80)
	Intervention	6.28 (2.61)	6.47 (2.44)	2.87 (2.38)
Leo	Baseline	7.00 (1.5)	8.00 (1.79)	3.17 (2.04)
	Intervention	7.41 (2.18)	7.63 (1.96)	2.59 (2.14)
Atlas	Baseline	7.33 (2.08)	7.67 (1.53)	1.67 (0.58)
	Intervention	7.91 (1.77)	8.00 (1.37)	1.37 (1.56)
Pluto	Baseline	8.33 (1.16)	9.00 (0.00)	3.00 (1.00)
	Intervention	8.24 (0.79)	8.79 (1.01)	2.03 (1.09)
Luna	Baseline	8.40 (0.55)	8.20 (0.84)	5.00 (2.65)
	Intervention	8.32 (1.11)	8.42 (0.89)	2.39 (1.09)

Note. AE = academic engagement; RB = respectful behavior; DB = disruptive behavior.

Cosmo. Cosmo showed a slight positive change in academic engagement, with the mean rating increasing across phases. Data indicates a positive trend in both phases, but the baseline phase had high variability and few data points, making it challenging to attribute causality. Upon controlling for baseline trend and estimating the slope and level change, it was found that academic engagement decreased during the intervention phase. All measurement points in the intervention phase fell below the projected trend envelope, indicating no positive intervention effect. The Tau-*U* analysis revealed a statistically significant positive moderate change in academic engagement across phases (Tau-*U* = 0.321, p = .008).

Leo. Visual analysis indicated a minimal change in the overall level of academic engagement. The introduction of the intervention resulted in a change from a small negative

trend in the baseline phase to a positive trend in the intervention phase. This change, along with the correction for the steep negative baseline trend, supported the effectiveness of the intervention. Additionally, a projection of the negative baseline trend into the intervention phase and the observation of a rotation in the graph after fitting a tri-split trend further supported the effectiveness of the intervention. The Tau-*U* statistic indicated a statistically significant positive moderate change in academic engagement for Leo (Tau-*U* = 0.264, p = .029).

Atlas. Regarding Atlas, the findings suggest a slight positive change in the level of academic engagement from the baseline to the intervention phase. The baseline phase had a clear negative trend, which shifted towards a positive trend during the intervention phase. Based on the baseline trend, the intervention phase showed higher academic engagement levels than expected. There was a slight reduction in rating variability across phases, and a naked-eye visual analysis further indicated a decreasing variability towards the end of the intervention. It is important to acknowledge that the relatively short duration of the baseline phase complicates drawing direct causal inferences when comparing the phases. Nonetheless, for Atlas, the Tau-*U* statistic confirmed a statistically significant moderate positive change in academic engagement across phases (Tau-*U* = 0.325, p = .008).

Pluto and Luna. The visual analysis for Pluto and Luna revealed a minimal reduction in academic engagement from the baseline to the intervention phase. Both participants displayed negative trends during the baseline phase, with Pluto exhibiting a more pronounced one. Both participants continued to show negative trends in the intervention phase but less steep than in the baseline phase. Based on the baseline data, most intervention phase measurements were above the projected trend envelope, indicating some improvement. However, it was challenging to draw definitive conclusions due to limited baseline measurements for Pluto and a near-ceiling effect for Luna. Statistical analysis showed no significant change in academic engagement for Pluto (Tau-*U* = -0.134, p = .75) and a significant negative change for Luna (Tau-*U* = -0.281, p = .04).

As hypothesized, the statistical analysis suggested statistically significant intervention trends for most participants. However, when considering all participants and the overall change across phases, only some participants seem to have made some moderate improvement. An overview of the results from the visual and statistical analyses is provided in Table 5.

Table 4

Tau-U Values for Intervention Effect From Baseline to Intervention Phase on the Three DBR-SIS Domains

	Outcome measure					
Participant	Academic engagement		Respectful behavior		Disruptive behavior	
	Tau-*U*	p	Tau-*U*	p	Tau-*U*	p
Cosmo	0.321 [c]	.008*	0.224 [c]	.057	-0.324 [c]	.007*
Leo	0.264 [c]	.029*	0.160 [c]	.192	-0.292 [c]	.016*
Atlas	0.325 [c]	.008*	0.285 [c]	.020*	-0.368 [c]	.003*
Pluto	-0.134	.747	-0.085	.846	-0.551	.165
Luna	-0.281 [c]	.035*	-0.165 [c]	.211	-0.724	.015*

Note. Values represent Tau-*U* statistics for each participant and variable. P-values indicate statistical significance. No effect sizes were corrected for baseline trend.

[c] Corrected for intervention trend.

*p < .05.

Table 5

Overview of the Results from the Visual and Statistical Analyses of Intervention Effects on Academic Engagement

Participant	**IP mean > BL mean**	**BL trend**	**IP trend**	**Variability**	**Tau-U**
Cosmo	Yes	+	+	Decreased	Pos., sig.
Leo	Yes	-	+	Increased	Pos., sig.
Atlas	Yes	-	+	Decreased	Pos., sig.
Pluto	No	-	-	Decreased	Neg., non-sig.
Luna	No	-	-	Increased	Neg., sig.

Note. IP = intervention phase; BL = baseline phase; Pos. = positive effect; Neg. = negative effect; sig. = statistically significant effect; non-sig. = statistically non-significant effect.

Respectful Behavior

Cosmo. Visual analysis revealed a slight positive change in Cosmo's academic engagement, with both baseline and intervention phases showing positive trends. However,

the steep baseline trend and limited measurement points in the baseline phase made it challenging to attribute causality. The difference in slopes between the phases decreased considerably. All data points in the intervention phase fell below the projected baseline trend envelope, suggesting a negative change in respectful behavior. Statistical analysis indicated a statistically non-significant positive change in respectful behavior, falling within the lower end of the moderate range for effect size (Tau-*U* = 0.224, p = .057).

Leo. For Leo, there was a minimal drop in the level of respectful behavior, and variability remained stable across phases. All measurements fell below the projected median-based envelope. Both phases showed a slight positive trend, but the slope change between phases decelerated slightly. The Tau-*U* analysis indicated a non-significant positive change in respectful behavior (Tau-*U* = 0.160, p = .192).

Atlas. There was a slight positive change in the level of respectful behavior. The baseline phase exhibited a negative trend, while the intervention phase showed a positive trend. Most measurement points in the intervention phase were above the projected envelope, indicating a positive change. However, limited baseline data made causal attributions more difficult. The Tau-*U* analysis revealed a statistically significant and moderate positive change in respectful behavior (Tau-*U* = 0.285, p = .020).

Pluto. The baseline phase for Pluto was short but stable, and there was a minimal negative change in the level between phases. The baseline measurements showed a near-ceiling effect, leaving little room for improvement. Trend estimates indicated no trend in either phase, suggesting no intervention effect. A significant portion of the data fell below the projected standard deviation envelope, confirming the negative result. The Tau-*U* analysis revealed a non-significant small negative effect on respectful behavior (Tau-*U* = -0.085, p = .846).

Luna. There was a slight positive change in the level of respectful behavior for Luna. However, a positive baseline trend gave way to a negative trend in the intervention phase, indicating a negative change in behavior upon intervention implementation. The Tau-*U* analysis indicated a non-significant small negative effect (Tau-*U* = -0.165, p = .211).

As with academic engagement, 4 out of 5 participants showed a positive trend in the intervention phase, which was accounted for in the statistical analysis. The overall effect was varied across participants. An overview of the results from the visual and statistical analyses for respectful behavior is provided in Table 6.

Table 6

Overview of the results from the visual and statistical analyses of intervention effects on respectful behavior

Participant	IP mean > BL mean	BL trend	IP trend	Variability	Tau-U
Cosmo	Yes	+	+	Decreased	Pos., non-sig.
Leo	No	+	+	Stable	Pos., non-sig.
Atlas	Yes	-	+	Stable	Pos., sig.
Pluto	No	None	None	Increased	Neg., non-sig.
Luna	Yes	+	-	Stable	Neg., non-sig.

Note. IP = intervention phase; BL = baseline phase; Pos. = positive effect; Neg. = negative effect; sig. = statistically significant effect; non-sig. = statistically non-significant effect.

Disruptive Behavior

Cosmo. The analysis of Cosmo's disruptive behavior indicated a clear negative change in level between the baseline and intervention phases. The baseline phase exhibited high variability and a steep negative trend, while the intervention phase showed a decrease in variability. After correcting for the steep baseline trend, the slope change estimate indicated an increase in disruptive behavior with the intervention, suggesting a negative intervention effect. The net level change estimate further confirms the result. The steep negative baseline trend, however, makes visual interpretation more difficult. Despite this, statistical analysis confirmed a moderate overall decrease in disruptive behavior that was statistically significant (Tau-U = -0.324, p = .007).

Leo. The data for Leo showed a small negative level change in the level of disruptive behavior between phases, with stable variability. The intervention phase displayed a slightly negative trend, but the baseline data did not align well with a linear trend line. Projection of a standard deviation envelope around the baseline mean indicated no improvement in behavior compared to baseline predictions. The statistical analysis revealed a moderate and statistically significant decrease in disruptive behavior (Tau-U = -0.292, p = .016).

Atlas. There was a minimal decrease in disruptive behavior between phases for Atlas and a slight increase in variability during the intervention phase. The baseline phase was relatively stable. Projecting a standard deviation envelope into the intervention phase indicated no intervention effect. However, a reduction in disruptive behavior was observed towards the end of the intervention, supported by a negative intervention trend. Atlas initially

had low levels of disruptive behavior, limiting room for improvement. The statistical analysis revealed a significant and moderate decrease in disruptive behavior (Tau-*U* = -0.368, p = .003).

Pluto. Pluto showed a slight decrease in disruptive behavior and stable variability across phases. Few measurements in the intervention phase decreased compared to baseline predictions. The short baseline duration made visual comparison challenging. The Tau-*U* analysis suggested a non-significant moderate decrease in disruptive behavior (Tau-*U* = -0.551, p = .165).

Luna. Luna exhibited a clear negative change in the level of disruptive behavior, with decreased variability across phases, indicating a positive intervention effect. A positive trend was observed in the baseline phase, and data correction confirmed a further decrease in disruptive behavior during the intervention phase. The statistical analysis revealed a statistically significant large reduction in disruptive behavior (Tau-*U* = -0.724, p = .015).

Overall, 3 out of 5 participants had significant positive trends in the intervention phase, which were accounted for in the individual Tau-*U* analyses. An overview of the results from the visual and statistical analyses for disruptive behavior is provided in Table 7.

Table 7

Overview of the Results from the Visual and Statistical Analyses of Intervention Effects on Disruptive Behavior

Participant	IP mean < BL mean	BL trend	IP trend	Variability	Tau-U
Cosmo	Yes	-	-	Decreased	Neg., sig.
Leo	Minimal	None	+	Stable	Neg., sig.
Atlas	Minimal	None	-	Increase	Neg., sig.
Pluto	Minimal	+	None	Stable	Neg., non-sig.
Luna	Yes	Positive	Negative	Decrease	Neg., sig.

Note. IP = intervention phase; BL = baseline phase; neg. = negative effect; sig. = statistically significant effect; non-sig = statistically non-significant effect.

Analysis of the Secondary Outcome Measure (ATTEX)

Teachers were asked to complete three sets of assessments using ATTEX. However, due to data collection constraints, follow-up data could not be obtained for all participants, which led to the analysis focusing solely on the pre-post data. Only the ATTEX total score

was explored. Table 8 presents the scores from the pre and post-assessments, illustrating the changes in teacher-rated symptomatology over time.

Cosmo demonstrated a significant 47% change in the ATTEX score between pre- and post-assessment stages. The scores indicated a transition from moderate difficulties to mild difficulties in behavior at school. Leo exhibited an 8% change, which remained within moderate challenges, suggesting a relatively small decline in attention and executive function difficulties. Atlas experienced a 45% reduction, placing Atlas' post-assessment score below the cut-off score for moderate difficulties, indicating a significant decrease in attention and executive functioning problems. Pluto displayed a 17% decrease as the total ATTEX score declined from moderate to mild difficulties. Luna demonstrated a remarkable 34% decrease in the ATTEX score, which signified a substantial decline in attention and executive function difficulties, indicating a change from significant to moderate difficulties when applying different cut-off scores for girls.

Table 8

Assessment Results from Pre- and Post-Intervention for the ATTEX

ATTEX		**Participants**				
		Cosmo	Leo	Atlas	Pluto	Luna
Total score	Pre	71.00	66.00	63.00	51.00	41.00
	Post	44.00	61.00	40.00	43.00	29.00

Note. ATTEX = Attention and Executive Function Rating Inventory.

Social Validity

The results indicated a generally positive level of acceptance of the intervention among the class teachers and intervention providers. On average, the respondents reported moderate to high agreement with the statements, with mean scores ranging from 4.3 to 5.6. These findings suggest that the class teachers and intervention providers found the intervention to be socially meaningful, relevant, and acceptable in their context, highlighting its potential effectiveness in improving children's attention and executive skills.

Discussion

The present pilot study aimed to examine the effects of the Fokus+ intervention on elementary school students with attention and executive function difficulties. The main

objectives were to investigate whether the intervention could enhance academic engagement, increase respectful behavior, and reduce disruptive behavior in a general education classroom. Furthermore, the study explored whether participants showed a general decrease in teacher-reported problems with attention and executive functions in a classroom setting.

The results indicate that the effect of the intervention on *academic engagement* varied among the five participants. Positive and statistically significant results were observed for two participants (Leo and Atlas), while two other participants (Pluto and Luna) showed a negative non-significant intervention effect. The fifth participant (Cosmo) showed no clear intervention effect, considering both visual and statistical analyses.

Findings regarding *respectful behavior* were also mixed. Cosmo and Leo exhibited no clear or significant changes, while Atlas demonstrated a significant small positive change. Pluto's results indicated a minimal negative change, with little room for improvement from the baseline phase. Luna also showed a slight negative change in respectful behavior across phases.

The findings on *disruptive behavior* among the participants indicated the effectiveness of the intervention in reducing disruptive behavior. Cosmo and Luna demonstrated significant improvements, while Leo and Atlas displayed small positive changes, decreasing disruptive behavior. Pluto showed no apparent effects.

Overall, the results showed varying effects across participants on the three DBR-SIS domains. Positive behavior change was primarily observed in disruptive behavior, where all participants showed a decrease in disruptive behavior, and four out of five of them showed a statistically significant decrease. Additionally, the study emphasizes the importance of considering the validity of the measures. Specifically, respectful behavior posed challenges due to cultural variations and its subjective nature. This could also contribute to the fact that inter-observer agreement for respectful behavior demonstrated the worst consistency between raters compared to the other two measures. In general, respectful behavior did not align well with the intended objectives. Since four of the initial nine children were excluded from the final analyses, and there were only two temporally distinct demonstrations of an effect, the study design does not establish a strong causal relationship between the intervention and behavior change.

All participants demonstrated improved teacher-rated attention and executive function problems, although with some variability. Based on these findings, no conclusive inference about whether the consultation model enhances the effectiveness of the intervention can be drawn. However, it can be assumed that introducing the consultation model assisted

intervention providers and teachers in understanding the evidenced-based principles of supporting students with attention and executive function difficulties. The benefits of the consultation may emerge over a more extended period as the teachers implement the principles in their classrooms, suggesting a potential idea for further research.

The Present Findings in the Context of Previous Intervention Research

Overall, the findings provide suggestive evidence supporting the efficacy of school-based behavioral interventions for addressing elementary school students' attention and executive function difficulties. While the results showed positive changes in disruptive behavior for all participants and in academic engagement and respectful behavior for some, it is essential to note that this study design does not establish a direct, strong causal relationship between the intervention and behavior change. Furthermore, the results indicated variability and specificity in the intervention effects, which aligns with the understanding that individual variability exists in response to behavioral interventions. Similar results were evident in previous results with the Fokus intervention by Paananen et al. (2017), where no robust effects were observed, and the standard deviations were large. Thus, one can imagine that the present results are no more ambiguous. The variability also mirrors the heterogeneity of attention and executive function difficulties, emphasizing the need for comprehensive intervention approaches. Previous research has also emphasized combining different intervention approaches to achieve better long-term outcomes, and the current study further supports this approach by demonstrating positive effects for some children.

During this study, all participants demonstrated improved teacher-rated attention and executive function problems, generally in line with previous research highlighting the effectiveness of the Fokus interventions targeting ADHD symptoms and executive function difficulties (Paananen et al., 2017). The findings also provide valuable insight into developing and implementing effective intervention strategies in educational settings.

Limitations

Some limitations of the study need to be noted. A technical issue with the online survey tool adopted for DBR-SIS data collection caused data duplication, creating a false impression of a higher quantity of collected data. Furthermore, non-compliance with the study protocol led to the exclusion of participants from the final analyses, which prevented the application of a more sophisticated study design. The conclusions drawn about a functional relationship

should not solely rely on visual analysis or effect sizes because the logic of causal inference is mostly design-dependent (Brossart et al., 2014; Shadish et al., 2015). The AB design provides stronger evidence than a pre/post design but still lacks sufficient control of biases to be considered a true experimental protocol (Tate et al., 2016, 2017). In practical school situations and applied settings, simple AB designs assessing response to intervention is often the only feasible option, and this study provides insight into the progress after the implementation of the intervention. Caution, however, is needed when interpreting causality. Additionally, the pre-post measurements cannot prove a functional relationship between the intervention and the ATTEX score.

The study faced challenges due to short baseline durations, near-ceiling effects during the baseline phase, and substantial data variability in the baseline phase for some participants. This affected visual analysis and the interpretation of intervention effects. Overall, short baselines also increased the size of the confidence intervals, and variability reduced the degree to which estimates of level and trend were meaningful and representative of the data. Therefore, quantifying the intervention effect was important in addition to the visual analysis.

To enable systematic monitoring of the data collection, the parallel observations would preferably have been implemented through additional blinded research assistants. This would have allowed for collecting sufficient baseline data, ensuring more baseline stability and accounting for possible ceiling or floor effects. For practical reasons, however, this was not possible, and some children started the intervention even if optimal stability was not achieved. This highlights the general baseline dilemma in applied settings, where collecting additional baseline data would have delayed the onset of the intervention. While it is evident that baseline data is essential for documenting change, it needs to be recognized that advocating for such data collection can be challenging in practice. Unfortunately, by definition, baseline data collection delays the start of the intervention. In this study, it would have affected not only individual children but the entire intervention group.

The present study also lacked randomization and blinding. Prespecification of the intervention start points in a random fashion would have made it possible to use randomization tests (RTs) as an analytical option that could have minimized the risk of the presence of linear baseline trends or effects of history and maturation (Manolov et al., 2021; Michiels & Orghena, 2019). As parents and teachers are key intervention implementers in most ADHD research, the use of blinding, in general, is difficult.

Finally, this study did not have a measure of implementation fidelity on behalf of the consultation model. Therefore, it is difficult to say how well support measures were transferred to or implemented in the classroom.

Implications

The study contributes to the limited research on school-based interventions for attention and executive function difficulties in Finland. Manual-based interventions implemented in the school environment were not studied before Fokus and Fokus+. This study also represents the first to utilize the progress-monitoring tool DBR-SIS in a Finnish elementary school setting, highlighting the need for further exploration regarding its applicability. It is important to acknowledge that this study was conducted during the challenging circumstances of the COVID-19 pandemic, which unquestionably imposed a significant strain on teachers and required flexibility. Beyond this, it is worth noting that direct observations, in general, are time-consuming as observers need to be trained, observations need to be conducted, and behavior coded. Nevertheless, despite these challenges, progress monitoring assumes a crucial role in intervention implementation and informs evidence-based decision-making. It also guides intervention adjustments and ultimately contributes to improving educational outcomes. In this regard, DBR-SIS demonstrates potential as a functional measurement tool for monitoring students' progress.

In pilot studies, the single-case design can be a valuable alternative that allows researchers to evaluate the practicality of methods, measurements, and procedures. It provides an opportunity to identify potential challenges and needed modifications before moving forward. When applying behavioral interventions in schools, the single-case approach allows the researcher to gain insight into interventions in real-time conditions and applied settings and make data-driven decisions.

Directions for Future Studies

Research on collaborative consultation suggests that many consultees struggle to maintain adequate implementation integrity (Hagermoser Sanetti et al., 2015). Within the framework of collaborative consultation, incorporating performance feedback and conducting classroom observations by the research team would enable the evaluation and enhancement of teacher implementation integrity. A simple checklist or, for example, the already existing DBR-CM (Sims et al., 2021), which is a brief rating tool of teachers' class management

behavior, could be included in future studies. In addition to the teachers, the collaborative consultation model could be expanded to include the parents to strengthen home-school collaboration and increase the chance for similar evidence-based methods to be used both in the classroom and at home to improve student outcomes. Interventions targeting family-school partnerships have sustained improved student functioning (Sheridan et al., 2019).

The pilot study also included children with comorbidities, and further investigation is required to delve deeper into how results apply to children with comorbidities on a group level. More recently, results by Paananen et al. (2022) indicated that the original Fokus intervention significantly improved on-task behavior and cognitive control but not hyperactivity-impulsivity. Cognitive skills did not moderate the outcomes, but the improvement was mainly observed in children with low levels of conduct problems. This would align with previous results (Paananen et al., 2017). Low fidelity was also associated with negative effects on on-task behavior, highlighting the importance of good intervention fidelity.

Conclusion

In conclusion, the pilot study investigated the effects of the Fokus+ intervention on five elementary school students with attention and executive function difficulties. The results from the visual and statistical analyses demonstrated varying effects on the outcome variables: academic engagement, respectful behavior, and disruptive behavior. Favorable improvements in disruptive behavior across all participants were demonstrated. The study provided insights into progress after the implementation of the intervention but could not establish a functional relationship. The limitations of the pilot study warrant further development and adjustment of the applied methods and further investigation in future studies.

Swedish summary – Svensk sammanfattning

Gruppbaserad intervention för lågstadiebarn med svårigheter med uppmärksamhet och exekutiva funktioner: en pilotstudie med single-case design

Inledning

Svårigheter med uppmärksamhet och exekutiva funktioner har en betydande inverkan på barns skolframgång och välmående. Den internationella prevalensen av aktivitets- och

uppmärksamhetsstörning (adhd) varierar mellan 3,4 % och 7,6 % (Polanzyk et al., 2015; Thomas et al., 2015; Salari et al., 2023), med betydligt flera barn som upplever liknande svårigheter utan att uppfylla de diagnostiska kriterierna. Adhd karaktäriseras av uppmärksamhetssvårigheter och/eller hyperaktivitet och impulsivitet (Polderman et al., 2010) och associeras med bristande exekutiva funktioner (Shephard et al., 2022; Silverstein et al., 2020). Exekutiva funktioner innebär svårigheter med högre kognitiva processer som är nödvändiga för målinriktat beteende. De är väsentliga under uppgiftssituationer i klassrummet, som kräver uppmärksamhet, aktivt lyssnande och deltagande utan att distraheras av andra aktiviteter. En av styrkorna inom det finska specialundervisningssystemet är lågtröskelpolicyn, som strävar efter att identifiera och stödja barn med ADHD-symptom i skolor utan att kräva en formell diagnos. Stödåtgärder bör initieras så fort problem med uppmärksamhet eller exekutiva funktioner identifieras, och åtskilliga interventioner för adhd-symptom och exekutiva svårigheter har utvecklats. Flerkomponentsinterventioner har visat sig vara effektiva för att förbättra symptomen på långsikt, särskilt när beteendeinterventioner och farmakologiska metoder kombineras (Arnold et al., 2015; Hinshaw et al., 2015). Det är vanligt och ofta nödvändigt att kombinera och genomföra olika tillvägagångssätt, och behandlingen kan variera beroende på ålder. Icke-farmakologiska interventioner för adhd-symptom, såsom beteendeinterventioner, skolbaserade interventioner, kognitiv träning samt strategi- och kompetensträning, har visat sig vara särskilt effektiva för att minska på adhd-symptom och förbättra akademisk prestation (Chronis et al., 2006; DuPaul et al., 2012; DuPaul et al., 2014; Evans et al., 2018; Fabiano et al., 2021; Harrison et al., 2019; Lambez et al., 2020). Däremot har effekterna av gruppbaserade interventioner överlag erhållit mindre uppmärksamhet i litteraturen. Gruppbaserade interventioner kan erbjuda en stödjande och dynamisk inlärningsmiljö för barn med adhd-symptom, vilket i sig kan öka interventionens övergripande effekt.

Syftet med denna pilotstudie var att undersöka effekterna av Fokus+ -interventionen som utvecklats vid Niilo Mäki -institutet. Fokusprogrammet är en skol- och gruppbaserad intervention för svårigheter med uppmärksamhet och exekutiva funktioner hos barn med adhd-symptom. En studie av Paananen et al. (2017) fann preliminära positiva effekter av Fokusinterventionen på uppmärksamhet, exekutiva funktioner och skolframgång, särskilt för barn med måttliga svårigheter. Följaktligen visade studien att samarbete mellan interventionsledaren och klassläraren stärkte effekterna. Denna studie kombinerade Fokusprogrammet med en samtidig kollaborativ konsultationsmodell, därav namnet Fokus+. Beteendekonsultation i skolor är ett kollaborativt tillvägagångssätt för att implementera en

beteendeintervention. Syftet med modellen var att förstärka interventionseffekterna och öka transfer mellan smågruppssituationen och klassrummet genom att främja liknande arbetsmetoder i klassrummet. Hypotesen var att implementering av Fokus+ -interventionen skulle leda till ökat akademiskt engagemang och respektfullt beteende samt minskat störande beteende i klassrummet. Det förväntades att positiv beteendeförändring skulle ske progressivt under interventionens gång och helhetsmässiga svårigheter i uppmärksamhet och exekutiva funktioner i en skolmiljö skulle minska.

Metoder

Denna studie genomfördes i tre finlandssvenska lågstadieskolor i Nyland och Österbotten under läsåret 2020–21. Nio barn i åldern 8–11 år som uppvisade utmaningar med uppmärksamhet och exekutiva funktioner i en klassrumsomgivning deltog i studien. Barnen valdes på basis av behov av stöd.

I studien tillämpades en single-subject AB -design för att utvärdera beteendeförändring under interventionen. Det fanns sammanlagt nio individuella baslinjefaser, men bara tre olika interventionsstartpunkter. På grund av en exkludering av deltagare från de slutgiltiga analyserna kunde studien endast införliva en serie AB-designer, snarare än den ursprungliga multiple-baseline -designen. Som primärmått användes Direct Behavior Rating Single-Item Scales (DBR-SIS), med hjälp av vilket barnens beteende observerades och utvärderades i klassrummet. De tre målbeteendena var akademiskt engagemang, respektfullt beteende och störande beteende (för operationella definitioner se tabell 1). Observationerna gjordes av klasslärare och skolpersonal under förhandsbestämda observationsperioder. Som sekundärmått fyllde klasslärarna i Keskittymiskysely (KESKY; Klenberg et al., 2010), som ämnar mäta uppmärksamhetssvårigheter och utmaningar med exekutiva funktioner i en skolomgivning.

Barnen deltog i Fokusprogrammet i smågrupper under skoldagen. Programmet bestod av 20 stukturerade sessioner som fokuserade på uppmärksamhet, koncentration och arbetsmetoder. Utbildade Fokusledare, som inkluderade speciallärare och skolpsykologer, genomförde sessionerna. Utöver interventionssessionerna erbjöds de lärare som inte fungerade som Fokusledare för sina egna elever kollaborativ beteendekonsultation av Fokusledarna. Fokusledarna utbildades i konsultationsmodellen och i hur man tillhandahåller kollaborativ konsultation. Konsultationsmodellen baserade sig på en modell som utvecklats

vid Niilo Mäki -institutet (Peitso & Närhi, 2015) och som tidigare studerats i en förskolemiljö. Hittills existerar inga resultat från studier som använt konsultationsmodellen i en skolmiljö.

I denna studie användes både visuell och statistisk analys för att utvärdera interventionseffekterna. För den visuella analysen användes visuella verktyg för att öka objektiviteten av analysen. Statistisk analys involverade beräkningar av effektstorlek, specifikt Tau-*U*, som ger ett kvantitativt mått på överlappande data mellan baslinje- och interventionsfasen. Tau-*U* beaktar bland annat trender i data och är mindre känsligt för takeffekter. Den procentuella förändringen i KESKY-poäng fungerade som sekundärmått. Studien bedömde också interventionens fidelitet, mellanbedömarreliabilitet och social validitet. Fideliteten, det vill säga huruvida Fokusledarna genomförde de avsedda interventionskomponenterna, utvärderades med hjälp av en checklista som fylldes i slutet av varje gruppsession och returnerades till forskningsgruppen. Forskningsgruppen genomförde oberoende och samtidiga DBR-SIS -parallellobservationer för att säkerställa mellanbedömarreliabiliteten. På grund av sociala distansåtgärder som förbjöd utomstående tillträde i skolorna under covid-19 -pandemin genomfördes parallellobservationerna på distans med hjälp av videokonferensprogramvaran Zoom.

Resultat

Denna studie inkluderade slutligen en analys av fem single-case (Cosmo, Leo, Atlas, Pluto och Luna) för att undersöka interventionseffekterna. Relevanta bakgrundsfaktorer presenteras i tabell 3. Fyra barn uteslöts från den slutgiltiga analysen på grund av brist på tillräckliga baslinjedata och ett byte av observatör mellan faserna. Det primära utfallsmåttet, DBR-SIS, användes för att utvärdera interventionseffekter inom tre domäner: akademiskt engagemang, respektfullt beteende och störande beteende. Fidelitetsanalysen visade att 78 % av det totala sessionsinnehållet genomfördes i den ena skolan (för Cosmo, Leo och Atlas) och 96 % i den andra (för Pluto och Luna). Alla 20 Fokus sessioner genomfördes i båda skolorna. Mellanbedömarreliabiliteten analyserades för 41 % av det totala antalet observationer och avslöjade inkonsekvens mellan de oberoende observatörerna. Svag reliabilitet mättes för akademiskt engagemang och respektfullt beteende, medan störande beteende uppvisade måttlig reliabilitet. Resultaten från Tau-*U* -analysen för alla tre DBR-SIS -domäner presenteras i tabell 4. En överblick av resultaten från de visuella och statistiska analyserna för varsin domän presenteras i tabell 5, 6 och 7.

Akademiskt engagemang. Två deltagare (Leo och Atlas) uppvisade en signifikant positiv effekt av interventionen, medan en deltagare (Cosmo) uppvisade en otydlig effekt på basis av den visuella och statistiska analysen. Effekterna var måttliga till storlek. De två återstående deltagarna uppvisade en svag negativ effekt, där effekten på Luna var statistiskt signifikant.

Respektfullt beteende. Endast Atlas uppvisade en signifikant positiv effekt inom respektfullt beteende, medan effekten på Cosmo och Atlas var positiva men icke-signifikanta. Pluto och Luna uppvisade icke-signifikanta små negativa effekter inom respektfullt beteende.

Störande beteende. Cosmo uppvisade en tydlig minskning i störande beteende och effekten var signifikant och måttlig. Leo och Pluto uppvisade en liten minskning och Atlas en minimal minskning i störande beteende. Luna uppvisade en tydlig minskning i störande beteende. Statistisk analys bekräftade signifikanta minskningar av störande beteende för Cosmo, Leo, Atlas och Luna.

Analysen av det sekundära utfallsmåttet KESKY påvisade en betydande minskning av problem med uppmärksamhet och exekutiva funktioner hos Cosmo, Atlas och Luna, medan Leo och Pluto visade en mindre minskning av symptom.

Den sociala validitetsbedömningen indikerade en allmänt positiv acceptans av interventionen bland lärare och Fokusledare, vilket tyder på att de fann interventionen socialt meningsfull och effektiv för att förbättra barnens uppmärksamhet och exekutiva färdigheter i klassrummet.

Diskussion

I denna pilotstudie var syftet att utvärdera effekterna av Fokus+ -interventionen för lågstadieelever med svårigheter med uppmärksamhet och exekutiva funktioner. Syftet var att avgöra om interventionen kunde förbättra akademiskt engagemang, öka respektfullt beteende och minska på störande beteende i klassrummet. I studien undersöktes sekundärt om interventionen ledde till en generell minskning av lärarrapporterade problem med uppmärksamhet och exekutiva funktioner i en klassrumsmiljö.

Sammanfattningsvis fann studien blandade resultat. En del av deltagarna visade en måttlig förbättring i akademiskt engagemang, medan andra visade minimala förändringar eller ingen tydlig effekt. Resultaten för respektfullt beteende varierade mellan deltagarna. Den största generella positiva beteendeförändringen observerades i störande beteende, där alla deltagare uppvisade en minskning i störande beteende och fyra av fem deltagare en statistiskt

signifikant effekt. Det sekundära utfallsmåttet indikerade en minskning av svårigheter i uppmärksamhet och exekutiva funktioner för alla deltagarna, och för tre av deltagarna var minskningen betydande. Den sociala validitetsbedömningen indikerade positivt accepterande av interventionen.

Det slutgiltiga upplägget möjliggjorde endast att undersöka två tidsmässigt distinkta demonstrationer av en effekt, vilket är en mindre än vad som vanligtvis krävs för att etablera ett starkt orsakssamband mellan interventionen och beteendeförändring inom single-case design. För en del deltagare gjorde korta baslinjefaser med hög variabilitet den visuella analysen mera utmanande. Trots dessa begränsningar överensstämmer resultaten av studien med tidigare forskning som indikerar effektiviteten av beteendeinterventioner för svårigheter i uppmärksamhet och exekutiva färdigheter. Studien betonar behovet av övergripande tillvägagångssätt och kombinationer av olika interventionsstrategier för att uppnå bättre resultat. Resultaten belyser också vikten av evidensbaserat och datadrivet beslutsfattande vid implementering av interventioner i en skolmiljö. Utöver detta görs förslag på framtida riktlinjer för forskning, inklusive att inkludera ett ytterligare fidelitetsmått för konsultationsmodellen, utvidga konsultationsmodellen att involvera föräldrar för att förbättra samarbetet mellan hem och skola och ytterligare undersöka effekterna av interventionen på barn med komorbida funktionsnedsättningar.

Denna studie bidrar till den begränsade forskningen inom skolbaserade interventioner för svårigheter med uppmärksamhet och exekutiva funktioner i Finland. Fokusinterventionen är den första manualbaserade interventionen för dessa svårigheter som implementerats i en lågstadiemiljö. Denna studie var också den första att använda observationsverktyget DBR-SIS i en finsk skolmiljö och betonar vikten av ytterligare utforskning av dess tillämpbarhet. Studien pekar på att DBR-SIS har potential som ett funktionellt mätverktyg för att följa upp elevernas respons på stöd.

Sammanfattningsvis undersökte pilotstudien effekterna av Fokus+-interventionen på lågstadieelever med svårigheter med uppmärksamhet och exekutiva funktioner. Resultaten visade varierande effekter på de primära utfallsmåtten. Samtidigt som studien gav insikter i effekterna av interventionen, identifierade den samtidigt begränsningar. Den aktuella studien kunde slutligen inte etablera en funktionell kausal relation mellan interventionen och barnens beteende. Framtida studier kan ta itu med att vidareutveckla och anpassa de tillämpade metoderna för att erhålla en mer robust förståelse av interventionens effektivitet.

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Appendix A

Examples From the Contents of the Intervention Sessions

The Story About Will (Session 1, exercise 3).

The tutor introduces a short story about Will, who struggles with paying attention at school. The group engages in a discussion to relate to Will's challenges. The discussion can be structured as follows:

- Describing Will's problem: What did Will do? Why does he encounter difficulties?
- Discussing Will's experience: What thoughts and emotions are related to Will's problems? Has anyone in the group faced similar difficulties at school?
- Examining cognitive processes: How does Will approach tasks, and what strategies do the children typically employ? Does Will rush through tasks without thinking, get distracted while working, or forget what he was doing? The group reflects on any shared experiences and whether they usually listen to instructions and pay attention to their tasks.

During the exercise, the tutor can display pictures from the appendix of the intervention manual of a child not listening, lacking focus, or being restless. The picture can be supplemented with a picture of stairs representing a child who listens, observes, and stops at different steps. The group reflects on factors contributing to success in a task based on the second picture. They explore how the situation can change, what Will could do differently, and what instructions he might need. The children can engage in role-playing, alternating between imitating a restless and inattentive child and one who works attentively.

The tutor directs the children's attention to the picture illustrating successful execution and asks them to consider how to succeed more often. They discuss the benefits of stopping to think, carefully looking, and listening attentively. The group becomes familiar with the aspects that are going to be trained in the intervention program, such as:

- Before starting a task: Stop! It is important to listen, look carefully, and think before diving right in.
- Before completing a task: Stop! It is important to double-check if the answer is correct and if anything has been overlooked.
- How does it help Will to remind himself, "Stop – you need to think"? In what ways does listening help? How does looking carefully and double-checking one's answers help?

Code Words (Session 7, Exercise 1).

In this exercise, letters have been exchanged for symbols. The symbols and their corresponding letters are provided on the same paper. The objective is to transform the symbols into letters, forming words and sentences. The tutor can use examples of varying difficulty from the manual appendix or custom-create sentences. Children's names, words, and sentences related to their interests can be incorporated. Symbol fonts in standard word processing programs can generate the code words.

The tutor demonstrates the following steps:

- Before starting a task: The tutor signals "Stop" by turning a STOP sign. They vocalize their approach, stating, "I will look carefully at each symbol and look for the corresponding letter. I will progress through the symbols in order." The STOP sign is then turned.
- Before answering: The tutor turns the STOP sign again, signaling another "Stop." Wait 5–8 seconds while the STOP sign is displayed, and check if the answer is correct.
- After checking the answer: The tutor turns the STOP sign, says the answer out loud, or writes it on paper.
- The tutor instructs the children to decode complete sentences before using the STOP sign and reviewing the answer.
- Children are responsible for independently turning or putting away the STOP sign when carrying out tasks.

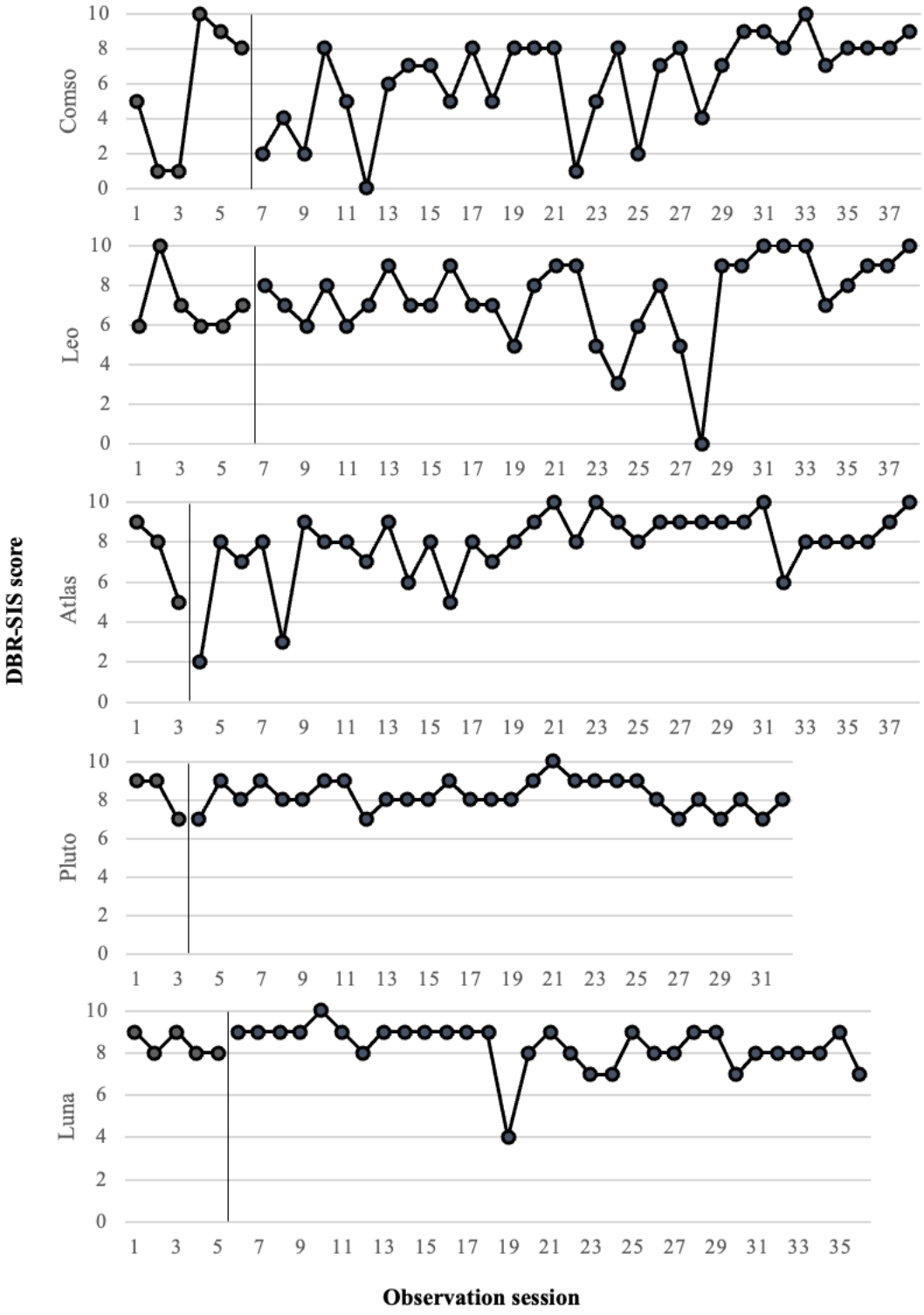
The children perform a sample task in the same way. Following that, each child is provided with an appropriate number of sentences and proceeds to work individually or in pairs. In the end, the children can compare what kind of sentences they each had to translate. While some carry out the tasks, others can act as facilitators, monitoring the correct usage of the STOP sign.

Appendix B

Supplementary Figures

Figure 1

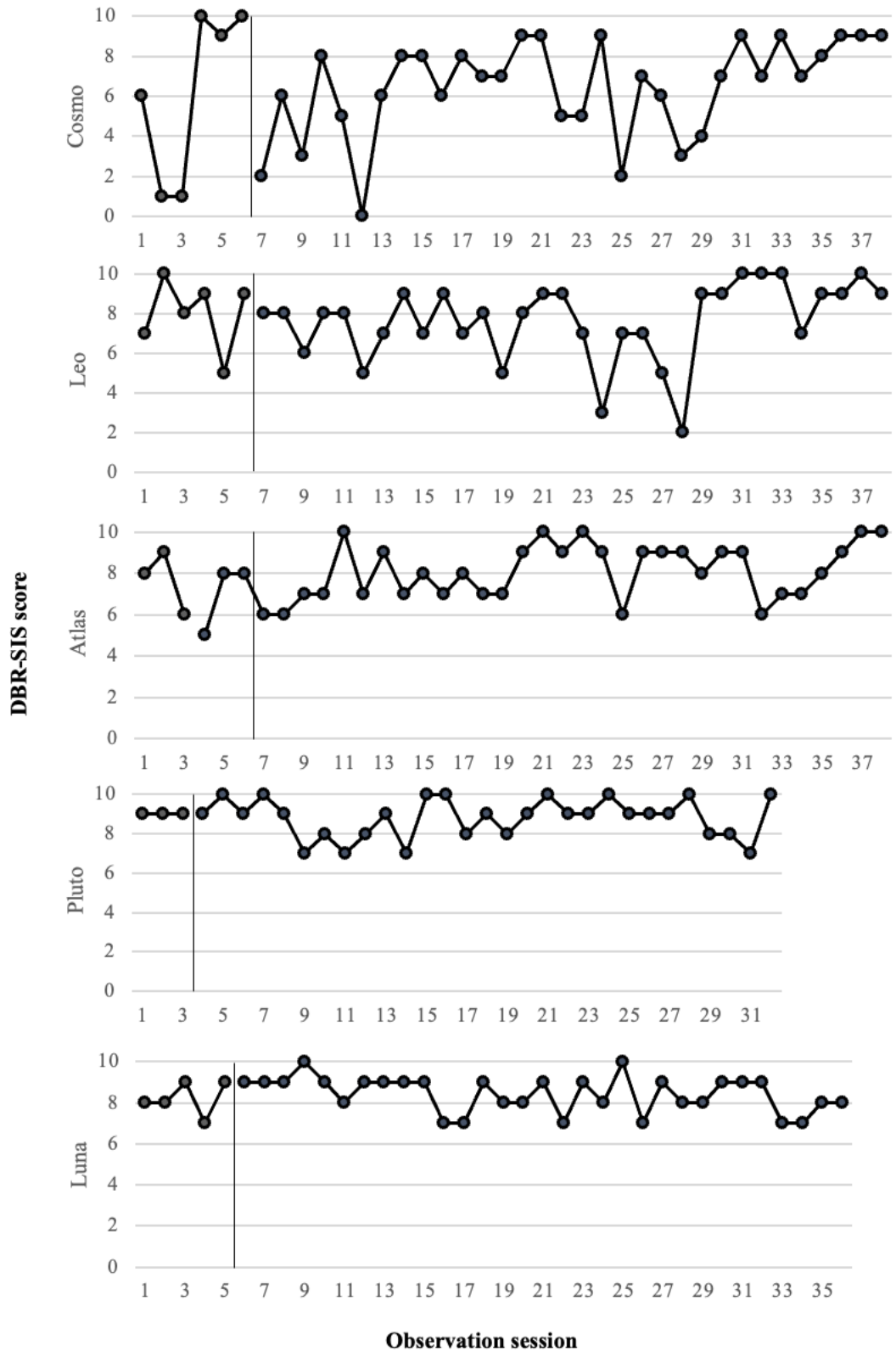
DBR-SIS Scores on Academic Engagement (AE).



Note. The vertical line indicates the initiation of intervention.

Figure 2

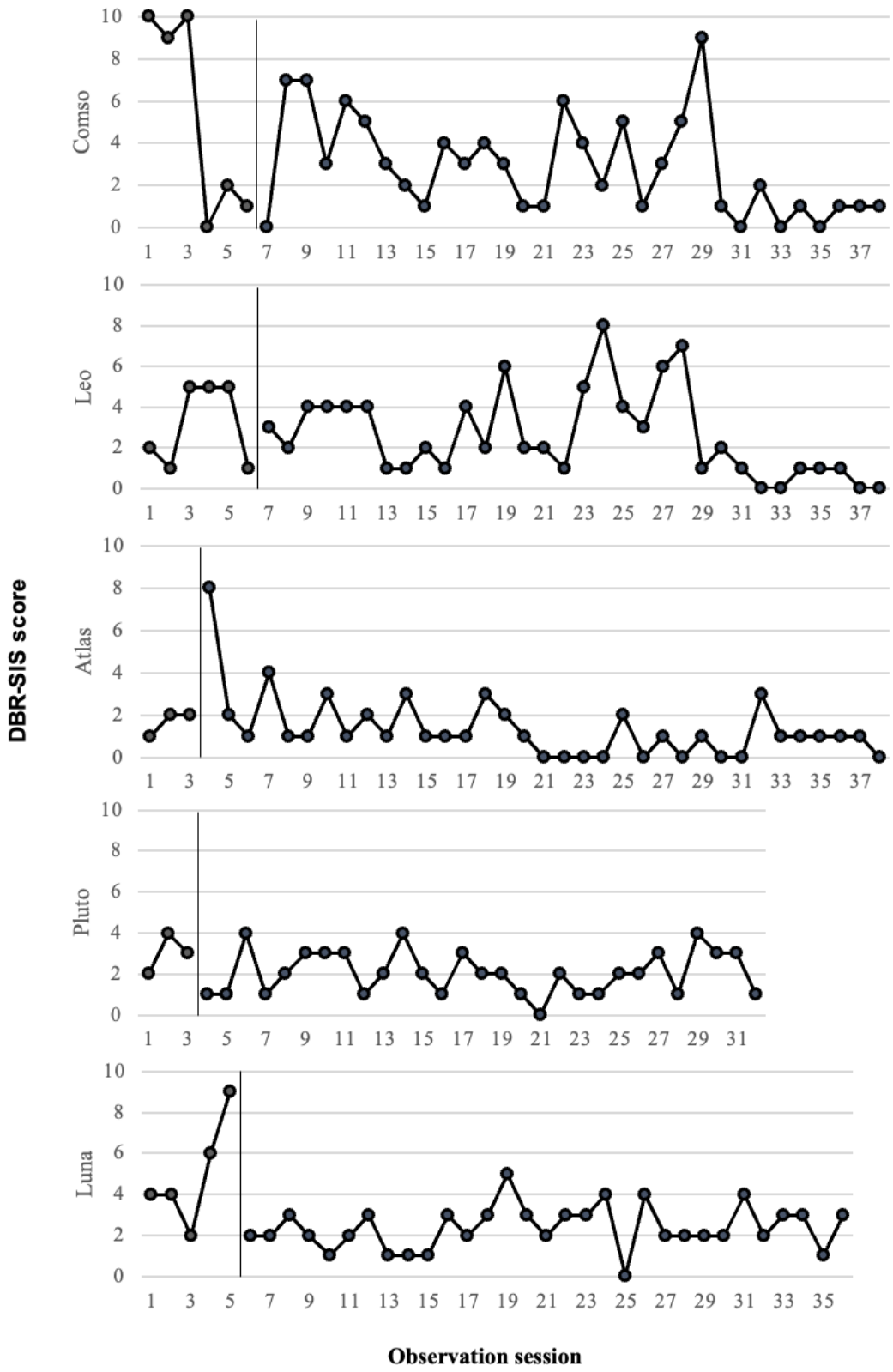
DBR-SIS Scores on Respectful Behavior (RB)



Note. The vertical line indicates the initiation of intervention.

Figure 3

DBR-SIS Scores on Disruptive Behavior (DB)



Note. The vertical line indicates the initiation of intervention.

Pressmeddelande

Gruppbaserad intervention för lågstadiebarn med svårigheter med uppmärksamhet och exekutiva funktioner: en pilotstudie med single-case design

Pro-gradu avhandling i psykologi

Fakulteten för humaniora, psykologi och teologi, Åbo Akademi

En pro-gradu avhandling i psykologi vid Åbo Akademi fann blandade effekter av Fokus+ interventionen på lågstadieelever med svårigheter med uppmärksamhet och exekutiva funktioner. Signifikanta positiva effekter kunde observeras på störande beteende i klassrummet. Studien fann också sekundärt en minskning av problem med uppmärksamhet och exekutiva funktioner i en klassrumsmiljö på basis av lärarnas bedömning. Både lärare och Fokusledare fann interventionen meningsfull och effektiv för att förbättra elevernas uppmärksamhet och exekutiva färdigheter i en klassrumsmiljö. Medan denna pilotstudie gav värdefulla insikter, identifierade den också begränsningar, såsom behovet av ytterligare forskning för att fastställa ett starkare orsakssamband mellan interventionen och beteendeförändring. Studien bidrar till den begränsade kunskapen om skolbaserade interventioner för problem med uppmärksamhet och exekutiva funktioner i Finland. Studien lyfter också fram den potentiella nyttan av observationsverktyget DBR-SIS (Direct Behavior Rating – Single Item Scales) som ett funktionellt mätverktyg för att följa upp elevernas respons på stöd i en skolmiljö. Ytterligare betonar studien betydelsen av evidensbaserat och datadrivet beslutsfattande för att implementera stödinsatser i en skolmiljö.

Studien utfördes som en del av ett forskningsprojekt vid Niilo Mäki institutet under läsåret 2020-21 i tre finlandssvenska lågstadieskolor. I studien användes en single-case design för att undersöka beteendeförändring hos deltagarna under interventionens gång. Fokus+ - interventionen är ett manualbaserat tillvägagångssätt, speciellt utformat för en grundsskolemiljö. Utbildade Fokusledare utförde 20 strukturerade sessioner som fokuserade på uppmärksamhet, koncentration och olika exekutiva färdigheter parallellt med en kollaborativ beteendekonsultation som erbjöds klasslärarna. Nio elever, varav fem elever inkluderades i de slutgiltiga analyserna, observerades i klassrummet med själv av direkt beteendeobservation för att följa upp klassrumsbeteendet under interventionens gång.

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