

School-Based Psychosocial Intervention Programs-A Framework for the Treatment of Children Exhibiting Sub-Clinical Symptoms of ADHD: A Systematic Narrative Review

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Abstract

Objective: Symptoms of hyperactivity, impulsivity and inattention can lead to significant academic issues for children, with few treatment options readily accessible for concerned families. This review investigates the benefits of psychosocial interventions programs in school-aged children exhibiting sub-clinical symptoms of ADHD.

Method: Pubmed, Scopus, Cochrane Library, and CINAHL were searched up to July 2017 for trials meeting inclusion criteria.

Results: Three studies met inclusion criteria for this review. The research reported improvements in self-control and impulsiveness ($p < 0.01$) as well as reduced hyperactivity ($p < 0.01$), conduct issues ($p < 0.05$) and increased attention ($p < 0.01$) in non-clinical child and adolescent samples. Effect sizes were mixed between programs.

Discussion: This area of research highlights the significance of the child's proximal environment and its impact on learning in a social context. The results reported here contribute to the applicability of psychosocial programs in improving behavioural symptoms of sub-clinical ADHD. However, consistent replication research is required to confirm their validity.

Conclusion: Psychosocial interventions are a valid and reliable intervention for improving the cognitive and behavioural outcomes in school-aged children. This is the first review to investigate the effects of psychosocial intervention programs framed within the context of sub-clinical ADHD. This review highlights the therapeutic benefits of these programs for children exhibiting symptoms of ADHD. Despite the reported significance of each study, the varied program designs made direct comparison difficult. The lack of reproducibility in this area may indicate the complex nature of the population being studied.

Keywords: Psychosocial intervention; Sub-clinical ADHD; SCADHD; Behaviour; Learning

Introduction

Attention deficit hyperactivity disorder (ADHD) is developmental disorder prevalent in 8-12% of school-aged children in Western culture [1,2]. The first description of hyperactivity in children was in 1798 [3], but it wasn't until 1937 when stimulant treatment was introduced to treat the excessive behaviour [4]. ADHD became the first psychiatric disorder to be diagnosed and treated in children [1]. The aetiology of the disorder is widely debated, with evidence for neuro-circuitry dysfunction [5], genetic disposition [6], toxin exposure during pregnancy [7], as well as nutritional deficits in the diet [8], all linked to associated symptoms. Diagnostic criteria for ADHD involves the clear understanding that symptoms have "persisted for at least six months to a degree that is inconsistent with developmental level and that negatively impacts directly on social and academic/occupational activities" [9]. Researchers Costello et al. [10] discuss the impact of functional impairment in those children above and below the threshold of diagnostic criterion.

Literature Review

In their 1992 review article, the authors note that "...intervention at low levels of disruptive behavioral symptomatology may be needed if significant functional impairment is to be avoided" (p.359). Current ADHD nosology in the DSM-V [9] specifies the presentation of six or more symptoms to breach the threshold for that symptom domain (hyperactivity/impulsivity or inattention) [11]. In cases where children present with fewer symptoms than this minimum diagnostic level, no formal classification can be made. Estimates for prevalence of sub-clinical ADHD in the child and adolescent population are as low as 0.8% and as high as 23% [12]. This broader spectrum of behavioural disorders covers a vast area of developmental dysfunction that is generally ignored due to the lack of diagnostic criteria.

Sub-clinical ADHD

Symptoms of hyperactivity, impulsivity and inattention, can lead to significant academic issues for children, with few treatment options readily available or accessible for concerned families. Previous research into sub-clinical attention deficit hyperactivity disorder (SCADHD), stressed the impact associated symptoms has on a child's functional

impairment [13]. The etiology of SCADHD is poorly understood due to inconsistent perception as to what level of symptom severity would require actionable intervention. This gradual spectrum of symptom severity presents a theoretical continuum of associated ADHD indicators. The concept of an ADHD continuum has been discussed before [14], with few studies looking into plausible treatment options for children with non-clinical ADHD [15]. Symptoms associated with SCADHD have shown to significantly impair an individual's functioning. In a recent study, Selinus et al. [13] compared 4,635 children and substantiated the differences between those with sub-clinical symptoms and those without any, reporting that as ADHD symptoms severity increases, so does the individual negative psychosocial outcomes. A study by Cho et al. [16] highlighted that in a sample of 2,493 students, those with SCADHD demonstrated the same temperament profile as those meeting criteria for ADHD displaying significantly greater levels of inattention, aggression and overall behavioural problems. In a cohort of children with Autism Spectrum disorder (ASD), those children also displaying sub-clinical symptoms of ADHD, demonstrated greater levels impairment relative to ASD children without the sub-clinical ADHD symptoms [17]. This was supported by a study by Christ et al. [18] who reported that ADHD symptoms need to be considered when investigating executive function impairments due to ASD.

Pharmaceutical options are available to those with clinical diagnoses; however, side effects of the medication may prevent families from trialing or continuing their use [19]. Therefore, efficacious alternative treatments that reduce the severity of these symptoms at both clinical and sub-clinical levels may have widespread implications throughout the neurodevelopmental field. To date, no stimulant-based intervention research has been conducted in this population, understandably, with ethical standards making administering these treatments to a paediatric population without a clinical diagnosis, not feasible. Complementary and alternative therapies that may aid in the treatment of SCADHD have been inconsistent, with few replicating results [20-24].

Psychosocial therapy

Randomised controlled trials have highlighted the benefits of psychosocial interventions, reporting improved behavioural and social skills [25], as well as confidence and assertiveness [26]. Further to this, previous research has demonstrated significant improvements in symptoms in children diagnosed with ADHD following an 8-week Social Skills Training program [27]. This concept highlights the environmental and social influence of both the home and school settings upon the child, and the impact it can have on cognitive and behavioural outcomes. A recent review by Pelham et al. [28] highlighted the importance of psychosocial intervention being a part of a combined approach to therapy for children with ADHD. In another review by Daly et al. [29], the authors highlight a flaw in the current psychosocial approach, indicating a lack of diversity in the research not only in race but in socioeconomic status and gender. Without these considerations, it is difficult to understand how successful psychosocial interventions would be in the wider ADHD population. Furthermore, broadening this area of research to enable the diversity to reach those children with SCADHD could enable greater understanding as to the benefits of the psychosocial interventions to specific symptoms present.

The purpose of the current review was to systematically assess and critically summarize the findings of school-based psychosocial

programs for children and adolescents exhibiting increased levels of hyperactivity and inattention and the benefits of these programs on behavioural, attention and cognitive outcomes.

Methods

Pubmed, Scopus, Cochrane Library, and CINAHL were searched up to July 2017 for trials with child and adolescent populations examining the cognitive and behavioural effects of psychosocial interventions. There were no restrictions in terms of study design. The following terms and truncations were searched: sub-clinical, sub-clinical, ADHD, add. These terms were searched against the following: Psychosocial, school health programs, prevention programs, emotional intelligence, teacher-child relationship, parent-child relationship, attachment and learning theory. The reference lists of any relevant papers were also examined for trials with a similar design. The following inclusion criteria were used:

Inclusion criteria

- Investigating a psychosocial intervention.
- Sample consisting of children or adolescents (aged 2-18).
- Participants did not have psychiatric or medical conditions.
- Participants were not taking medications during study period.
- Randomised and/or controlled trial.
- Study took place within school settings.
- Sample size ≥ 20 (10 if a cross-over study).
- Duration of intervention ≥ 1 month.
- Have measurable outcomes on cognition or behavior.
- Full paper in English.

Papers not meeting these criteria were excluded. Titles were searched for key terms and designs. Following initial inclusion, article abstracts were read and in majority of cases the methods section of the published article was read in order to determine inclusion of paper. See Figure 1 for a complete flow-chart of search outcomes and excluded trials.

Effect size

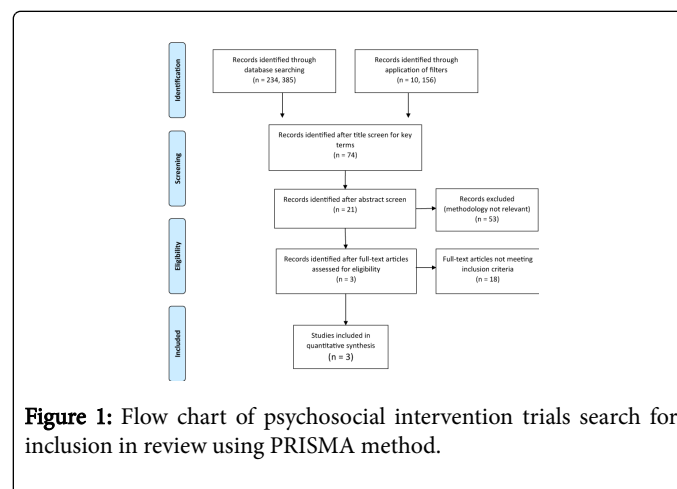


Figure 1: Flow chart of psychosocial intervention trials search for inclusion in review using PRISMA method.

Effect sizes were reported in all studies where the results were significant (small clinical effect=0.2, medium clinical effect=0.5, large clinical effect=0.8). Effect sizes were not calculated for non-significant

results or where data was not appropriate to perform calculations. Cohen's d was calculated by firstly subtracting the differences between the results on the assessment scale of the intervention and placebo, then dividing this by the pooled standard deviation at baseline [30].

Results

Three studies investigated psychosocial interventions within school settings [31-33]. The sample included 736 participants, ages ranging from 2 to 18 years (M=11.94), with an average intervention period of nine weeks. One study reported improvements in self-control and impulsiveness as well as improved cognitive outcomes [32]; whereas the other two reported reduced hyperactivity and conduct issues as well increased attention [31,33].

Study design and outcomes

Each intervention utilised positive training exercises for the children and adolescents in school settings. Driscoll et al. [31] investigated the benefits of increased social interaction between children and teachers and its effect on child behavioural outcomes. Twenty-nine teachers from included schools provided rankings based on an adjustment concern, enabling researchers to select children with the greatest adjustment concerns. Researchers also identified teachers as having child-centred or teacher centred beliefs (The Modernity Scale) [34]; it was hypothesised that teachers with child-centred beliefs would be able to apply the intervention with greater skill. Furthermore, the researchers identified the level of enthusiasm each of the teachers had regarding the program.

Outcome measures included the Teacher-Child Rating Scale (TCRS), a 38-item teacher-reported rating scale that loaded on seven factors of children's behaviour-conduct problems, learning problems, shy/anxious problems, frustration tolerance, work habits, assertive social skills, and peer sociability [35]. Relationships between teacher and student were measured using the Student Teacher Relationship

Scale (STRS) [36], which provided two subscales: Closeness and Conflict. Furthermore, the interaction between the teacher and student was assessed by the research coordinator rating each teacher and student interaction using the Teacher-Child Interaction task [37]. The fidelity of the psychosocial intervention program was monitored through short video logs by each teacher involved. They recorded the date, length of the session and a brief description of its session's content, which included a reflection by the teacher about how the session went. The intervention program was monitored via videotape and included four components for the teacher to follow:

- 1) Observe the child's actions.
- 2) Narrate the child's actions.
- 3) Label the child's feelings and emotions.
- 4) Develop relational themes.

Driscoll et al. [31] reported significant improvements in conduct behaviour ($p < 0.10$) and increased task orientation ($p < 0.01$) in a culturally diverse group of children, across multiple settings, including public schools and community service programs (Table 1).

Ghahremani et al. [32] employed a youth empowerment seminar in order to improve the effects of impulsivity on adolescents. The YES! Program is designed to promote three key facets: healthy body, healthy mind and healthy lifestyle [38]. Researchers assessed the demographics of all participants and included the MacArthur Scale of Subjective Social Status, which enabled insight into the students' perception of their own social status [39]. Those in the active group participated in the YES! program for one hour each day for four weeks, whereas the control group continued standard curriculum. There were no inclusion or exclusion criteria for participation in the study. The active intervention group significantly improved in impulsiveness ($p < 0.01$) over their matched controls. The researchers did not include fidelity measures and so was a limitation to this study.

Author	Study design	Participants	Intervention program	Outcome measures	Results	Effect size (Cohen's d)
Driscoll et al. [31]	12 wks 18s; 2tp R, C	116 ppts (58 m; 58 f) No age range	Head start program	TCRS STRS CSSI	Reduced conduct problems Improved attention	0.51* 0.77**
Ghahremani [32]	4 wks 20s; 2tp C	445 ppts (229 m; 216 f) 13-18 yrs	Life skills workshop	BIS-11	Reduced impulsiveness Improved self-control	0.22** 0.22**
Vancraeyveldt [33]	12 wks 24s; 3tp R, C	175ppts (175 m) 2-6 yrs	Playing-2-gether Intervention	STRS SDQ	Reduced hyperactivity and attention Reduced conduct problems	0.35** 0.28*

* $p < 0.05$; ** $p < 0.01$; s-Sessions; tp-Time-points; BIS-11-Barratt Impulsiveness Scale; C-controlled; f-female; m-Male; ppts-Participants; R-Randomised; STRS-Student-Teacher Relationship Scale; SDQ-Strengths and Difficulties Questionnaire; CSSI-Coded semi structured Interactions (videotaped); TCRS-The Teacher-Child Rating Scale; wks-Weeks; yrs-Years.

Table 1: Outcomes for psychosocial intervention programs in children and adolescents.

Vancraeyveldt et al. [33] utilized a bi-directional program that aimed at teaching both children and teachers' methods for also improving the strength of relationship between student and teacher. The aim of the researchers was to investigate avenues for reducing Externalizing Problem Behaviour (EPB) in Belgium schoolchildren.

From the schools recruited (n=46), all pre-school teachers completed a checklist enabling researchers to identify one child from each classroom with the greatest level of EPB. Similar to Driscoll et al. [31], Vancraeyveldt et al. [33] utilized the Student Teacher Relationship Scale (STRS). The researchers included a strengths and difficulties

questionnaire (SDQ) comprised of five subscales-emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems, and prosocial behavior [40]. Fidelity was calculated through a diary kept by teachers in the intervention group. In this diary they planned out the next session and evaluated how the recent session went. The Playing-2-gether intervention program comprised of two components, the Relationship-Game, whereby the teacher encourages the child to choose the activity, the teacher observes the child during the game while following their lead and imitating their actions and labelling the child's feelings as they progressed. The second component is the Rule-Game, led by the teacher. This stage involves the teacher guiding the child with clear commands, the introduction of rules for good behaviour and praising the child for that good behaviour. The nature of the game is to remain positive to boost the well-being of the child and the strength of the teacher-child relationship.

The study revealed improvements in student attention and hyperactivity ($p < 0.01$) as well as conduct problems ($p < 0.05$). Overall, average effect size for improvements was low to moderate (0.39). Distinctive effect sizes were again moderate for reductions in conduct disorder symptoms (0.40), improved attention (0.56) with lower effect sizes for inhibitory symptoms, including impulsivity (0.22) and self-control (0.22).

Discussion

This is the very first review to review the effects of psychosocial intervention programs on children with sub-clinical levels of ADHD. Majority of excluded studies examined ADHD-diagnosed population samples. Psychosocial skills have a large impact on a child's academic success [41]. Recent research into Emotional Intelligence has highlighted the benefits of the academic environment, which can impact a child's ability to take in, retain and recall information from class [42]. Despite the significance of the studies, psychosocial therapies require greater validation.

The implications of current research evidence for clinical consideration

Although each program reported benefits to the population under study, the intervention program implemented by Driscoll et al. [31] demonstrated the greatest level of improvement. This design was unique, in that it explored how the implementation of the intervention may be affected by teacher biases. Gauging the teacher's levels of enthusiasm toward the program, as well as what each teacher's personal beliefs about education, allowed the researchers more control over plausible extraneous variables. The bi-directionality of the intervention not only encouraged the children to engage more openly but introduced a new creative dialogue between teacher and student.

However, the length of time and number of persons involved in each intervention is highly demanding. Each program requires the cooperation of three social units – the child, the parent and the teacher. This level of demand requires significant effort and with the current ambiguity in terms of what defines SCADHD, it may seem too effortful for families and schools to undertake.

Examinations into teacher's ratings of behaviour in children with ADHD and SCADHD, has been validated through a study by Cho et al. [43], who reported significant correlations between teacher-rated behaviour and scores on both ADHD rating scales and a neurocognitive assessment battery. This highlights the clinical importance of teacher-based behaviour ratings of children with

SCADHD and ADHD with the context of the learning environment. In the current review, only one study investigated the teacher's perspective on learning [31]. This perspective may significantly impact how an intervention program is implemented within schools, and as noted by the authors, the attitudes of the teachers were illustrative of the "bi-directional nature of teacher-child relationships and provide support for the connection between teacher attitudes and classroom practices" [31]. Vancraeyveldt et al. [33] reported a decrease in teacher-child conflict, child conduct issues and hyperactivity and inattention symptoms. This area of research is unique due its focus on the child's proximal development and its impact on learning in a social context [44]. Previous work has highlighted the impact of symptom severity on the individual's psychosocial negativity [13]. Ghahremani [32] reported improvements in impulsive behaviour due to the integration of a comprehensive biopsychosocial workshop. The approach encourages improvements in all students, not simply those who have sub-clinical levels of hyperactivity and inattention. This program highlights the benefits of a holistic approach to health that includes multiple mental and physical practices. Previous work has indicated the impact of SCADHD on other elements of a child's well-being including sleep [45], anxiety [16], cognition [15], as well as greater difficulties with learning than children without sub-clinical symptoms [15].

The research included here highlighted the importance of both the child's social environment and the relationship that exists between student and teacher; both fundamental to a child's educational development.

Limitations

One major issue with the current review is the unique interventions under study. Each of the programs utilised distinctive methods for improving the psychosocial outcomes of the children involved. Therefore, direct comparison of the interventions used was not possible. However, the main focus of the current review were the outcome measures employed by the researchers. Previous research into the efficacy of psychosocial interventions in children with ADHD has explored variations in psychosocial interventions [46], its efficacy in combination with pharmaceutical treatment [47], as well as what components within these psychosocial interventions require further attention and consideration [48]. Due to its novel nature, the scope of this review is limited due to the scarcity of the research in the field. The review was conducted to promote further discussion of this under studied area.

Conclusion

Psychosocial interventions are a valid and reliable intervention for improving the cognitive and behavioural outcomes in school-aged children. This is the first review to investigate the effects of psychosocial intervention programs framed within the context of sub-clinical ADHD. This review highlights the therapeutic benefits of these programs for children exhibiting symptoms of ADHD. Despite the reported significance of each study, the varied program designs made direct comparison difficult. The strength of this review is that a systematic search and critical analysis was conducted. These studies highlight the possible avenues for intervention therapies that may be otherwise unknown to the majority of teachers and schools. The lack of reproducibility in this area may indicate the complex nature of the population being studied, and signify the need for clarity within this field of developmental research.

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