Impact of a cognitively-enhanced behavioural parent training program for parents and teachers of children with ADHD

by

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Abstract

ADHD is a common neurodevelopmental disorder that is known to jeopardize children's social, emotional, and academic wellness. Behavioural Parent Training (BPT), where parents are taught strategies for managing children's ADHD symptoms and behaviour, is an evidence-based intervention for childhood ADHD. However, BPT programs focus primarily on behaviour and do not address the way parents are thinking about their children, in spite of the influence parent cognitions have on parenting approach and behaviour. This study investigates outcomes of a BPT program that targets parents' and teachers' cognitions, specifically their self-efficacy and attributions, as well as their behaviour. Data collection involved a pilot sample of 16 parents and teachers (one parent group and two teacher groups) of children with ADHD. Data were analyzed using a repeated measures MANOVA, a repeated measures ANCOVA, and a linear regression, to assess trends in the data and effect sizes. ADHD symptoms decreased as reported by both parents and teachers throughout the course of the intervention, and results were mixed regarding cognitive change. Attributions predicted symptom change for parents but not teachers. These results indicate a promising intervention and raise interesting questions for future research.

Preface

This thesis is based on collaborative work with my supervisors, Dr. Christina Rinaldi and Dr. Yuanyuan Jiang. The literature review, data analysis, and all written output in this thesis are my own original work. The intervention program under study was created by Dr. Jiang, and data collection was completed by research assistants other than myself, led by Dr. Jiang and Dr. Rinaldi. The research project, of which this thesis is part, was approved by University of Alberta Research Ethics Board 2, project name "ABC Study," Pro00082154, originally approved July 17, 2018, with a renewal at the time of writing this thesis approved on October 6, 2023. The research project was supported by a Killam Research Fund obtained by the Principal Investigator, Dr. Jiang.

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Introduction

Childhood ADHD

ADHD is a common neurodevelopmental disorder in childhood, affecting approximately 7% of children (American Psychiatric Association, 2022; Roberts et al., 2015). This condition consists of two core symptom clusters: inattention, and hyperactivity or impulsivity. Inattention in children may involve losing things like schoolwork or clothing, not listening when others are speaking, or having trouble focusing on tasks like their schoolwork (Roberts et al., 2015). Hyperactivity could involve excessive movement or talking, where impulsivity may involve intruding on conversations, or struggling to wait one's turn. Children diagnosed with ADHD may present with primarily inattentive symptoms, primarily hyperactive or impulsive symptoms, or both. Regardless of presentation, children with ADHD have developmentally unusual levels of at least some of these challenges. These children tend to experience academic challenges beginning at an early age, likely due to a combination of behavioural (i.e., falling behind because they are not able to complete assigned tasks) and cognitive (i.e., struggling due to reduced working memory capacity) factors (Rogers et al., 2015). Children with ADHD are also at higher risk for a host of social and emotional difficulties, including the development of co-occurring anxiety or depression (Oddo et al., 2021; Rogers et al., 2015).

Theoretical Frameworks

There are many theories used to explain different aspects of the etiology, mechanisms, and nuanced presentation of ADHD. Of particular interest to this study are theories aiming to explain the way ADHD is involved in complex family and social contexts. Studies have found that ADHD is strongly influenced by genetics, meaning that immediate biological family members of a child with ADHD are more likely than others to experience ADHD themselves

(Ragadran et al., 2023; Thapar et al., 2007). Parents of children with ADHD are also disproportionately likely to experience other mental illnesses including depression, which may pose unique parenting challenges (Cheung & Theule, 2016). Children with ADHD may also experience unique relational structures, with research suggesting that their parents have different parenting cognitions and patterns of interaction with their children than do parents of typically developing children (Gerdes & Hoza, 2006; Johnston & Chronis-Tuscano, 2015). Both genetic and environmental factors have been posited as explanations for the patterns of behaviour and challenges seen in the families of children with ADHD (Johnston & Chronis-Tuscano, 2015, Thapar et al., 2007). Similarly, children with ADHD and their parents have been shown to have weaker and less collaborative relationships with their teachers, a factor that is known to impact academic achievement and classroom behaviour (Rogers et al., 2015; Rogers et al., 2009). Therefore, it is important to consider how ADHD functions in the context of these often-unique environments.

One influential theory in understanding any child in the context of their environment is Bronfenbrenner's Bioecological Theory, often called Ecological Systems Theory (Bronfenbrenner & Evans, 2000). This general theory of development holds that the development of a person throughout the course of their life is driven by a series of interactions between themselves and the people, places, and objects in varying levels of proximity to them. These interactions can flow in multiple directions, including bi-directionally between the individual and prominent figures in their life. Thus, developmental trajectory is influenced by the characteristics of the person and their relational figures, those of the environment, and the specific interactions among them. Bronfenbrenner and Evans (2000) theorised that positive developmental outcomes for any child were reliant on their participation in reciprocal

relationships with others. These relationships are characterized by increasing complexity of interactions and emotional connections as the child ages, as well as consistent desire for the other's well-being on both sides. One important implication of this theory is that parent, child, and outside environmental influences can all have an impact on whether and how such relationships are formed within and outside of the family, and thus on the outcomes for the child.

Many researchers have expanded upon and applied Ecological Systems Theory in recent years. This theory has been found useful in forming a holistic, multifactorial understanding of children's adjustment and wellbeing (Paat, 2013; Vaezghasemi et al., 2023), academic engagement (Gottfried & Gee, 2017), and family relationships (Doğan & Aytekin, 2021). Ecological Systems Theory has also been applied specifically to the context of children with behaviour issues. Yu and colleagues (2013) used this theory to investigate the web of known risk factors for the development of conduct problems in children, and suggested that intervention with parents would be critical in improving outcomes for these children. This focus on parents is due to their role in influencing multiple spheres of a child's life; they are not only key relational figures for their children, they also manage much of the larger environment in which their children operate. Others have similarly applied Ecological Systems Theory to children with ADHD and concluded that multimodal supports, including in the family and classroom environments, are critical to addressing the multiple levels of interaction where children with ADHD experience challenges (Rogers et al., 2015).

One specific theory that is highly relevant to this research is the Developmental-Transactional Theory of ADHD and Family Functioning, as described by Johnston and Chronis-Tuscano (2015). This theory deals with the specific family context of ADHD and what is known about the disorder, while sharing many common elements with Ecological Systems Theory. The

primary tenet of Developmental-Transactional Theory is that there is ongoing reciprocal influence between children and their parents, with factors such as individual traits and temperament, the parental partner relationship, children's sibling relationships, and broader family and cultural influences all playing a role. This theory suggests the importance of considering a wide variety of factors when trying to examine how parents understand or intervene in the course of their child's ADHD. Johnston and Chronis-Tuscano (2015) also outline how the complex correlates of childhood ADHD, including parental ADHD symptoms, other parental psychopathology, and patterns of thinking and behaviour at all family levels, may be common factors in the maintenance of child ADHD symptoms and related impairment.

The present research will be guided by Developmental-Transactional Theory, and will expand it to an understanding of the school as well as the home environment. Children spend vast amounts of time at school, and in accordance with Ecological Systems Theory, the amount of time spent interacting with this environment and the adults in it will have an impact on children. Schools and teachers are less studied in the area of interventional research on child ADHD in comparison to parent-focused and home treatments, so this research will use a combination of general Ecological Systems Theory, as applied by Rogers and colleagues (2015) to ADHD in the school environment, and some ADHD-specific content from Developmental-Transactional Theory, to understand the role of schools and teachers in shaping the trajectory of a student with ADHD.

Adult Factors and Child ADHD

In accordance with the Developmental-Transactional model, it is important to understand relevant factors in parents of children with ADHD and their typical influence on children. These include parent behaviours, cognitions, and emotions, as well as symptoms of mental disorders

that disproportionately impact those with ADHD and their near relatives. Similarly, teacher behaviours and cognitions must also be considered, although their mental health status is less relevant due to the professional and non-biological nature of their relationship with the child.

Behaviour

The parenting behaviour of parents of children with ADHD is, under this framework, likely to reciprocally interact with the way their children act. There is evidence that the behaviours of children, especially disruptive behaviours, can have an influence on the parenting practices used by their caregivers (Burke et al., 2008). Disruptive behaviour disorders are not directly caused by ADHD but are a common co-occurrence (Pliszka, 2015). Although the evidence is not conclusive, some research has also suggested that early symptoms of ADHD may influence parental hostility (Harold et al., 2013). Johnston and Chronis-Tuscano (2015) noted that parents of children with ADHD may use more directive and less warm parenting methods than are usually used with typically developing children, which they theorize creates a conducive environment for the later development of conduct or internalizing disorders. This interaction cycle may help explain children's behaviour, but there are also exceptions to it. The use of positive parenting practices is a protective factor for children with ADHD. One systematic review found associations between positive parenting and higher children's quality of peer relationships, greater academic achievement, and reduced risk of conduct problems (Deault, 2010).

Research likewise shows that the behaviour of teachers is relevant to and reciprocally involved with that of their students. There are many methods of teaching and classroom management that are beneficial for students with ADHD, including strategies to improve academics and behavioural issues (DuPaul et al., 2012). One important factor in the success of

teaching methods is the student-teacher relationship, which is key for students' learning and school behaviour (Ewe, 2019). However, studies show that teachers may be at risk of paying less attention to students with ADHD as an intentional or unintentional response to their classroom behaviour (Tegtmejer, 2019), and that relationships between teachers and students with ADHD are often more strained than those between teachers and their typically-developing students (Ewe, 2019; Rogers et al., 2015). These risk factors may be a hindrance to the academic development of students; viewed from an Ecological Systems lens, it may also stymie their emotional and social growth.

Cognitions

Cognition is a broad term which can encompass all aspects of how a person thinks and attempts to understand the world around them. In the context of understanding parenting or teaching, an adult's attributions of child behaviour and the adult's self-efficacy are two highly relevant cognitions. When the term cognitions is used broadly in the following sections, it is referring to these two processes. Attribution in general refers to the judgment made by an individual, consciously or not, about the cause of human behaviours or outcomes (Weiner, 1972; Weiner, 2010). Attributions generally include a belief about the cause of a behaviour/outcome, including whether it is internal (caused by the person) or external (caused by the environment), stable over time, and under the individual's control (Weiner, 2010). People make attributions every day about their own behaviour and the behaviour of others. For example, a parent might attribute their child's rule-breaking behaviour to immorality on the part of the child. This attribution would be internal (caused by the child), stable (relating to a long-standing trait), and relatively controllable (presuming people tend to view morality as within an individual's control). Relevant to parenting and teaching research is the term "child-blaming attributions,"

which may be used to refer to internal, stable, and/or controllable attributions of a child's misbehaviour; that is, blaming misbehaviour on a child's negative traits or intentions (e.g., Park et al., 2018).

Another critical cognition is self-efficacy. Self-efficacy refers in general to a person's evaluation of their own ability to successfully perform a task (Bandura, 1977). Parenting self-efficacy is fairly well-researched; it generally consists of how confident a parent feels in the parenting role, and whether they believe they are capable of effectively addressing any challenges that may emerge with their child (Stephenson et al., 2023). However, it is sometimes measured with regard to one or more specific areas of parenting, such as with respect to managing challenging child behaviour or providing emotional support (Holzer et al., 2024; Sofronoff & Farbotko, 2002). Teacher self-efficacy is likewise reasonably well-researched, generally defined as a teacher's belief in their ability to teach and engage students, and to manage their classrooms well (Brunsting et al., 2024; Calkins et al., 2024; Finch et al., 2023).

Parental cognitions are a key factor in understanding parenting processes. Making attributions that blame a child for their behaviour may contribute to parenting methods that increase disruptive child behaviours and worsen parent-child relationships (Johnston & Chronis-Tuscano, 2015; Lench et al., 2013; Park et al., 2018). A parent's self-efficacy could also play a role. Research has shown that a strong sense of parental self-efficacy is associated with more positive parenting behaviour, and better outcomes for children (Glatz et al., 2024; Johnston et al., 2018). Longitudinal research using a transactional model has suggested that there are reciprocal effects of child behaviour and parental self-efficacy (Glatz et al., 2024). Parental self-efficacy is also changeable; parent training interventions can promote increases in parental self-efficacy relating to challenging child behaviour (Sofronoff & Farbotko, 2002). Improvement in parental

self-efficacy has been associated with improvements in parenting and fewer negative parenting behaviours, as have reductions in cognitive errors including attributions (Jiang, Haack, et al., 2018).

Teachers' cognitions have been found relevant to their teaching processes, in terms of attributions and self-efficacy, and also with respect to teachers' knowledge and beliefs about ADHD. Teachers who attributed children's ADHD-related behaviour to stable and internal causes were less approving of interventions for those children, and also had worse relationship outcomes with them (Mikami et al., 2019). In addition, the students of teachers with high self-efficacy tend to show fewer externalizing behaviours (Finch et al., 2023). Teachers who held positive attitudes about students with ADHD were also more likely to engage in evidence-based behavioural management techniques with them than those who held negative beliefs (Blotnicky-Gallant et al., 2015). Positive teacher attitudes about children with ADHD were also associated with greater knowledge of ADHD, suggesting that psychoeducation could impact teaching behaviour.

Parent Mental Health

Lastly, there is a likely influence of parent mental health on their children with ADHD. In addition to the established genetic linkage of ADHD (and other frequently co-occurring concerns) between parents and children, research also shows that the mental health of adoptive parents is strongly related to the course of their child's ADHD, suggesting an additional social or behavioural link between the two (Harold et al., 2013; Ragadran et al., 2023). Maternal depressive symptoms and difficulties with emotional regulation are risk factors for children with ADHD in developing depression, a common ADHD comorbidity, in adolescence (Oddo et al., 2021). There is also evidence that parental mental health may be a prominent factor in the course

of ADHD treatment for children, and research suggests that cognitive treatment for parent mental health, incorporated into ADHD treatment, can improve outcomes for both parents and children (Chronis-Tuscano et al., 2013; Novick et al., 2022).

Behavioural Parent/Teacher Training

The Developmental-Transactional Theory of ADHD strongly suggests that interventions for children with ADHD should involve consideration of familial factors. This family focus is reflected in the typical interventions used for these children; many children will receive stimulant medication to help manage their ADHD, but one of the most prominent and evidence-based non-pharmaceutical interventions is behavioural parent training (BPT), which focuses on parents as agents of change (H. A. Jones & Rabinovitch, 2014). In BPT, therapists interact with parents, not children. Their aim is to teach parenting strategies that will allow parents to form positive connections, handle their children's challenging behaviour more adaptively, and encourage positive behaviour (Dekkers et al., 2022). There are many different BPT programs that approach this aim in differing ways. Some focus mainly on ADHD psychoeducation (e.g., Ferrin et al., 2020), while others involve additional components including training on communication and positively interacting with children (e.g., Sonuga-Barke et al., 2018). These components target the behavioural aspects of the parent/child relationship, enabling parents to respond differently to their children's behaviour. Research has shown that BPT can positively impact child ADHD symptoms, child disruptive behaviour, and parents' self-efficacy and use of positive parenting practices (Daley et al., 2014; Dekkers et al., 2022; P.-C. Lee et al., 2012; Mah et al, 2020; Marquet-Doleac et al., 2023; Sofronoff & Farbotko, 2002; Yao et al., 2022). Emerging evidence also suggests that BPT may help improve children's ability to regulate and inhibit behaviour, an area where many children with ADHD struggle (Yao et al., 2022).

BPT programs with emphasis on different treatment components can show different patterns in results. Encouraging parents to reward positive behaviours has shown associations with reductions in negative parenting (Dekkers et al., 2022). Training in mindfulness tended to relate to reductions in negative disciplinary techniques and increases in parental emotion regulation skills (Mah et al., 2020). Recent research has also highlighted the possibility that within a behavioural program, content focused on managing the antecedents of behaviour may be more important for program efficacy and parent sense of self-efficacy than content relating to punishment or reinforcement (Dekkers et al., 2022; Hornstra et al., 2021, 2023).

One component that is not common in BPT programs is intervention in parental cognitions. However, as discussed above, cognitions are likely to be influential. Research has shown that high parental self-efficacy predicts better outcomes in BPT programs (van den Hoofdakker et al., 2014; Johnston et al., 2010). Likewise, child-crediting attributions show a strong relationship with positive BPT outcomes (Sawrikar & Dadds, 2018). BPT programs have also shown the potential to improve parental self-efficacy (Sofronoff & Farbotko, 2002). Researchers have begun calling for the inclusion of cognitive training in BPT programs (e.g., Jiang, Haack, et al., 2018; Sawrikar & Dadds, 2018), and some research into cognitive-enhanced BPT has been published recently. Interventions targeting cognition as well as behaviour have succeeded in changing some cognitions for parents, and shown improvement over standard BPT for child ADHD symptoms (Novick et al., 2022).

Although they are less studied than parent programs, comprising only two of 32 studies in a recent meta-analysis, similar programs are also used to help teachers of children with ADHD support their students (Hornstra et al., 2023). They are often still referred to as BPT programs, but sometimes as teacher training programs or with generic descriptors. Such programs typically

involve some psychoeducation and a strong behavioral component similar to parent programs, and may have a considerable pedagogical component as well (Aldabbagh et al., 2024; Corkum et al., 2019; Froelich et al., 2012; Miranda et al., 2002). Research suggests that these programs can improve the ADHD-related behaviours of students within the classroom context, in addition to providing academic benefits (Aldabbagh et al., 2024; Corkum et al., 2019; Miranda et al., 2002).

More frequent than teacher-only interventions are multi-modal interventions that have a parent and a teacher component (Hornstra et al., 2023). These programs may or may not involve significant teacher training; some focus primarily on strengthening the relationship between families and teachers (e.g., Power et al., 2012). Many combined programs rely on teachers mostly for behavioural program implementation, with tasks like completing daily behavioural report cards, and provide them with less overall training than is provided for parents (Abikoff et al., 2004; Iznardo et al., 2020; Pfiffner et al., 2007; Pfiffner et al., 2018). Although these methods have been found useful in supporting students with ADHD (Iznardo et al., 2020; Pfiffner et al., 2007; Pfiffner et al., 2018; Sheridan et al., 2001), they are often meant to supplement parent training and not all programs provide teachers with focused psychoeducation and behavioural training. It was also difficult to find any research on programs targeting teachers' cognitions or mental wellness as a part of a BPT intervention.

Barriers to BPT Participation

There are many known barriers to BPT participation. BPT programs are often subject to high rates of attrition, with one review finding that over half of participants scheduled for a BPT program drop out before completing the program, many of them before completing a single session (Chacko et al., 2016). One primary predictor of attrition in BPT programs is Socio-Economic Status (SES), which is understandable given the resources needed for parents to attend

weekly interventions, including childcare and transportation (D. Jones et al., 2014). Although these burdens have an outsized impact on those of low SES, BPT programs are often very demanding of time and resources from all participants, parents and teachers, which could contribute to high overall attrition. Many programs have adapted their modalities recently in order to improve accessibility, including moving interventions into an online and/or asynchronous format (Corkum et al., 2019; D. Jones et al., 2014).

BPT also tends to require considerable effort and active involvement from participants; group formats can make scheduling less flexible, and homework involving child interactions may be difficult to complete simply because it entails the involvement of another person and thus is harder to do last-minute than homework for other interventions (Woodfield & Cartwright, 2020). Unfortunately, disengagement in the form of missed sessions or incomplete homework/home practice can decrease the benefits of a program (Baydar et al., 2003). Although this type of disengagement can also be due to time or resource constraints, as well as issues with the program itself (i.e., unclear instructions), considerable homework disengagement is explained by participants as stemming from their disagreement with the treatment rationale, lack of confidence in their ability to complete the homework, or belief that the assigned homework would not improve their child's symptoms (Chacko et al., 2013). Considering non-participation, attrition, and disengagement, research has likewise suggested that a wide range of factors, including perceived stigma and the belief that parenting changes will not impact child behaviour, may be barriers to participation (Mytton et al., 2014). Beliefs about whether an intervention will be effective are critical in the course of interventions, and believing that a child cannot change, or that one cannot help them, is associated with reduced engagement and worse outcomes in parent and teacher interventions (Johnston et al., 2010; Mikami et al., 2019). These beliefs are

tied closely with attributions about child behaviour and parenting/teaching self-efficacy, which can also be relevant predictors of program disengagement (Chacko et al., 2017), and may be causes of treatment avoidance or attrition. This is an area of ongoing research, and it is critical to develop understanding of why parents are not willing or able to participate in programs in order to improve access.

The ABC Program

In order to investigate the impacts of parent cognitive training on the course of a BPT program, University of Alberta researcher Dr. Yuanyuan Jiang developed and piloted a BPT program called the Attention, Behaviour, and Cognitions (ABC) program (Jiang, Rinaldi, et al., 2018), drawing from standard BPT (Pfiffner & Haack, 2014) and cognitive-behavioural therapy (J. S. Beck, 2011). The aim of the ABC program was to integrate cognitive training methods with typical behavioural and psychoeducational methods, to address the way cognitions may influence participants' parenting or teaching behaviour. These cognitive methods focus on addressing attributions and self-efficacy, both of which appear promising as elements of focus for parent training (Jiang, Haack, et al., 2018; Johnston & Chronis-Tuscano, 2015; Lench et al., 2013). The program starts with a considerable psychoeducational component, teaching parents and teachers about ADHD, reciprocal parent-child influences, and the Antecedent-Behaviour-Consequence (ABC) model (Jiang, Rinaldi et al., 2018). As the program progresses, cognitive and mindfulness methods for parent/teacher regulation and behavioural methods for child behaviour management are introduced. These methods are all categorized within the ABC framework as antecedent- or consequence-related, and participants have the opportunity to practice them between sessions and log their progress. The program wraps up with a review of methods learned and an opportunity to plan for future challenges.

The Present Study

As discussed above, there are strong indications that incorporating a cognitive component into BPT programs could have benefits, but little research so far investigating a program that does so. The present study examined the impacts of the ABC program on child ADHD symptoms and parent cognitions. Using data from Dr. Jiang's original pilot program, this study investigated the potential clinical impact of the program, aiming to answer the following three questions: firstly, did participant cognitions change over the course of the program? Secondly, did participant-reported child ADHD symptoms change over time? And lastly, what was the impact of change in parent/teacher cognitions between time points on symptom change?

Methods

Participants and Recruitment

Participants in this study were parents and teachers of children who had been diagnosed with ADHD. Parents all had children between the ages of 6 and 11 years, had lived with them for at least the past year, and were their legal guardians. Teachers taught children of the same ages in their classrooms. All participants needed to be fluent in English, since the intervention was delivered in English. Parents also confirmed that their children did not have major developmental concerns or psychiatric conditions that required immediate attention; this intervention was not expected to be as useful for such children, and it was deemed ethically important to make sure parents did not replace treatment for another serious mental health condition with this program. Participants were recruited through schools, where the study was announced and teachers could volunteer to participate. Teachers also provided the study information to parents. Interested parents were able to reach out to the lab based on the information provided, or ask the school to

give their contact information to researchers. They all participated in a screening and consent process before the start of the intervention.

Parent participants were a group of seven, all women, recruited from the Edmonton area. Although eight parents were originally recruited, one parent dropped out of the study before post-intervention data collection and was not included in analyses. Parent participants were majority White (*n=5*), with one reporting that she was Latina, and one reporting that she was of mixed Black and White ethnicity. They ranged in age from 30 to 48 years, with a mean age of 40 at the start of the study. Parents had a wide range of education levels, with most having either a high school diploma (*n=3*) or a college degree/diploma (*n=2*). One parent had a Bachelor's degree, and one parent had a partial high school education. Most parents were married or in common-law marriages (*n=4*), with one never married, one separated, and one preferring not to answer. The majority of parent participants (*n=6*) reported having a previous mental health diagnosis, although none of them reported having ADHD themselves. One parent was an adoptive parent of the children they reported on, and six were biological parents.

The parent group reported on a group of nine children (two participants completed full reports on two of their individual children who both met inclusion criteria). Six of the children were boys and three were girls. These children were also majority White (*n=6*), with one reported as being of mixed Black and White ethnicity, one of mixed Indigenous and White ethnicity, and one parent preferring not to answer. The children ranged in age from 6 to 11 years, with a mean age of 8.

Teacher participants were a group of nine, recruited through schools in the Edmonton area. They were majority White (*n=7*), with one participant reporting their race as Asian and ethnicity as Canadian, and another preferring not to answer. They were majority female (*n=8*),

and ranged in age from 26 to 58 years, with a mean age of 42 at the beginning of the study. All teachers had at least a university education (i.e., a Bachelor's degree), and three teachers also reported having a Master's degree. One teacher reported having ADHD themselves, and a total of two teachers reported having a mental health diagnosis. Seven participants responded that they were married while two had never been married, and seven of the teachers had children of their own. Most teachers reported having known the student they were reporting on for approximately one school year (8 months) at the outset of the study, but one teacher reported only 5 months, and three reported between 1 and 3 years. All teachers reported knowing the student moderately or very well. All reported working with the student in a regular education classroom, though one teacher noted that their classroom included a high proportion of students who were struggling readers and English language learners (about 50% of both).

Teacher participants also reported on a group of nine children. These children were reported to be majority male ($n=7$) and majority White ($n=7$) according to teacher reports, with one Black student and one student of Indigenous and French ethnicity. The children in this group also ranged in age from 6 to 11 years, with a mean age of 8.

Data Collection

Survey data were originally collected from three groups, two teacher groups and one parent group, which were run during Dr. Jiang's pilot study in 2018. The research was approved by a University of Alberta research ethics board (Pro00082154). The program included 8 weeks of group training, with one 1.5-hour session each week. In each session, participants reviewed the previous week and discussed their own and their respective children's progress in terms of strengths and weaknesses. Then, they participated in training that consisted of learning more about ADHD, learning about how different cognitions can affect behaviour, and learning

strategies to implement this knowledge in day-to-day interactions with children. Homework was assigned for each week, mostly involving practice of the strategies discussed during the session. Participants completed questionnaires investigating children's symptoms and parenting/teaching behaviours and cognitions at three timepoints (baseline, mid-point, post-treatment). Video recordings were also taken of all sessions.

Survey Instruments

Parent Cognitions

The *Parent Cognition Scale* (PCS; Snarr et al., 2009) is a 30-item self-report measure used to assess parental cognitions, particularly child-blaming and parent-blaming attributions of child behaviour. It uses a 6-point, Likert-type scale, asking parents the degree to which they agree with a statement attributing blame for their child's misbehaviour on themselves or their child. Of the 30 total items, 16 are used to create two subscales, the child-responsible subscale (9 items) and the parent-causal subscale (7 items; Snarr et al., 2009). The PCS subscales have been researched in various populations of children and found to have a reliable factor structure and acceptable subscale internal reliability (Coefficient alphas ranging from 0.81-0.92; Fernandes et al., 2019; Lysenko et al., 2021; Snarr et al., 2009).

The *Parenting Sense of Competence* scale (PSOC; Johnston & Mash, 1989) is a 17-item self-report scale measuring parents' satisfaction and self-efficacy in their parental role. The self-efficacy scale consists of 7 items regarding comfort in the parenting role and confidence in one's parenting, answered on a 6-point, Likert-type scale (Johnston & Mash, 1989). This scale has shown strong internal consistency given its length (α=0.85-0.91), and been used in research with a variety of demographics and programs (Gilmore & Cuskelly, 2024; Oltra-Benavent et al.,

2020). The PSOC is a commonly used scale in parenting program research (Colalillo & Johnston, 2016).

Teacher Cognitions

The *Teacher Attribution Questionnaire* (TAQ; Mikami et al., 2019) consists of a series of vignettes designed to assess teachers' attributions about child behaviour. Teachers read a brief description of a child's classroom behaviour, then answer a series of six questions on a 10-point Likert-type scale. These questions are the same for each vignette and include whether the child intended to behave as they did, should be blamed for their behaviour, are responsible for their behaviour, and are likely to behave the same way in the future. An internal/controllable attribution of behaviour subscale can be calculated using four of the six questions across all vignettes. This subscale was determined based on the results of an exploratory factor analysis and has demonstrated acceptable internal consistency (α=0.84) in past research (Mikami et al., 2019).

The *Teacher Sense of Efficacy Scale* (TSES; Tschannen-Moran & Woolfolk Hoy, 2001) is a self-report measure of a teacher's feelings of competence and ability in their teaching role. It has been altered frequently since publication and is available in long and short forms (Ma et al., 2019). The current long form of the questionnaire includes 24 items asking how much teachers believe they can manage student behaviour, teach concepts effectively, and engage students. The questionnaire uses a scale of 1 (Very Little) to 9 (A Great Deal). Three domain scales (management, engagement, and instruction) as well as an overall composite score can be calculated. The TSES scales have shown positive correlations with other measures of teacher self-efficacy beliefs and the global scale, used in this study, has shown strong internal reliability in past research (α=0.92-0.95; Fives & Buehl, 2010; Tschannen-Moran & Woolfolk Hoy, 2001).

Child Outcomes

The *ADHD Rating Scale, Fourth Edition* (ADHD-RS-IV; DuPaul et al., 1998) is a measure of child inattentive and hyperactive behaviours, with versions available to be filled out by either parents or teachers. Both parent and teacher forms contain 18 items, 9 about hyperactivity/impulsivity and 9 about inattention, measured on a 4-point Likert-type scale (Dobrean et al., 2021). This scale structure allows for the calculation of separate hyperactivity and inattention scales, as well as a total scale including all 18 items (McGoey et al., 2007). The ADHD-RS-IV has been widely used and has shown acceptable internal reliability (α=0.79-0.95) and measurement invariance across populations (Dobrean et al., 2021; McGoey et al., 2007).

The *Clinical Global Impression* scale (CGI; Guy, 1976, as cited in Toolan et al., 2022) is a simple metric used to assess the severity of symptoms or level of impairment experienced by an individual. It includes a single item, where a rater expresses the level of impairment they perceive the individual to be experiencing on a scale of 1 (no impairment) to 7 (profound impairment; Toolan et al., 2022). It is frequently used in health fields due to its simplicity and face validity, and has shown moderate correlations with symptom specific rating scales (de Beurs et al., 2019; Goodman et al., 2010; Kadouri et al., 2007). It has also been used previously in studies of children with neurodevelopmental disorders (e.g., Goodman et al., 2010; Toolan et al., 2022).

Data Analysis

Data from Time 1 (T1; baseline or pre-intervention), Time 2 (T2; mid-intervention), and Time 3 (T3; post-intervention) from this study were analysed with the aim of further understanding how both parent/teacher and child factors changed over the course of the intervention, and how the two may have interacted. Parent factors include parental self-efficacy

(PSOC) and child-blaming attributions (PCS). Teacher factors include teacher self-efficacy (TSES) and child-blaming attributions (TAQ). Child factors include ADHD symptoms (ADHD-RS-IV) and global impairment (CGI; used only at T1), as reported by parents/teachers. A repeated measures MANOVA was used to assess the degree of change in parent/teacher cognitions over time. A repeated measures ANCOVA was used to investigate changes in child ADHD symptoms over time, controlling for pre-intervention levels of child-blaming attributions and parental/teacher sense of self-efficacy. Child symptom changes and participant cognition changes were assessed separately so that cognitions at T1 of data collection could be included as covariates in the ANCOVA, which would not have been possible were they included in a single analysis. Lastly, a linear regression was used to investigate whether changes in cognitions predicted change in child ADHD symptoms, after controlling for pre-intervention participant cognitions and level of child impairment. To allow for this analysis, several new variables were calculated, representing the change in cognitions and reported child symptoms between T1 and T3 for each participant. Change values were calculated by subtracting scores at T3 from scores at T1, so that a reduction in symptoms or cognition levels is represented by a positive change value. This is intuitive for symptom change and change in child blaming attributions, but may be less so for self-efficacy. Change in child symptoms was used as the regression Dependent Variable (DV), with change in participant cognitions, participant cognitions at T1, and global level of child impairment at T1 acting as predictors in the model.

The same analyses were completed using parent and teacher data; however, because of variation in the instruments used to measure cognitions for parents versus teachers, and uncertainty about the homogeneity of results between the groups, parent and teacher data were analysed separately. All analyses were completed using IBM's SPSS Statistics software, version

29.0.2.0 (IBM Corp., 2023). Because of the small sample size available for this pilot study, and its exploratory nature, effect sizes are reported alongside statistical significance. Inclusion of effect sizes will allow for appropriate interpretation of the clinical potential of the program, considering the impact of sample size, and may provide useful information for future researchers and/or clinicians. Statistical significance is reported additionally as an indicator of the robustness of results. Given the scope of this study, emphasis on effect size is appropriate and in line with current recommendations in statistical literature to move beyond significance testing (D. K. Lee, 2016; Sullivan & Feinn, 2012; Wasserstein et al., 2019). Clinical meaningfulness/significance is also considered as a factor in the interpretation of statistical results, to contextualize the real-world impact of scores and changes that are discussed.

Results

Parent Group

Data Exploration

Prior to addressing the main research questions, basic analyses were completed to gain an overall understanding of the data. Table 1 shows complete descriptive statistics for parent cognitions and reported child symptoms. Table 2 shows bivariate correlations between relevant variables at each time point. Shapiro-Wilks tests were chosen to assess normality due to the size of the sample and vulnerabilities of general linear models and linear regression (Zygmont, 2023). Tests identified that parent self-efficacy at T1 ($p=.016$) and child-blaming attributions at T2 ($p=.002$) were non-normally distributed. Because these variables were measured at several time points and were typically normal within the sample, it appears likely that this reflects the impact of individual reporting idiosyncrasies at some time points, rather than an underlying non-normal

distribution. These variables will be included unaltered in analyses using general linear models as they are robust regarding violations of normality (Blanca et al., 2023).

Change variables, included in the third analysis and indicative of overall trends in the data, were also analysed for normality. A Shapiro-Wilks test indicated that change in self-efficacy was non-normally distributed (*p=.002*). Further investigation showed that an individual outlier, who reported very low self-efficacy at T1, and by the end of the intervention reported a level of self-efficacy much closer to the mean of the rest of the group, was responsible for the non-normality in both T1 self-efficacy and change in self-efficacy. While this individual will not be excluded from analyses, potential impacts of their data will be considered.

Table 1

Descriptive statistics for parent-reported variables at times 1, 2, and 3

	Minimum Statistic	Maximum Statistic	Mean Statistic	Standard Deviation	Skewness Statistic
ADHD Symptoms					
T1	1.50	3.00	2.0802	.45822	.957
T2	1.06	2.89	1.8250	.57546	.525
T3	.94	2.94	1.7284	.56754	1.082
Parental Self-Efficacy					
T1	1.57	5.29	4.1746	1.07802	-2.023
T2	3.29	5.43	4.4127	.59524	-.286
T3	4.00	5.43	4.6032	.48853	.360
Child-Blaming Attributions					
T1	2.22	3.78	3.0000	.59577	-.063
T2	2.44	4.56	2.9877	.63936	2.225
T3	1.89	4.11	3.0617	.69857	-.180
Global Child Impairment					
T1	1.00	5.00	3.7778	1.30171	-1.229

Note: n = 9. Skewness statistic SE = .717.

Table 2

Pearson correlations between parent-reported variables at times 1, 2, and 3

	ADHD Symptoms			Parental Self-Efficacy			Child-Blaming Attributions		
	T1	T2	T3	T1	T2	T3	T1	T2	T3
ADHD Symptoms									
T2	.215								
T3	.379	.906**							
Parental Self-Efficacy									
T1	.261	.250	.275						
T2	.547	.171	.221	.522					
T3	.275	.269	.278	.550	.791*				
Child-Blaming Attributions									
T1	-.331	.604	.534	.470	.302	.470			
T2	-.128	.148	.111	.363	.573	.459	.652		
T3	.038	.482	.437	.229	.542	.685*	.693*	.638	
Global Child Impairment									
T1	.371	.397	.322	.273	.802**	.490	.412	.464	.567

Note: $n = 9$. $p<.05$ is denoted by a *, $p<.01$ is denoted by a **. All significance levels are for a 2-tailed test.

Change in Cognitions

Change in parental cognitions was assessed using a repeated measures MANOVA. In order to avoid double-counting the two participants who reported on more than one child, an average of the self-efficacy and child-blaming attributions they reported for both of their children was taken at each time point, to represent their approximate overall attitude at each time point. Mauchley's test indicated no violations of the sphericity assumption for either self-efficacy or child-blaming attributions. Child-blaming attributions did not change significantly or meaningfully over the three time points ($\eta p^2 = .012$, $p = .930$). While not statistically significant,

effect size estimates suggest that parent self-efficacy increased to a potentially relevant degree over time within this sample ($\eta p^2 = .185$, $p = .293$). This result is likely strongly influenced by the outlier discussed previously, and especially considering the lack of statistical significance, caution in interpretation of the effect size is warranted. Table 3 shows results of the MANOVA in detail.

Table 3

Results of repeated measures MANOVA for change in parent cognitions between time points

Measure	F	Sig.	Partial Eta Squared
Self-Efficacy	1.361	.293	.185
Child-Blaming Attributions	.073	.930	.012

Note: $n = 7$. $df = 2$ for both variables. Sphericity-assumed significance values used.

Change in Reported Child Symptoms

Symptom change was investigated using a repeated measures ANCOVA. Parent reported child ADHD symptoms significantly decreased over the course of the intervention after accounting for the level of both cognitive variables at T1 ($\eta p^2 = .668$, $p = .001$). Mauchley's test did not indicate any concerning lack of sphericity. Overall results of the ANCOVA model are included in Table 4. While T1 parental self-efficacy did not appear to interact strongly with the effect of time ($\eta p^2 = .269$, $p = .152$), T1 child-blaming attributions strongly interacted with the effect of time on symptoms ($\eta p^2 = .675$, $p = .001$). Therefore, although the main effect of time was significant, and post-hoc comparisons (shown in Table 5) suggest a significant change from T1 to T3 in reported child ADHD symptoms ($p = .022$), caution must be exercised in interpreting these effects given the interaction noted. To further understand and visualize the relationship

between T1 attributions and change in ADHD symptoms, change values representing the difference in reported child ADHD symptoms between T1 and T3 were used. Change in ADHD symptoms was strongly associated with T1 child-blaming attributions (*r=-.786, p=.012*). Figure 1 shows a scatterplot of this relationship. This correlation helps elucidate the interaction effect described above, as symptom improvement is strongly predicted by low levels of pre-intervention child-blaming attributions.

In addition to statistical analyses, inspection of the data shows that three of the participants' children had improved their (parent-reported) symptoms to a degree considered to have a meaningful clinical impact, using the interpretation of the ADHD-RS-IV suggested by Goodman and colleagues (2010). Four participants reported smaller improvements, while two participants reported that their children actually showed slightly more ADHD symptoms at T3 than T1 (though not to a degree that would be considered clinically meaningful, applying the same standard as above). Although these changes in child ADHD symptoms were strongly predicted by the parents' pre-intervention cognitions, as described above, it is important to recognize that only some participants saw clinically impactful outcomes.

Table 4

Results of repeated measures ANCOVA tests of within-subjects effects for change in parent-reported ADHD symptoms

Source	F	Sig.	Partial Eta Squared
Time	12.082	.001	.668
Time x SE	2.210	.152	.269
Time x CBA	12.443	.001	.675

Note: $n = 9$. $df = 2$ for all sources. Sphericity-assumed significance values used. SE = Parental self-efficacy, CBA = Child-blaming attributions.

Table 5

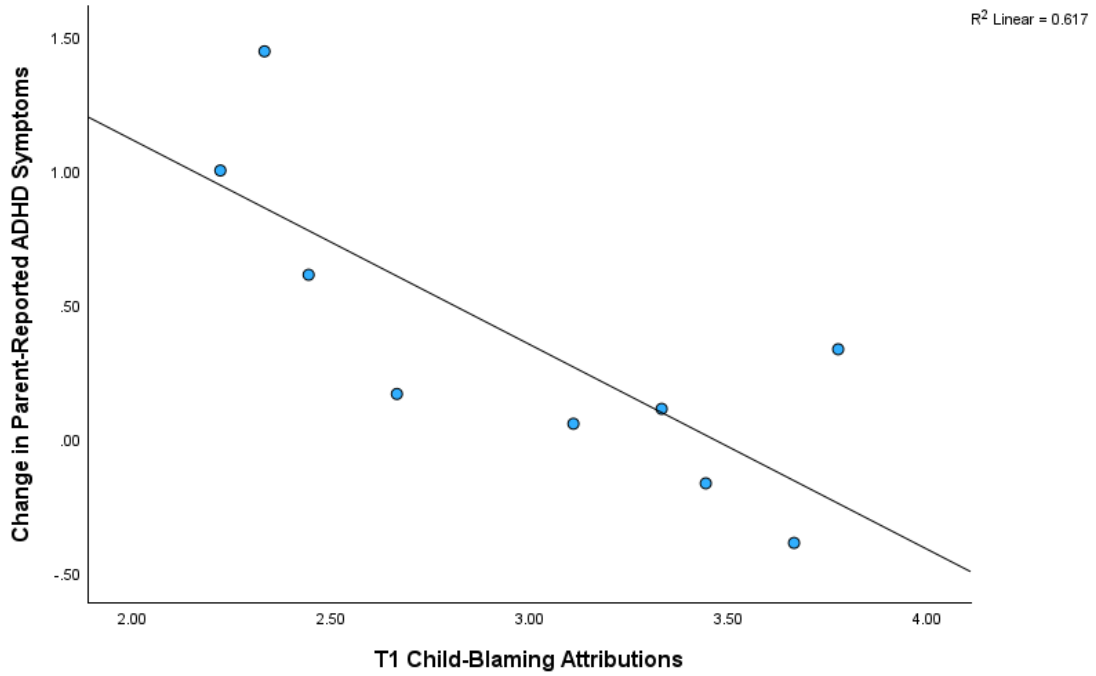
Pairwise comparisons of parent-reported ADHD symptoms at times 1, 2, and 3

(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig.
1	2	.255	.134	.106
	3	.352	.114	.022
2	1	-.255	.134	.106
	3	.097	.093	.337
3	1	-.352	.114	.022
	2	-.097	.093	.337

Note: $n = 9$. Comparisons are based on estimated marginal means from ANCOVA analysis. Adjustment for multiple comparisons: Least Significant Difference.

Figure 1

Relationship of change in parent-reported ADHD symptoms (T1-T3) and child-blaming attributions at T1



Effect of Changing Cognitions on Child Outcomes

The independent effect of changes in parent cognitions was assessed using a linear regression. Parent-reported ADHD symptoms were the DV, and predictors included parent self-efficacy at T1, child-blaming attributions at T1, global child impairment at T1, change in parent self-efficacy, and change in child-blaming attributions. Neither change in self-efficacy nor change in child-blaming attributions were predictive of change in ADHD symptoms in this model. The model overall was insignificant, and the only significant predictor was pre-treatment child-blaming attributions (*p=.041*), which aligns with results found above. There was some multicollinearity in the model between change in self-efficacy and self-efficacy at T1. Removing either variable from the model did not make the other a significant predictor, however, it is interesting to note that they were strongly correlated (*r=.893, p=.001*). This result appears to be due to the effect of the outlier discussed in the data exploration section. Figure 2 shows a scatterplot of this correlation. Details of the linear regression outcome are shown in Table 6.

Table 6

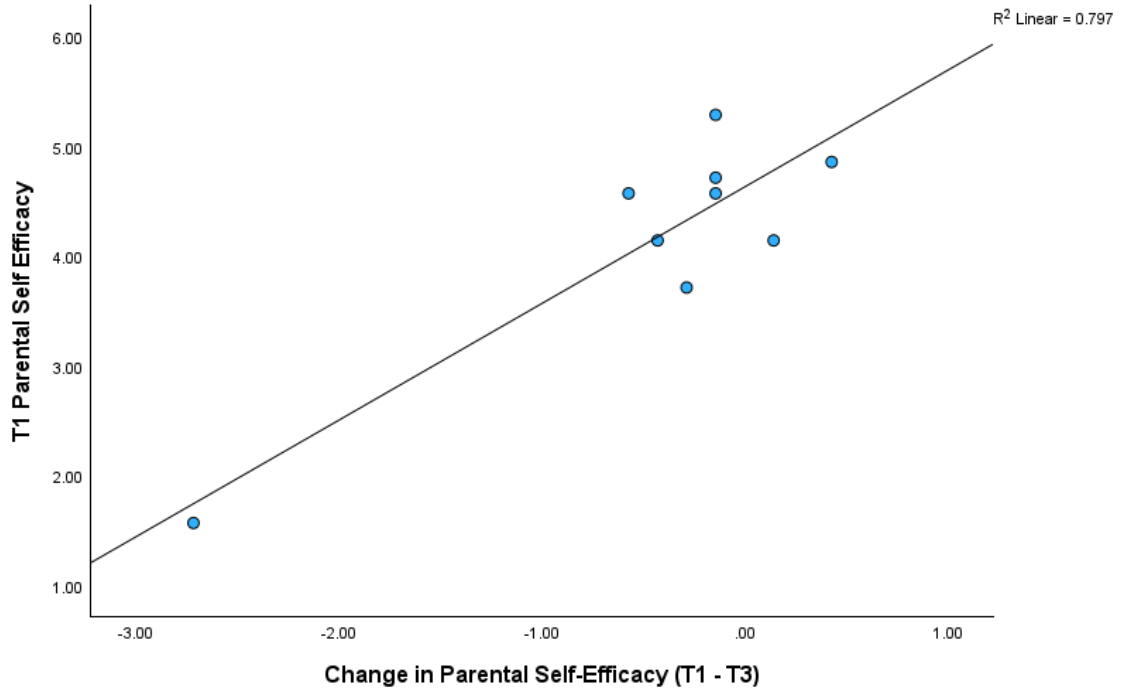
Results of linear regression predicting change in parent-reported ADHD symptoms

Variable	Unstandardized B	SE	*β*	Sig.	Correlations		Tolerance
					Partial	Part	
(Constant)	1.747	1.467		.319			
SE Change	-.116	.468	-.182	.820	-.142	-.056	.094
CBA Change	-.119	.384	-.106	.776	-.177	-.070	.431
T1 Impairment	.110	.124	.247	.440	.456	.199	.652
T1 SE	.301	.386	.560	.493	.410	.175	.097
T1 CBA	-1.041	.302	-1.072	.041	-.894	-.775	.522

Note: *n* = 9. All variables were included in a single simple model. SE = Parental self-efficacy, CBA = Child-blaming attributions. Change values = T1 - T3.

Figure 2

Scatterplot showing relationship of parent self-efficacy at T1 and change in parent self-efficacy (T1-T3)



Teacher Group

Data Exploration

Table 7 includes descriptive statistics for teacher cognitions and reported child symptoms at each time point. Table 8 shows bivariate correlations between relevant variables at each time point. Using a Shapiro-Wilks test, scales at all time points appear to be normally distributed, with the exception of child-blaming attributions at T1 ($p=.01$). Further investigation of this distribution showed an individual outlier with the maximum possible score for child-blaming attributions, meaning that on a scale of 1-10, they chose 10 for every item. This is a significant numerical outlier. However, their scores remained quite high on this particular scale across time

points, so there is reason to think this participant was expressing a true opinion rather than being inattentive in their responding. Analysis of change values showed that change in both cognitions were normally distributed, however, change in ADHD symptoms was not (*p=.012,* Shapiro-Wilks test). There was a single outlier individual who reported considerable reduction in child symptoms, while most participants reported very little. To maintain power, and due to the robustness of tests to non-normality, data were included in analyses without attempting to correct for outliers. However, the potential impact of these outliers will be considered where relevant, and additional caution will be used when interpreting results.

Table 7

Descriptive statistics for teacher-reported variables at times 1, 2, and 3

	Minimum Statistic	Maximum Statistic	Mean Statistic	Standard Deviation	Skewness Statistic
ADHD Symptoms					
T1	1.61	3.00	2.1173	.44047	.885
T2	1.44	2.56	1.9684	.33713	.060
T3	.50	2.50	1.7284	.66519	-.554
Teacher Self-Efficacy					
T1	5.08	8.38	6.8333	1.12423	-.236
T2	6.50	7.91	7.1894	.51564	-.184
T3	6.25	8.42	7.5093	.63798	-.712
Child-Blaming Attributions					
T1	3.89	10.00	5.5432	1.89786	1.949
T2	3.67	6.75	5.7315	.98933	-1.264
T3	1.75	8.00	4.9167	1.62714	-.130
Global Child Impairment					
T1	3.00	5.00	2.5556	1.01379	.270

Note: n = 9. Skewness statistic SE = .717.

Table 8

Pearson correlations between teacher-reported variables at times 1, 2, and 3

	ADHD Symptoms			Teacher Self-Efficacy			Child-Blaming Attributions		
	T1	T2	T3	T1	T2	T3	T1	T2	T3
ADHD Symptoms									
T2	-.140								
T3	.436	.334							
Teacher Self-Efficacy									
T1	-.207	.335	-.188						
T2	-.159	.467	.329	.694*					
T3	.354	-.028	.022	-.127	.131				
Child-Blaming Attributions									
T1	.534	-.104	.308	.472	.346	.114			
T2	-.389	.538	.448	.518	.832**	-.225	.136		
T3	-.356	-.036	-.153	.606	.504	.129	.442	.515	
Global Child Impairment									
T1	-.123	.379	.466	-.222	.150	-.091	-.198	.544	.173

Note: $n = 9$. p<.05 is denoted by a *, p<.01 is denoted by a **. All significance levels are for a 2-tailed test.

Change in Cognitions

A repeated measures MANOVA was used to assess the change in teacher cognitions over the course of the intervention. Mauchley's test indicated likely violation of the sphericity assumption ($p=.049$) in teacher self-efficacy, and no significant sphericity concerns in teacher attributions. Neither self-efficacy ($\eta p^2=.196$, $p=.194$, using Greenhouse-Geisser correction) nor attributions ($\eta p^2=.114$, $p=.380$, with sphericity assumed) changed in a statistically significant way over the course of the intervention. However, as means in Table 7 show, child-blaming

attributions of teachers generally decreased over time, and teacher self-efficacy generally increased over time. Both showed improvement with moderate effect sizes in this sample, although change was not large enough on average to reach statistical significance. Output of the MANOVA can be seen in Table 9.

Table 9

Results of repeated measures MANOVA for change in teacher cognitions between time points

Measure	*df*	F	Sig.	Partial Eta Squared
Self-Efficacy	1.267	1.951	.194	.196
Child-Blaming Attributions	2	1.028	.380	.114

Note: $n = 9$. Greenhouse-Geisser correction used for self-efficacy. Sphericity assumed threshold used for child-blaming attributions.

Change in Reported Child Symptoms

A repeated measures ANCOVA was used to investigate the change in reported child ADHD symptoms over the course of the intervention. Mauchley's test did not indicate any concerns with sphericity. Teacher-reported child ADHD symptoms declined insignificantly throughout the course of the intervention, after controlling for pre-test teacher cognitions ($\eta p^2 = .110$, $p = .497$). Neither of the pre-test cognitions showed a significant interaction with the effect of time. However, trend analysis showed that a quadratic trend was present in the interaction of both self-efficacy ($\eta p^2 = .691$, $p = .011$) and child-blaming attributions ($\eta p^2 = .712$, $p = .008$) with time. Because of the interactions present, it may not be informative to consider the main effect as a good representation of change in symptoms throughout the intervention. Tables 10 and 11 show relevant results of the ANCOVA.

Table 10

Results of repeated measures ANCOVA tests of within-subjects effects for change in teacher-reported ADHD symptoms

Source	F	Sig.	Partial Eta Squared
Time	.742	.497	.110
Time x SE	2.838	.098	.321
Time x CBA	2.565	.118	.299

Note: $n = 9$. $df = 2$ for all sources. Sphericity-assumed significance values used. SE = Teacher self-efficacy, CBA = Child-blaming attributions.

Table 11

Results of repeated measures ANCOVA tests of within-subjects contrasts for change in teacher-reported ADHD symptoms

Measure	Time	F	Sig	Partial Eta Squared
Time	Linear	.014	.911	.002
	Quadratic	3.830	.098	.390
Time x SE	Linear	.004	.952	.001
	Quadratic	14.845	.008	.712
Time x CBA	Linear	.008	.931	.001
	Quadratic	13.394	.011	.691

Note: $n = 9$. $df = 1$ for all sources. SE = Teacher self-efficacy, CBA = Child-blaming attributions. Shows trends over time points for data overall (Time) as well as trends for interactions between time and child-blaming attributions and time and teacher self-efficacy.

To further understand how the program worked for participants and their students, reported change in individual students' symptoms will be considered in light of clinical impact. In the teacher group, two of the nine children reported on showed improvement that could be

considered clinically meaningful (Goodman et al., 2010), with one participant reporting a very large change. Four participants reported smaller improvements, one reported no change, and two reported small symptom increases. Level of change did not show a linear relationship with either pre-test self-efficacy or pre-test child-blaming attributions (see Figures 3 and 4). Although many participants showed little overall change in symptoms, several individuals reported fluctuations between times 1 or 3 and time 2 which approach a level of clinical meaning. Although it is unclear why symptom reports fluctuated so much, these trajectories may help explain the quadratic trends identified in the ANCOVA analysis.

Figure 3

Relationship of change in teacher-reported ADHD symptoms and teacher self-efficacy at T1

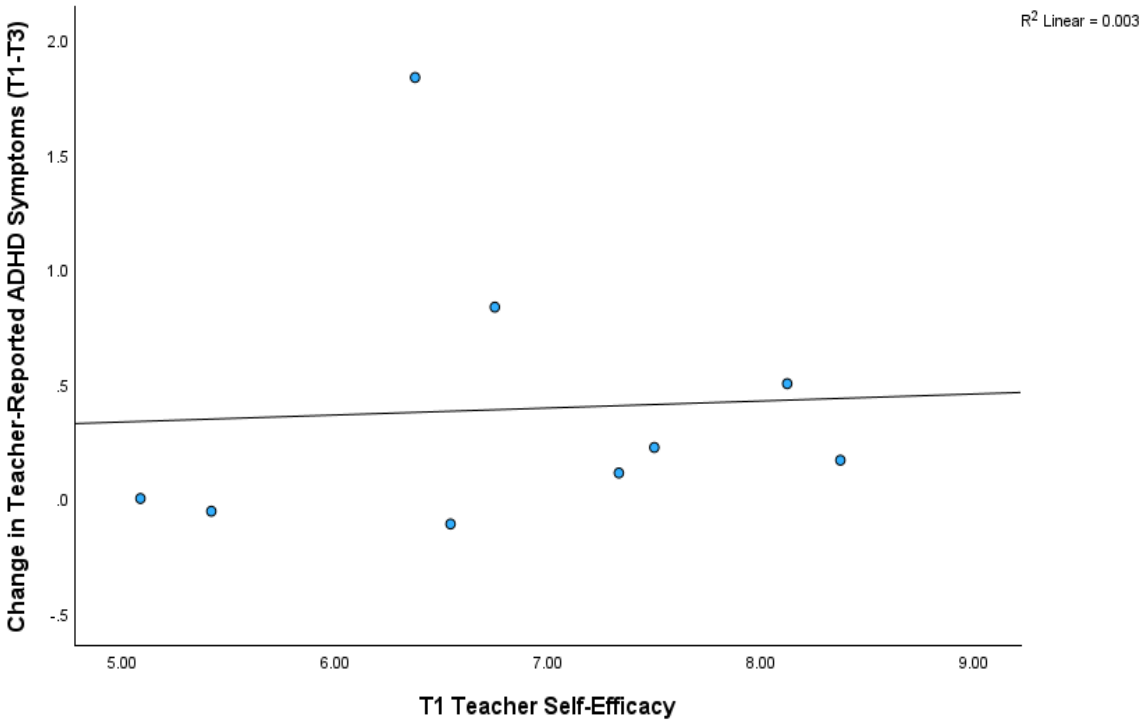
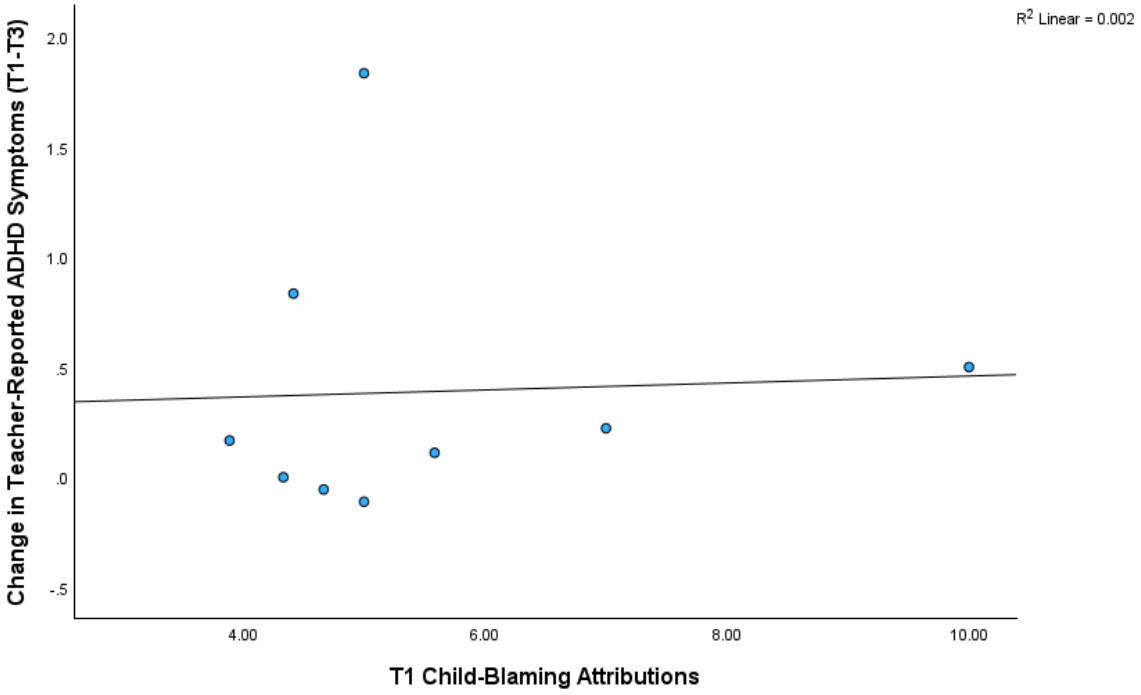


Figure 4

Relationship of change in teacher-reported ADHD symptoms and child-blaming attributions at T1



Effect of Changing Cognitions on Child Outcomes

The independent effect of changes in cognition on changes in reported symptoms was assessed using a linear regression. Neither change in self-efficacy nor change in child-blaming attributions were predictive of change in ADHD symptoms when included in a model accounting for pre-test teacher cognitions and child impairment. The overall model was insignificant (*p=.836*), and none of the predictors approached significance. No concerns with multicollinearity were observed in this model. Caution is needed in interpreting this model due to the presence of a significant outlier in the DV, as discussed previously. Detailed output of the model is shown in Table 12.

Table 12

Results of linear regression predicting change in teacher-reported ADHD symptoms

Variable	Unstandardized B	SE	β	Sig.	Correlations		Tolerance
					Partial	Part	
(Constant)	1.902	5.427		.749			
SE Change	-.159	.474	-.351	.759	-.190	-.151	.186
CBA Change	-.031	.257	-.093	.913	-.069	-.054	.333
T1 Impairment	-.577	.492	-.623	.325	-.561	-.530	.721
T1 SE	.124	.698	.225	.871	.102	.080	.126
T1 CBA	-.002	.273	-.005	.996	-.003	-.002	.288

Note: $n = 9$. All variables were included in a single simple model. SE = Teacher self-efficacy, CBA = Child-blaming attributions. Change values = T1 - T3.

Discussion

Parent Intervention

This research sought to understand the impact of the ABC BPT program on the cognitions of parent participants and the level of ADHD symptoms they saw in their children. Parent results show promising indications that reported ADHD symptoms improved over the course of the intervention. One third of the children reported on showed a clinically meaningful improvement, and none showed clinically meaningful worsening of symptoms. Interestingly, improvement in symptoms over time appeared to be influenced by the level of child-blaming attributions at pre-test. Low child-blaming was associated with greater improvements in symptoms. This finding is aligned with emerging literature suggesting that child-blaming attributions are a relevant predictor of child improvement in parenting programs, as well as predicting parent non-attendance (Chacko et al., 2017; Sawrikar & Dadds, 2018). The implications of this relationship are very relevant; it may be that low levels of child-blaming

form a cognitive environment that is friendly to the types of intervention methods used here, or that parents who tend to blame their children more are less primed to receive and benefit from such intervention. This finding highlights the importance of parental attributions as a factor in intervention outcomes, and suggests a need for future research to understand how interventions work for parents with different cognitions and perspectives. A better understanding of this issue has potential clinical implications; parents who tend to make child blaming attributions may be better served by a different type of intervention, or by intervention that can help to ameliorate these cognitions before attempting to target parenting behaviour. Information on how to help such parents and what recommendations are likely to be effective in their cases could be key for clinical decision making.

In response to the literature showing the impact of pre-intervention cognitions, one of the aims of this program was to improve parent cognitions over time in the hope that this would improve engagement with the program and child outcomes. Although this data affirms the relevance of pre-test cognitions, particularly attributions, the intervention was not associated with any change in attributions, and it appears that a slight mean improvement in self-efficacy may be due to the effect of an outlier. This means that it is very difficult to determine statistically whether a change in cognitions could improve outcomes for a participant, as, potentially due to small sample size or under-performance of cognitive training content, there were not enough participants who saw meaningful change in cognitions to inform this analysis adequately. Although the regression assessing the impact of cognitive change was carried out as planned, it is unsurprising that in a small sample with so few participants experiencing meaningful change in cognitions, neither change variable was significantly predictive.

Within the context of the small sample size, analyses were not able to capture statistically-significant change in parent cognitions during the intervention. If this program is not related to improvement in cognitions, this suggests that the cognitive elements of the program may not be able to produce their intended outcome. Previous research has generally shown that parenting self-efficacy, as well as other parenting cognitions, can be impacted by parenting programs; however, most of this research was completed using larger samples and reporting statistical significance rather than effect sizes (Colalillo & Johnston, 2016), making it challenging to assess how the present effect sizes compare to those in other studies. It may be that this study lacked the power to detect change, particularly for self-efficacy which showed an increase of a moderate effect size, but it may also be the case that parenting cognitions did not change throughout the intervention.

There are several possible explanations for a lack of change in parenting cognitions. Parents are typically busy individuals with limited time, and it may be that they felt their effort would be best rewarded by focusing on the behavioural elements of the program. These elements may be more tangible, and if they have an immediate impact on child behaviour, more rewarding for parents. Cognitive change can be achieved through intervention, but this requires significant effort over time (Lorenzo-Luaces et al., 2015). In addition to parents potentially focusing their effort more on other aspects of the program, the time-scale of measurement used here may not be sufficient to capture changes in cognitions. There also may simply not have been enough cognitively-focused content in the program to produce change; future research is needed to better understand the level of cognitive content, as opposed to psychoeducational or other content, that is needed to produce cognitive change in this time span.

One notable possibility explaining the lack of cognitive change in this particular sample of parents is that they may have needed more intensive cognitive intervention to alter their cognitions than would be expected for the general population. Though they were diverse in some ways, almost all of the parent participants indicated that they had experienced mental health difficulties, with 5/7 indicating challenges that include anxiety or depression. Both of these are mental health challenges that frequently come with cognitive distortions as part of the symptomology, and cognitive-behavioural therapy is often recommended as an intervention (American Psychiatric Association, 2022; A. T. Beck & Haigh, 2014). It is possible that as a group particularly influenced by mental health challenges, these parents may have needed more intervention to improve cognitions than is practical within the constraints of this parenting program.

Although future research may be beneficial to understand whether the cognitive elements of this program would be sufficient to produce change in a more general population, it is also important to consider that many parents of children with ADHD in general struggle with their mental health. Parents of a child with ADHD are at higher risk for several types of mental health difficulty, including depression and anxiety as well as ADHD (Cheung & Theule, 2016; Friedman et al., 2020; Robinson et al., 2024). Parental mental health challenges, and even a history of mental health challenges, can be associated with difficulty in implementing positive parenting practices (Thomas et al., 2015). Parents struggling with their mental health also tend to have lower engagement and less positive outcomes in BPT than other parents (Friedman et al., 2020; Pelham & Fabiano, 2008). Therefore, a program aiming to help the parents of children with ADHD also needs to take into account the impacts of mental health difficulties on program participation. Further research into program outcomes for parents with varying levels of mental

health difficulties and their associated impacts on cognitions could also be useful for clinicians when determining recommendations for a family where a parent or parents have mental health challenges. Future research seeking to understand the amount of cognitive content needed in a program to produce change, as recommended above, could include parents with and without mental health challenges to improve program tailoring. Research has already begun to investigate benefits of parent mental health intervention as an accompaniment to or component of parent training with promising results (Chronis-Tuscano et al., 2017; Novick et al., 2022).

Teacher Intervention

Just as for parents, the teacher intervention aimed to help teachers improve any maladaptive cognitions they may have and work with students who have ADHD in a way that improved their behavioural symptoms. Teacher results showed general statistically insignificant improvements in both cognitions and reported child ADHD symptoms. While symptom improvement was less clear than in the parent group, teachers did still report improvement on average. They also reported some improvement in attributions, where the parent group did not. Two children were reported to have improved to a clinically meaningful degree, and as in the parent group, no clinically meaningful worsening of symptoms was reported.

It is unclear why the teacher group did not report symptom improvements to the same degree that the parent group did, though there are many possibilities. It may be that as parents spend a good deal of time with their children individually, and teachers primarily see their students in large groups, the impact that teachers have on students is smaller than the impact a parent would have on their child. Because of the number of students they work with, teachers may also have less time to observe a child's behaviour, and small changes in behaviour may be less apparent in a classroom setting. It is also possible that a classroom setting, which is

dynamic, difficult to control, and may offer a lot of distractions, is a less facilitative environment for behaviour change among children with ADHD. Though evidence has previously shown that intensive teacher interventions can impact child ADHD symptoms, programs vary in their inclusion of psychoeducational, behavioural, cognitive, pedagogical, and other content (Aldabbagh et al., 2024; Corkum et al., 2019; Froelich et al., 2012). Future research is still needed to understand which elements of programming for teachers are most effective in the unique classroom environment. It is also important to remember that this study included a limited sample, and it is possible that random influences of individual participants or children could have impacted the results, particularly given the presence of a considerable outlier in reported symptom change. Future research can investigate whether the program consistently produces smaller effect sizes among teachers with respect to child ADHD symptoms, or whether the apparent contrast is simply a factor of this sample.

It is interesting that in contrast to the parent sample, pre-intervention child-blaming attributions did not predict symptom change in the teacher sample. Much of the previous literature on the impact of attributions on program outcomes focuses on parents (e.g., Chacko et al., 2017; Sawrikar & Dadds, 2018) and not teachers. It is possible that cognitions have a different impact in the two groups. It is also important to note that different measures validated for the appropriate populations were used in this research to assess parent and teacher attributions, and it is possible that variations in the measurement influenced the apparent outcomes. This pilot study is not designed to produce generalizable outcomes, thus, no statistical tests compared the parent and teacher groups, so differences between them are purely observational. However, this study is one of the first in the ADHD research literature to include teachers in programming of a similar intensity to what is offered for parents. These results raise

interesting questions for future research, including whether attributions tend to have an impact for teachers in similar programs to this one, and whether there are differences in how cognitive processes impact the way parents and teachers implement behavioural strategies.

Strengths

There are several notable strengths of this research. One major strength is a relative lack of attrition. Attrition is a very common problem in BPT research, with up to half of participants not completing the intervention in some studies, and an average attrition rate around 26% (Chacko et al., 2016). The current study had very limited attrition, with only one parent participant not completing the program, and no attrition in the teacher group. This lack of attrition may be due to the differences between the cognitively-enhanced content of the ABC program and standard behaviourally-oriented BPT. Cognitively-enhanced content encourages self-reflection with respect to self-confidence and explanations regarding child challenges, and this greater self-exploration may be a potential reason for such adherence. Social support and training to improve emotion regulation have been identified by previous research as a factor in BPT acceptability for parents (Raulston et al., 2019). Given that this pilot study is not designed to be generalizable, we cannot draw conclusions about the likeliness of attrition for the intervention per se moving forward. However, it seems clear that the current findings are not likely to have been strongly influenced by attrition – that is, the results are likely not due to people for whom the program was not working dropping out in large numbers. This increases confidence in the promising results of the pilot study.

Another strength of this research is the educational and situational diversity of the sample, especially in the parent group. Accessibility is often a major concern in BPT research, with lower income participants, single parents, and other groups with lower treatment access

often experiencing worse outcomes and greater attrition (Lavigne et al., 2010; Schneider et al., 2013). Since parent participants indicated a wide array of education levels, professions, and family circumstances, the promising results observed here are less likely to be partially due to the influence of financial means, high participant education, or partner support. Although teachers were naturally more homogenous in terms of education and profession, there was still some variation among teachers in education level, as well as considerable variation in age, partner occupation, and marital and parental status. Inclusion of teachers of different ages, who are at different stages in their careers, and who have different experiences with children of their own also means that teacher results are less likely to be due to an unintended quirk of the sample (such as all teachers having been fairly recent graduates, which might have impacted how they would interact with the program).

Limitations

There are also several meaningful limitations to this research. Firstly, this is a small pilot study with three treatment groups, but no control groups. This means that we cannot ensure that the symptom improvements observed are not due to the effects of time and maturation, rather than the intervention itself. We also cannot compare the ABC program to other parent/teacher-focused ADHD psychosocial treatment methods to identify clinical utility of the program compared to other childhood ADHD interventions that are currently available. Because of the small size of the sample, statistical power is also limited, meaning it was not practical to include a large number of variables in the analysis. This may have led to an important factor being overlooked. Especially in the parent sample, as it consists of a single treatment group, there may also be unique influences of the group dynamic that would be better controlled for in a larger study.

One methodological limitation to this study is the reliance on participant reports of child behaviour and symptoms. Diagnostic evaluations and psychosocial interventions regularly rely on self-reports as standard and well-validated components of the process (Pelham et al., 2005). However, it is still important to note that these reports could be influenced by many factors, including participant biases, the limited situations in which the participant observes the child, or other unique factors. As participants are aware that they are receiving an intervention that aims to improve the child's symptoms, a placebo effect could alter their perceptions of child behaviour after beginning the program. A key component of the program also aims to improve participant cognitions about their children/students, and encourages them to notice and comment on positive behaviours shown by the children. Although child-blaming attributions did not appear to be strongly impacted by the program, it is possible that this coaching could contribute to changes in participant perceptions of child behaviour. While changes in perceptions of child behaviour could reflect perceptions becoming more aligned with reality, they could nonetheless introduce a confound between parent cognitive change and child symptom change. Although no method of measuring child behaviour is perfect, using a multi-rater approach by incorporating the report of a parent/second parent, teacher, or other relevant reporter could help improve report validity and is aligned with current recommendations for assessing child ADHD symptoms (Alperin et al., 2023; American Academy of Pediatrics, 2011; Tripp et al., 2006). Generalizable observations by a researcher could also potentially improve quality of information on child behaviour (Aspland & Gardner, 2003; Hayden et al., 2010; Jiang et al., 2019).

A lack of gender and ethnic diversity could also be a limitation in this study. Although there was some ethnic diversity in both samples, they were still majority White, and analyses of participants of minority backgrounds were not able to be conducted to determine whether there

were differential outcomes based on ethnicity. As previous research has sometimes shown disparities in BPT outcomes, as well as other ADHD intervention outcomes, based on ethnicity (Green et al., 2020; Lavigne et al., 2010; Schneider et al., 2013), this is an important area to address. Gender diversity was also lacking as parent participants all self-identified as women and female, and most teacher participants self-identified as women and female. Future studies should examine individuals who do not identify as cisgender along with caregivers and teachers who identify as male and men within this program. It is possible that participants of various gender identities may respond differently to the program, and also that children might respond differently to participant behaviour depending on gender role and biological sex. This may be especially true regarding parent participants, as in family structures with heterosexual parents, parents may take on gendered parenting practices, and children may respond differently to the parenting behaviour of their mother compared to their father (Muñoz-Suazo et al., 2020; Piotrowska et al., 2017). The fact that two of the three intervention groups were all-female also means that the group dynamics could have been influenced by sex and gender compositions.

Lastly, another limitation is that in the parent group, two parents reported on more than one child. The reports of all children were included in analyses using child outcomes as the dependent variable, in order to improve power and utilize all relevant data; however, this introduces a greater degree of non-independence into the sample, which may already have been impacted by the fact that participants met each other and frequently interacted during the course of the intervention. Instructions on measures of self-efficacy and attributions specified that answers should be specific to the child in question, and the parents who reported on two children generally did not report exactly the same (and sometimes reported considerably different)

cognitions regarding both of them. Still, it is important to note that statistical analyses might have been impacted by this aspect of the data.

Future Directions

This research raises several new questions, and there are many relevant paths for future research to build upon current findings. Firstly, after finding promising results with this pilot study, the next step is to carry out a larger study with more robust controls. A larger sample size could improve the statistical power and reliability of the results. Such a study should also include a comparison group; a waitlist control could be a good option to rule out maturation effects. It would be ideal to have an additional comparison group who received a standard behavioural program, to determine how outcomes in the ABC program compare to those from currently available BPT programs. Other changes could also help improve the robustness of future results, including gathering data on child outcomes from more sources and improving gender and ethnic diversity among participants.

Another potential research direction would involve further testing of the cognitive intervention methods used here. In this limited sample and within the constraints of the analyses, there did not appear to be significant change in cognitions. Many factors could have contributed to a potential lack of change. Idiosyncrasies within the sample, such as the high level of psychological challenges reported by parent participants, could have uniquely influenced the responsiveness of these participants to the cognitive intervention. The size of the sample could also mean that the study simply lacked the power to detect a small to medium size change. However, it could also be that some elements of the intervention are not useful in this population, or that a greater amount of cognitive-focused content is needed to foster change. Future research could involve getting feedback on cognitive training components from parents and teachers to

identify any elements that were not well understood, not well-tailored, or were especially difficult to implement. More robust quantitative study of the program, as described in the previous paragraph, could also be used to rule out anomalies due to this particular sample or insufficient power.

To further assess the impact of cognitions and cognitive change, future larger-scale research could investigate particular individuals who saw the greatest and least amount of cognitive change throughout the course of the intervention. In-depth study of these individuals could further elucidate pathways of cognitive change, potentially identifying covariates or conditions that are associated with change in cognitions. This could also provide further data on whether change in cognitions can promote or is associated with change in child behaviour, which is consistent with recent research on BPT moving beyond behavioural treatment alone (e.g., Chronis-Tuscano et al., 2017; Novick et al., 2022).

Conclusions

Overall, the results of this pilot study show that the ABC program is a promising potential intervention for childhood ADHD, particularly if implemented with parents. Both parent and teacher participants tended to report decreases in the ADHD symptoms of their children/students over the course of the intervention, although this finding was not significant for the teacher group. Baseline parent attributions were significantly associated with child ADHD symptom improvement such that less negative parental attributions of child behaviour were related to more positive child ADHD symptom change. This study represents the first of its kind with a teacher-focused 8-week intensive psychosocial program for child ADHD, and showed no attrition from the two teacher groups involved. In addition, low attrition among parent participants contrasts with the high attrition rates often seen in literature on existing BPT

programs which do not include a significant cognitive component. These promising aspects of the program are limited within its sample and design, but underline the significant need for future work in this area with a wider population. Indeed, future research is warranted to assess these findings in a larger and more diverse sample, and investigate how the program compares to other available BPT programs for ADHD. Much less consistent change was reported in child-blaming attributions and self-efficacy, making it difficult to assess whether change in cognitions and change in child symptoms may be related. Further research can help clarify the impact of the program on participant cognitions and potentially provide insight into improving cognitive elements of the intervention. Although this data did not show meaningful average change in cognitions, it did highlight that, for parents, child-blaming attributions could be negatively related to their outcomes in parenting programs. This finding emphasizes the need for continued investigation of methods to produce change in parenting cognitions, as well as research into intervention methods that may be more effective for parents with a tendency towards child-blaming. If similar results can be found within a standardized design such as a Randomized Controlled Trial (RCT), the level of child-blaming attributions may become a relevant consideration for clinicians making intervention recommendations, and information on which interventions are best tailored for such parents would be especially useful.

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