The Role of Occupational Therapy with Children with Attention Disorders

By

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Abstract

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Introduction: Children with attention deficit hyperactivity disorder (ADHD), a prevalent neurobehavioural childhood disorder, demonstrate a persistent pattern of inattention and hyperactive and/or impulsive behavior that is more severe than their typically developing peers. The current literature has examined issues of clinical diagnosis and pharmacological management of ADHD. There is a need to better understand the associated functional limitations and participation restrictions in ADHD. Occupational therapists are uniquely suited to address this perspective.

Objectives: Grounded in implementation science, the first part of this project aimed to examine the available literature describing occupational therapy (OT) assessment and treatment interventions with children/youth with attention disorders. The second part involved disseminating an online survey to examine the level and nature of involvement of Canadian OT practice with children with ADHD. The purpose of this synthesis was to identify the scope of OT practice, indicate potential research and practice gaps, and to discuss future implications with respect to OT for children with attention disorders.

Methods: First, a scoping study framework was used to review the literature published 1985-2015. Included were studies of participants aged 3-18 years with attention difficulties and the involvement of an occupational therapist as researcher or practitioner. The International Classification of Functioning Disability and Health-Child/Youth (ICF-CY) served as a taxonomy to guide the thematic analysis. For the second part, a bilingual national survey was created based on scoping review findings and interviews with experts in pediatrics' and knowledge translation.

The survey link was sent to pediatric OTs across Canada through mailing lists obtained from national and provincial orders.

Results: For the scoping study, after removing duplicates, 118/420 papers met the inclusion criteria. Of these, 21% (n=25) were grey literature. Approximately half of the empirical papers (n=86) discussed impairments in children/youth with ADHD (43% [n=37]), often exploring co-existing difficulties (e.g. sensory processing and motor skills). A slightly smaller number of papers addressed outcomes describing childhood occupations or activities/participation restrictions (36%; [n=31]), fewer described environmental/contextual factors (21% [n=18]). Only 22% (19/86) examined the effects of an intervention. In the second part of the study, a total of 172 surveys were completed (response rate =10.1%). Approximately 59% of OT respondents working in pediatrics reported 26-75% of their caseload consisted of children with ADHD. Greater than 90% of respondents reported using OT interventions to improve fine motor functioning, sensory processing, and school functioning in their treatment of children with attentional disorders. The most common form of service delivery was individualized sessions, followed by consultation.

Conclusions: The thematic analysis revealed OTs were implicated across all levels of functioning as per the ICF-CY: body structures/functions, activities, participation and at the environmental level. Results highlighted the lack of high quality evidence for OT interventions with children with attention disorders, particularly experimental research on interventions for functional outcomes. Survey results were reflective of scoping review results. OTs generally used sensory-based principles to address the symptoms of children with ADHD. Consultative service delivery models require further investigation with respect to working with this

population. Potential gaps and implications at the research, practice and organizational levels are discussed to further support the role of OT with this population.

Résumé

Le rôle de l'ergothérapie auprès des enfants et des jeunes ayant des troubles de l'attention

Introduction: Les enfants atteints d'un trouble du déficit de l'attention avec hyperactivité (TDAH), un trouble neurocomportemental assez répandue à l'enfance, démontrent généralement un comportement persistant d'inattention et un comportement hyperactif et / ou impulsif plus sévère que leurs pairs. La littérature scientifique sur le sujet indique le besoin de prôner une approche holistique pour comprendre les limites fonctionnelles et les restrictions de participation associées au profil complexe de l'enfant atteint d'un trouble de l'attention. Les ergothérapeutes se trouvent dans une position privilégiée pour faire progresser la compréhension du déficit de l'attention chez les enfants.

Objectifs: Fondé sur la science d'application des connaissances, la première partie de ce projet visait à examiner la littérature disponible en décrivant la recherche et les pratiques en ergothérapie chez les enfants / jeunes souffrant de troubles de l'attention. La deuxième partie a consisté de diffuser un sondage électronique afin d'examiner le niveau et la nature de l'implication des ergothérapeutes canadiennes auprès de cette population. Le but de cette synthèse est d'identifier la portée de la pratique, d'aborder les lacunes et de discuter des implications futures en ce qui concerne l'ergothérapie auprès des enfants ayant des troubles de l'attention.

Méthodes: Une étude de délimitation de l'étendue a été effectuée en vue d'examiner des études réaliser entre 1985-2015. Les études comprenaient des participants de 3 à 18 ans ayant des difficultés d'attention, ainsi que la participation d'un ergothérapeute comme chercheur ou praticien. « La classification internationale du fonctionnement, du handicap et de la santé –

Version pour enfants et adolescents » (CIF-EA) a servi comme taxonomie pour guider l'analyse thématique. Pour la deuxième partie, un sondage bilingue a été créé sur la base des résultats de l'étude de délimitation de l'étendue. De plus, des discussions avec des experts dans la science d'application des connaissances ont contribué au développement du sondage. Le lien de sondage a été envoyé aux ergothérapeutes pédiatriques au Canada par les listes de diffusion obtenues par les ordres professionnels provinciaux et l'Association canadienne des ergothérapeutes (ACE).

Résultats: Après avoir supprimé les doublons, 118/420 études répondaient aux critères d'inclusion. Parmi ceux-ci, 21% (n = 25) consistaient de la « littérature grise. » Les études empiriques (n = 86) ont discuté : des déficiences (43% [n = 37]), explorant souvent des difficultés co-existantes (par exemple, les habiletés sensoriels et compétences motrices); résultats décrivant les occupations d'enfance ou les activités / restrictions de participation (36%; [n = 31]); et facteurs environnementaux / contextuels (21% [n = 18]). Seulement 22% (19/86) ont examiné les effets d'une intervention. Dans la deuxième partie, un total de 172 sondages ont été complétés, correspondant à un taux de réponse de 10.1%. Environ 59% des ergothérapeutes travaillant en pédiatrie ont déclaré que 26 à 75% de leur clientèle se composait d'enfants atteints de TDAH. Plus de 90% des répondants ont déclaré utiliser des interventions pour améliorer le fonctionnement moteur, le traitement sensoriel et le fonctionnement scolaire. La méthode la plus courante de prestation des services en ergothérapie était par des sessions individuelles, suivi par l'approche de consultation.

Conclusions: L'analyse thématique révèle que les ergothérapeutes sont impliqués dans tous les niveaux de fonctionnement selon le CIF-EA: niveau de fonctions organiques et structures anatomiques, niveau d'activités et participation et au niveau environnemental. Les résultats mettent en évidence le manque de preuves de haute qualité pour les interventions en ergothérapie

auprès des enfants atteints de troubles de l'attention, en particulier la recherche empirique sur les interventions fonctionnelles. Les résultats du sondage reflètent les résultats de l'étude de délimitation de l'étendue. Les ergothérapeutes utilisent généralement des principes sensoriels pour traiter les symptômes des enfants atteints de TDAH. Les modèles consultatifs de prestation de services nécessitent une enquête plus approfondie en ce qui concerne le travail avec cette population. Les lacunes potentielles et les implications au niveau de la recherche, de la pratique et de l'organisation sont discutées pour soutenir davantage le rôle de l'ergothérapie avec cette population.

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Preface & Contribution of Authors

This thesis was written to fulfill the graduation requirements of a Master's in Rehabilitation Science. Grounded in implementation science, the project was carried out in two distinct parts to develop a comprehensive synthesis of the findings. The first part was a scoping review of the occupational therapy literature for children with attention disorders. Following this, the second part, a national survey was disseminated to Canadian occupational therapists to examine their assessment and intervention practices when working with this population. The synthesis of both parts of the project highlighted potential implications for research and practice, as well as areas for future growth in the field of pediatric occupational therapy for children with attention disorders.

Contributions to this thesis were made by the supervisory committee members: Dr. Laurie Snider, Dr. Barbara Mazer, and Dr. Aliki Thomas.

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CHAPTER I: INTRODUCTION AND RATIONALE

1.1 Attention deficit/hyperactivity disorder among school children

Attention deficit/hyperactivity disorder (ADHD) is the most common neurobehavioral disorder of childhood, and affects the academic achievement, well-being, and social interactions of children (Subcommittee on Attention-Deficit/Hyperactivity Disorder & Management, 2011). It is a highly prevalent condition estimated at 3% to 8% of school-age children (Jitendra, Dupaul, Someki, & Tresco, 2008; Power, Tresco, & Cassano, 2009). The worldwide pooled prevalence, based on the findings of a systematic review, is 5.29% (Polanczyk, de Lima, Horta, Biederman, & Rohde, 2007). In children, ADHD is characterized by a persistent pattern of inattention and/or hyperactive and impulsive behavior that is more frequent and severe than their typically developing peers (Efron, Sciberras, & Hassell, 2008). These impairments greatly compromise the participation of these children in daily activities, placing them at high risk for antisocial behavior, social exclusion and school expulsion (Efron et al., 2008; Loe & Feldman, 2007; Polderman, Boomsma, Bartels, Verhulst, & Huizink, 2010).

As traditionally used, *impairment* refers to a problem with a structure or organ of the body; *disability* is a functional limitation with regard to a particular activity; and *handicap* refers to a disadvantage in filling a role in life relative to a peer group (WHO, 2007). The core impairments in inattention, impulsiveness, and hyperactivity, serve as a "magnet" for other difficulties such as academic underachievement, high rates of noncompliance and aggression, and disturbances in peer relations (DuPaul & Stoner, 2004). Children with attention disorders often disrupt classroom activities and thus disable the learning of their classmates. Example of classroom disruptions include leaving their seats without permission, playing inappropriately with objects, repetitive tapping of hands and feet, and fidgeting in their chairs (DuPaul & Stoner,

2004). These children may shift from one uncompleted activity to the next, perform messy written work, make noises, and talk or touch things excessively (VandenBerg, 2001). The core impairments not only impact academic achievement in children with ADHD, they may contribute to functional disabilities which hinder social relationships and affect overall quality of life. Also, comorbid behavioural disorders (i.e. oppositional defiant disorder), mood disorders, anxiety disorders and learning disabilities (Spencer, Biederman, & Mick, 2007) may be present. Therefore, given the possible combined presence of all these problem areas, it is critical to have a multifaceted view and understanding of this disorder which affects all aspects of a child's functioning.

1.2 Assessment of ADHD: Shifting from clinical diagnosis to a focus on function

The diagnosis of ADHD relies heavily on the identification of specific behaviours as observed by a child's educator, parents and caregivers. With reference to the Diagnostic and Statistical Manual of Mental Disorders – Fifth Edition (DSM-V) criteria, for an ADHD diagnosis to be met, six symptoms of inattention and/or hyperactivity and impulsivity must be clearly identified. Within the most recent and fifth revision of the DSM, three clinical 'presentations' of ADHD are listed: 1) the combined presentation which includes both symptoms from the inattention and hyperactivity criteria; 2) the predominantly inattentive presentation in which the criteria for inattention are met but not for hyperactivity; 3) and the predominantly hyperactive/impulsive presentation in which the second criterion is met but not the first criterion (APA, 2013).

Research on assessment practices has focused on the diagnosis of ADHD (Ogg et al., 2013). Best practice guidelines recommend basing diagnosis on the DSM-V criteria; using interviews with the parent, teacher, and child (Handler & DuPaul, 2005). Many rating scales

have been developed based on the previous edition of the DSM, the DSM-IV (Collett, Ohan, & Myers, 2003). These narrow-band, or diagnostic specific scales, are typically completed by parents and/or teachers who are considered as optimal informants to report externalizing behaviours of ADHD in home and academic environments (Loeber, Green, Lahey, & Stouthamer-Loeber, 1991). Rating scales have been shown to be by far the most common sources of screening data (Atkins & Pelham, 1991; Demaray, Schaefer, & Delong, 2003; Loeber et al., 1991). Although the use of rating scales improves the reliability, breadth and efficiency of a screening assessment, a systematic review of national and international guidelines reports a general consensus in favour of the need for screening of comorbidities (Seixas, Weiss, & Müller, 2011). Specifically, in order to conduct a comprehensive diagnostic evaluation for ADHD, the use of both narrow-band scales (or diagnosis-specific) and broadband scales (i.e. scales that cover additional dimensions, including comorbidity) specific to the clinical presentation provides an optimal approach (Collett et al., 2003).

The research highlighting poor academic, educational and behavioural outcomes among children with ADHD is well documented (Loe & Feldman, 2007). However, professionals are increasingly encouraged to take on a more ecological approach to identify at-risk students before the problems become too significant, in order to match the interventions to the specific challenges that a student faces (Ogg et al., 2013). Among children presenting with attention difficulties, it is also important to determine the functional impairments that stem beyond the core symptom impairments of inattention, hyperactivity and impulsivity. The pattern of impairments in individual children with ADHD is quite heterogeneous (Garner et al., 2013). Keeping the ecological approach in mind, Lollar, Hartzell, and Evans (2012) explored both health conditions and functional difficulties among children with special health needs to better

understand the dimensional and dynamic characteristics of this population. They made the important distinction that professionals who provide therapeutic interventions focus on the functional limitations and restrictions in participation in everyday activities rather than depending solely on the diagnosis to guide treatment. The diagnosis of a chronic condition, such as ADHD, is usually stable whereas functioning can and does change over time. Thus, although much emphasis has been placed on the diagnosis of ADHD, as Pelham, Fabiano, and Massetti (2005) state, the fundamental reason for clinical assessment goes well beyond diagnosis.

Recent literature has shown that a complementary system for a more comprehensive and standardized assessment of functioning in the context of certain environmental and personal factors is necessary to derive clear indication for treatment (Bölte et al., 2013). The International Classification of Functioning, Disability and Health – Children and Youth (ICF-CY) provides a systematic framework for understanding and improving the health of children (WHO, 2007). Through the application of the ICF, separation of the signs/symptoms and consequences can permit better understanding of the disease pathophysiology (Üstün, 2007). It builds on the person-environment interaction which is implicit to the paradigm shift from a medical to a broader biopsychosocial model of disability (Simeonsson et al., 2003). Few studies have explored and advocated for the use of the ICF taxonomy to establish ICF core sets for ADHD, with the goal of creating a common language for the description of functioning in ADHD in different areas of life and across the lifespan (Bölte et al., 2013; Söderström et al., 2014; Üstün, 2007). These findings can thus have significant implications for health care practitioners, including occupational therapists. Regardless of the underlying pathology, what matters most is the alleviation of daily problems in family life, school, and relations with peers (Üstün, 2007). This is where the role of occupational therapy can assist in the assessment and treatment of these

various factors. Occupational therapy is based on the expertise of occupation, daily living, participation and performance in real context; thus the discipline can take on an active role in advancing the concepts within the ICF-CY (Cramm, Aiken, & Stewart, 2012; Darzins, Fone, & Darzins, 2006). In summary, a thorough assessment of functional skills may not only assist clinicians in making the diagnosis of an attention disorder, but can also facilitate the long-term intervention planning with these individuals. This can thereby highlight the vital role of an occupational therapist to participate in the ADHD management process.

1.3 Comorbidities associated with ADHD: Highlighting the need for comprehensive management

Children diagnosed with ADHD frequently present with comorbid conditions, such as developmental coordination disorder, behavioural disorders and learning difficulties (Dineen & Fitzgerald, 2010; Kadesjö & Gillberg, 2003; Amanda Kirby, Gill Salmon, & Lisa Edwards, 2007). Specifically, 50% of individuals diagnosed with ADHD meet the criteria for one or more additional psychiatric and developmental disorders (Brown, 2000). A study by Kadesjö and Gillberg (2003) found that 87% of children diagnosed with pure ADHD, as per DSM-III criteria, presented with at least one comorbidity. The two most commonly identified were oppositional defiant disorder and developmental coordination disorder. Kirby et al. (2007) used the Movement Assessment Battery for Children Checklist to assess a sample of 69 children diagnosed with ADHD and found that 19% presented with a 'movement problem' and an additional 16% were characterized as being 'at risk' for a movement difficulty. Another study by Harvey et al. (2009) demonstrated that boys with ADHD were not as proficient movers as their matched peers without ADHD. Previous research has reported on both fine and gross motor

difficulties among children diagnosed with ADHD (Kadesjö & Gillberg, 2003; Piek & Dyck, 2004; Pitcher, Piek, & Hay, 2003).

Early findings suggest that sensory modulation dysfunction may be an important, yet overlooked component of behaviours observed among children with ADHD (Mangeot, Miller, McIntosh, McGrath-Clarke, et al., 2001). As measured by parental reports, children with ADHD exhibit 'functional' manifestations of sensory problems - particularly in sensory seeking, auditory filtering, and in sensitivity to tactile, auditory, visual, taste, and olfactory stimuli. Abnormalities in sensory modulation on physiological measures have also been reported (Mangeot, Miller, McIntosh, McGrath-Clarke, et al. (2001). Mulligan (1996) found that children with sensory modulation disorders who are sensory seekers often have attention difficulties, poor impulse control and hyperactivity. Engel-Yeger and Ziv-On (2011) also found sensory processing disorder may negatively impact participation and activity preference of children with ADHD. A study by Davis, Pass, Finch, Dean, and Woodcock (2009) investigated the relationship between sensory-motor functioning and academic achievement, demonstrating that sensory-motor skills accounted for 65% and 31% of the variance in academic achievement and cognitive processing variables, respectively. This evidence suggests that early assessment of sensory-motor skills can contribute to the understanding of academic, behavioural and emotional problems in children with ADHD.

In terms of childhood occupations, several studies have also reported on poor handwriting (Brossard-Racine, Majnemer, Shevell, Snider, & Belanger, 2011). Poor handwriting legibility and slow writing speed were common in children newly diagnosed with ADHD and were associated with their poor motor abilities (Brossard-Racine et al., 2011; Shen, Lee, & Chen, 2012). It is noteworthy that motor difficulties have been reported to persist despite the use of

stimulant medication (Brossard-Racine, Shevell, Snider, Belanger, & Majnemer, 2012). Participation in leisure activities has also been reported to be poorer in children with ADHD (Engel-Yeger & Ziv-On, 2011; Shimoni, Engel-Yeger, & Tirosh, 2010). Furthermore, Yochman, Ornoy, and Parush (2006) compiled comprehensive functional profiles of child with ADHD (including sensory, motor, intellectual and language skills) and found that children with ADHD scored consistently lower in comparison to the control group across all measures. As a consequence, these difficulties in functioning in daily activities negatively interfere with a child's quality of life (Danckaerts et al., 2010).

1.4 Attention disorders: Need for a multidisciplinary perspective

When screening for attention disorders, such as ADHD, the importance of having a multidisciplinary view has been highlighted. For instance, teachers often refer children exhibiting the abovementioned behaviours for additional school support, documenting concerns about their problematic behaviours involving control and discipline, difficulties with social skills, poor academic performance and problems complying with instructions (Kos, Richdale, & Hay, 2006; Ogg et al., 2013; Sciutto, Terjesen, & Frank, 2000). Many studies to date have focused mainly on referrals made for psychological services, particularly in schools when students present with attention and behaviour problems (Bramlett, Murphy, Johnson, Wallingsford, & Hall, 2002; Landau & Burcham, 1995). However, little is known about the broader nature of requests for assistance, such as those made to school-based or multidisciplinary teams. Several authors within the occupational therapy, educational and medical literature have advocated for collaborative practice to provide services in a cohesive and holistic way so to 'maximize the impact of different disciplinary expertise' and design multifaceted interventions for children with attention disorders (Boshoff & Stewart, 2013; Press, Sumsion, & Wong, 2010,

p. 53; Chu & Reynolds, 2007a; Mulligan, 2001). With these points in mind, occupational therapists can play a vital role on the multi-disciplinary team in screening, assessment and intervention with children with attention disorders to address the broader range of co-existing difficulties.

1.5 The role of occupational therapists and the promotion of function

'Function' is a fundamental concept in occupational therapy practice. Occupational therapists may work directly with a children or indirectly via collaborative consultation with teachers or parents with a focus on skill development and capacity building in order to improve a child's level of functioning (Villeneuve, 2009). Occupational therapists enable implicated individuals (such as teachers, educational assistants, parents) to remove barriers to support the student, promote participation, and identify strategies or technologies that will afford a student the opportunity to succeed at school and daily life despite limitations imposed by his or her disability (Bundy, 1995; Case-Smith, Rogers, & Johnson, 2005). School being a child's main occupation, occupational therapists may also take part in inclusive education practices such that children with special needs are served to the optimal extent possible in the general education setting (Bundy, 1995).

Occupational therapists use their unique expertise to help children and youth with and without challenges to prepare for and perform important learning and developmental activities within their natural environment (Clark, Jackson, Polichino, & DeLany, 2011). Evaluation and intervention in occupational therapy address factors that influence functional abilities such as performance skills (e.g. motor skills and praxis skills, sensory-perceptual skills, emotional regulation skills, cognitive skills, communication and social skills), contexts and environments, activity demands and individual client factors (e.g. values and beliefs) (Clark et al., 2011;

Mulligan, 2001). Assessing these various capacities and factors can enable the occupational therapist to set realistic goals specific to the child and develop interventions aimed at optimizing a child's functioning.

With respect to occupational therapy practice and attention disorders or ADHD, one of the aims of occupational therapy assessment is to demonstrate the severity of the impact of inattention and impulsivity on children's function and learning capacity (Lane & Bundy, 2012). In addition, occupational therapists can provide valuable information regarding the co-morbidities prevalent among this population (Young, 2007). Given the profound impact that ADHD can have on a child's overall function, occupational therapists should have a primary role in assessment and intervention (Young, 2007).

There have been few published studies specifically describing the role of occupational therapy for children with ADHD (Chu & Reynolds, 2007a, 2007b). Chu and Reynolds (2007a) proposed an occupational therapy model of practice for children with ADHD with an emphasis on theoretical concepts relating to the child, the environment, the tasks, the interaction among these factors and the child's participation. Chu (2003a) further completed a review of the literature concerning ADHD and the multiple factors associated with this condition. These include neurological (e.g. genetic, neurochemical imbalances of dopamine and norepinephrine, sensory modulation dysfunction), psychological (e.g. poor attention and impulse control, problems with executive functions) and behavioural factors (e.g. poor social skills, hyperactivity, inattentiveness). These findings further add to the general consensus regarding the need for a comprehensive assessment of attention disorders that extends beyond the two-dimensional model of inattention and hyperactivity/impulsivity as described in the Diagnostic and Statistical Manual

of Mental Disorders – Fifth Edition (DSM-V) and as typically rated by teachers (Wolraich et al., 2003).

In terms of interventions and treatment of children with attention disorders, there is an upward trend in the prevalence of prescribed ADHD medications and ADHD diagnosis currently observed in Canadian school-age children (Brault & Lacourse, 2012). To note, a recent study by Currie, Stabile, and Jones (2014), explored the effects of a policy change in Quebec, Canada, which expanded coverage for prescription medications. They found that the change in policy was associated with an increase in the use of stimulant medication commonly prescribed in Quebec relative to the rest of Canada. They further explored whether this increase in medication use was associated with improvements in emotional functioning and academic function among children with ADHD. Little evidence of improvement in either the medium or the long term was found, suggesting that increasing medication use within a community had little positive benefit. These important findings can open the door to exploring other alternative or complementary methods to manage symptoms and impairments associated with attention disorders. Alternative modes of interventions, such as psychosocial or behavioral interventions are still lacking robust evidence of efficacy (Sonuga-Barke et al., 2013; Tannock, 2014). While occupational therapists can likely contribute to the overall management of children with attention disorders, to our knowledge there is no synthesis on the scope of occupational therapy research or practice with this population.

This creates an opportunity to further explore the role of occupational therapists working with children with ADHD. Therefore, the important first step in this pursuit is to methodically inquire as to what evidence currently exists regarding occupational therapy and attention disorders. Furthermore, it will be important to compare the available evidence to determine

which Canadian occupational therapists are currently doing in practice to provide suggestions and guide future research.

1.6 Research questions

1) What is known from the existing literature about occupational therapy research with children with attention disorders?
2) What is known from the existing literature about occupational therapists' practices, including assessment and interventions practices, in children presenting with an attention disorder?
3) In Canada, what are the current practices, including assessment and intervention approaches, of occupational therapists working with children with attention disorders?

1.7 Conceptual framework

In the context of research, 'synthesis' means the contextualization and integration of research findings of individual research studies within the larger body of knowledge on the topic (CIHR, 2014). Synthesis is a vital first step to bridge the gap from research to practice. The field that allows us to get a sense of what research gaps are is the science of *knowledge translation.*

Recent studies suggest that occupational therapists are not readily incorporating research evidence in clinical practice (Bennett et al., 2003; Cameron et al., 2005; Philibert, Snyder, Judd, & Windsor, 2003; Salls, Dolhi, Silverman, & Hansen, 2009). Overall, the administration and interpretation of standardized assessments as well as the implementation of effective evidence-based interventions is low (Chard, 2006; Gustafsson & McKenna, 2003; Hanna et al., 2007; Henderson & McMillan, 2002; Tempest & Roden, 2008). Thus, although evidence is available in these fields, the uptake of evidence has been poor.

The knowledge-to-action (KTA) framework (Graham et al., 2006; Straus, Tetroe, & Graham, 2009) concerns both knowledge creation and application. In the knowledge creation phase, the production of knowledge consists of three phases: knowledge inquiry, knowledge synthesis, and knowledge tools and/or product creation. In this part of the KTA cycle, knowledge is refined and tailored to be potentially more useful to end users. The seven steps of the action cycle can be followed sequentially or iteratively. Processes are undertaken to implement the knowledge: identify the problem/review the knowledge; adapt the knowledge to the local context; assess barriers and facilitators to knowledge use; select and tailor the interventions; monitor knowledge use; evaluate outcomes; and determine sustainability strategies.

The exploratory aim of this study aligns well with the *knowledge inquiry and knowledge synthesis* parts within the 'knowledge creation' phase of the KTA framework. *Knowledge inquiry* represents the multitude of studies or information of variable quality that is available and that may not be easily accessed (Graham et al., 2006). *Knowledge synthesis* is done to make sense of all the relevant knowledge. Since the role of an occupational therapy with children with attention disorders is a relatively new area of exploration, particularly in Canada, the science of KT can assist in understanding the current state of knowledge and evidence in the field and in identifying any gaps within this knowledge. KTA initiatives can result in such actions as: research in the area of occupational therapy with children with attention disorders, increase training opportunities for occupational therapists, or more awareness building of occupational therapy interventions in the area. Therefore, the focus of this research study will be framed within the "knowledge creation" phase, whereby a review and a synthesis of the pertinent and existing literature will be conducted. Furthermore, this synthesis will be further elaborated by

including information based on the actual practices of Canadian occupational therapists working with this population.

CHAPTER II: SCOPING REVIEW OF THE EVIDENCE

Scoping reviews are considered highly useful when an overview of the evidence is needed to determine priorities for future investigations or when a review is required to establish the evidence that currently exists when the topic has not been previously and comprehensively reviewed (Arksey & O'Malley, 2005). Scoping studies are commonly referred as "mapping" processes used to convey the breadth and depth of emerging or complex for which little is known (Levac, Colquhoun, & O'Brien, 2010). In contrast, systematic reviews focus on narrow questions with specific study designs decided a priori. Studies included in systematic reviews are appraised for the quality of the research, whereas scoping reviews do not exclude studies based on quality, but are inclusive and may allow commentaries or grey literature. Thus, to answer the first research question, a scoping review was undertaken to understand the current level of available evidence of the impact and role of occupational therapy and attention disorders.

2.1 Methods

The steps in carrying out the scoping review were based on the methodology proposed by Arksey and O'Malley (2005): identifying the research question(s), searching for relevant studies, selecting studies, charting the data, collating, summarizing, and reporting the results.

2.1.1 Identifying the research question

The research questions that guided the scoping review were: "What is known from the existing literature about occupational therapists' practices, including assessment and interventions practices, in children presenting with an attention disorder?" and "What is known from the existing literature about occupational therapy research with children with attention disorders?"

2.1.2 Identifying relevant studies and study selection

Determining relevant studies was an iterative process. Searches were built with the assistance of a research librarian who was familiar with health science databases as well as conducting literature reviews. Searches were conducted in CINAHL, Embase, ERIC, MEDLINE, PsycInfo, and PubMed, for studies and grey literature published from 1985 to 2015. To capture the breadth of the literature, the search strategy was tailored to target the key concepts: occupational therapy, children and attention disorders. Key words included combinations of *attention deficit disorder with hyperactivity, attention difficult*, attention disorder, attention deficit*, ADHD, ADDH, hyperkinetic syndrome*, hyper-kinetic disorder, occupational therapy, and ergotherap*.* A first search was conducted in MEDLINE, then modified for subsequent searches in the other databases. Studies were imported into the EndNote citation manager on March 4th, 2015.

2.1.3 Selecting inclusion and exclusion criteria

The patient population addressed in eligible studies was pre-school and school-aged adolescents (aged 3-17 years old) diagnosed with, or reported to have an attention disorder or attention difficulties. Involvement of occupational therapists as the primary interveners or as researchers of the study was also an inclusion criterion. Papers on outcome measures developed for use or applicable for children with attention disorders and relevant to occupational therapy were also included. Articles on surveys or questionnaires given to occupational therapists pertaining to children with attention disorders were also considered. Studies using quantitative, qualitative, and mixed-methods designs were eligible for inclusion; varying study designs as well as grey literature were included to provide a comprehensive commentary on the state of the literature. Grey literature (e.g. special interest articles, commentaries, relevant dissertations) was

included to have a complete view of the available evidence. Literature reviews and theoretical articles also met the inclusion criteria. Articles were excluded if they were not specific to children with attention difficulties (e.g. autism spectrum disorder, developmental coordination disorder), if involvement of occupational therapy was not indicated, or if they were not written in English. Books or chapter sections were excluded from the final list.

2.1.4 Charting the data

A data charting form was developed to record the following information for each study or article: author, title, year of publication, location of study/paper, primary category of the study (i.e. sensory processing, motor skills, activities of daily living, social skills, play skills, service delivery, knowledge and attitudes, etc.), setting, target population, study design, description of intervention, outcome measures, results, implications for practice, and ICF-CY constructs for the thematic analysis (Appendix A). A separate data charting form for papers studying outcome measures was also created to record: author, title, year, country, type of measure, target population, description of subtests/items, psychometrics, and the main ICF-CY constructs (Appendix B). The form was created following discussions with research committee members who were familiar with scoping study methods.

2.1.5 Collating, summarizing and reporting results

The study findings were analyzed both quantitatively and thematically. Numerical analysis underlined the distribution of the studies and papers (studies retrieved per database, per location, per year, etc.). Regarding the thematic analysis, the range and the types of studies, the types of interventions, and the primary categories were examined collectively to determine the strengths and weaknesses of this occupational therapy practice area. The thematic analysis was further supported using the International Classification of Functioning – Children and Youth

(ICF-CY) Taxonomy to classify the studies and papers. As discussed, ADHD can produce symptoms persisting into adulthood, affects multiple domains of life, and is a considerable source of disability (Üstün, 2007). For these reasons, the ICF-CY broad categories were used to map and classify the constructs of the included studies and papers identified in the scoping review.

The data were collected and collated using a data tracking chart, as abovementioned. This data collection and charting process provided an overview of all the material found in the articles. A quality appraisal was not carried out as scoping studies do not seek to assess the quality of the evidence (Arksey & O'Malley, 2005).

2.2 Results

There were a total of 661 records identified through database searching. After duplicates were removed, 420 records remained. After screening titles and abstracts, 188 records were rejected for the following reasons: population did not include children (n=24), the population did not include children with attention disorders (n=39), there was no involvement of occupational therapists or was not relevant to occupational therapy practice (n=25), the study was not published in English (n=24), or the paper was considered to be outside the scope of the research questions (n=76). Thus, 232 records remained. Following this, after assessing full texts, 111 met the inclusion criteria for eligibility. Seven additional records were added from external sources for a total of 118 papers (Figure 1). These 7 additional records were not identified through database searching. Rather, they were detected by reading through the articles and by scanning the reference lists of included sources. Five of the records were related to sensory processing and sensory modulation patterns in children with ADHD. Two external sources were related to handwriting performance in children with ADHD. All records were screened by the author.

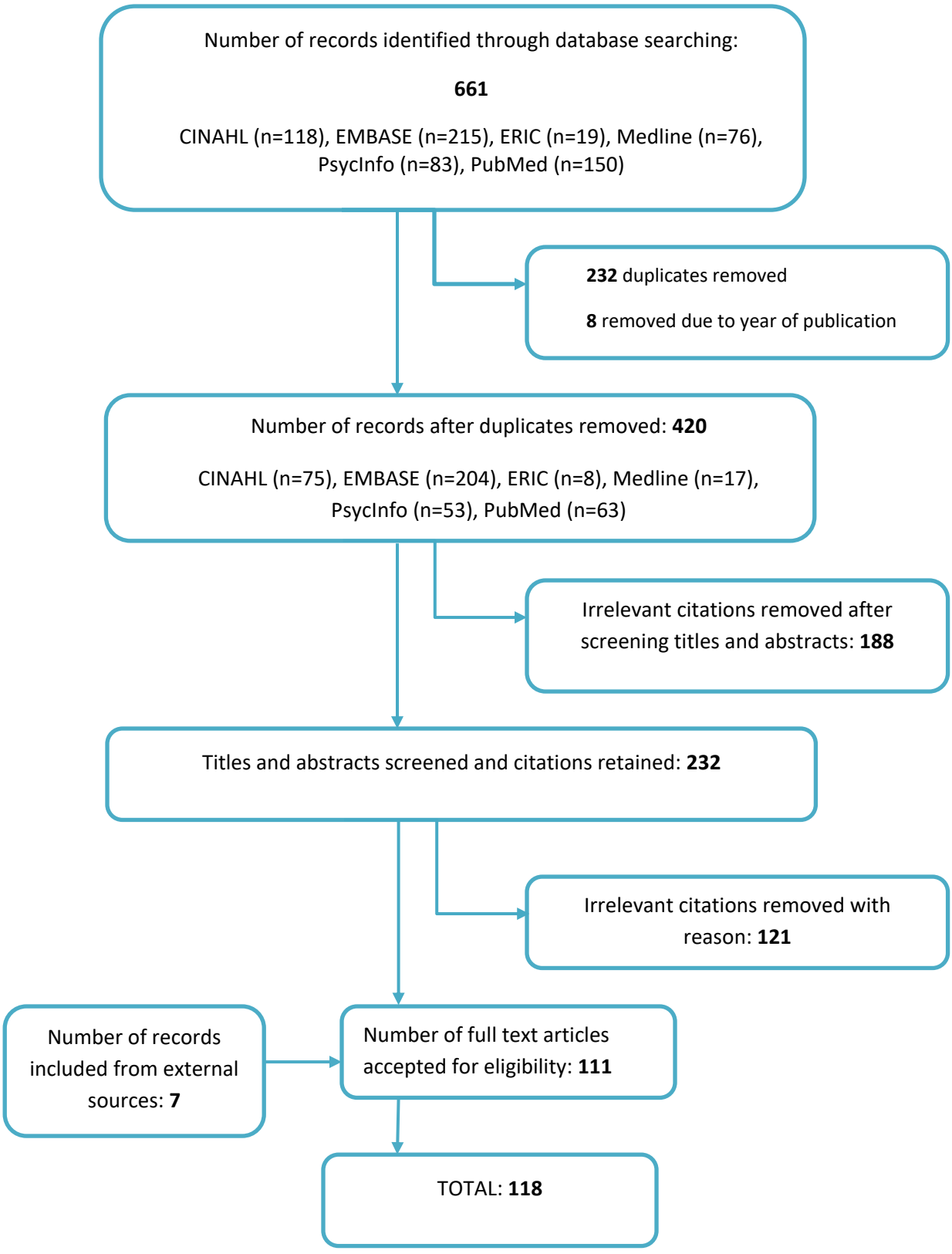

Figure 1: Flowchart of article selection for scoping review

2.2.1 Numerical analysis

Most of the studies were conducted in the United States (n=51; 43.2%), Israel (n=19; 16.1%), Canada (n=9; 7.6%), Taiwan (n=7; 5.9%), UK (n=7; 5.9%), and Australia (n=5; 4.2%). Other studies were from Iran, Brazil, China, Hong Kong, Korea, Greece, Spain, Belgium, India, Japan, Korea, New Zealand, Scotland, South Africa, and Thailand. The number of studies per year range was 1985 to 1990 (n=3; 2.5%), 1991 to 1995 (n=1; 0.8%), 1996-2000 (n=11; 9.3%), 2001 to 2005 (n=29; 24.6%), 2006 to 2010 (n=39; 33.1%) and 2011 to 2015 (n=35; 29.7%).

The majority of the papers focused on elementary school age children (n = 73; 62%). There were 6 papers (5.1%) which focused on pre-school age children and 17 (14.4%) papers addressed multiple age groups and were classified as "mixed." Five papers (4.2%) were on middle school and high school aged adolescents. Several papers were not classified with a specific age range per se as they were considered as theoretical papers, studies on outcome measures or they exclusively involved parents, teachers or occupational therapists as the sample population.

Regarding the methodologies of the studies (Table 1), seven papers were on outcome measures. These studies highlighted the psychometric properties of an evaluation or the utility of an assessment for children with attention disorders, as applicable in the field of occupational therapy. Nineteen papers (17%) were classified as grey literature. Some examples of grey literature include newspaper articles, special interest articles, commentaries, and chapter sections, if they were applicable to the research questions. There were 19 papers (16%) classified as experimental, quasi-experimental papers or pre-post studies. Of these, 2 were clearly defined as randomized control trials (RCTs), 3 studies stated subjects were either randomly divided or randomly assigned to either the intervention or control group, and one study used a randomized

two-period crossover design. A proportion of the studies, 51 papers out of 118 (43%), were classified as observational studies. These papers typically described the characteristics, co-existing difficulties or explored processes related to the health state of a child with an attention disorder. Several papers were described as case-controls studies, however with further scrutiny, they appeared to be cross-sectional (Mayo & Goldberg, 2009). Both study types were grouped under one heading of "observational studies," which accounted for 43.2% of the included studies. Overall, excluding grey literature, dissertations, and case histories, there were 86 (73%) papers classified as "empirical" papers. There were few papers classified as single-subject designs (4%), literature reviews, systematic reviews, and case studies (4%). Three dissertations were also included in the final tally as they were deemed relevant to the scope of the research.

Table 1: Frequencies of types of study methodologies

Methodologies of records	**n**	**%**
Experimental papers, quasi-experimental and pre-post designs (e.g. RCTs, crossover designs, and pre-post studies)	19	16.1
Single-subject design	5	4.2
Observational papers (including cross-sectional and case-control studies)	51	43.2
Qualitative studies	6	5.1
Literature reviews and structured reviews	3	2.5
Systematic reviews and meta-analyses	2	1.7
Studies on outcome measures/assessments	7	5.9
Case histories or case studies	3	2.5
Dissertations	3	2.5
Grey literature (including news columns, editorials, etc.)	19	16.1
TOTAL	**118**	**100%**

2.2.2 Thematic analysis

A thematic analysis was completed using the main findings from each article and source. Specific themes among the literature were difficult to identify given the breadth and the

heterogeneity of the findings. However, the main units to guide thematic analysis were the two main components as outlined in the ICF-CY: components of functioning and disability (body structures and functions, activities and participation) and components of contextual factors (environmental and personal factors). Specific studies on outcome measures/assessments were explored separately. Figure 2 illustrates the categorization of the empirical papers according to the ICF-CY primary domains.

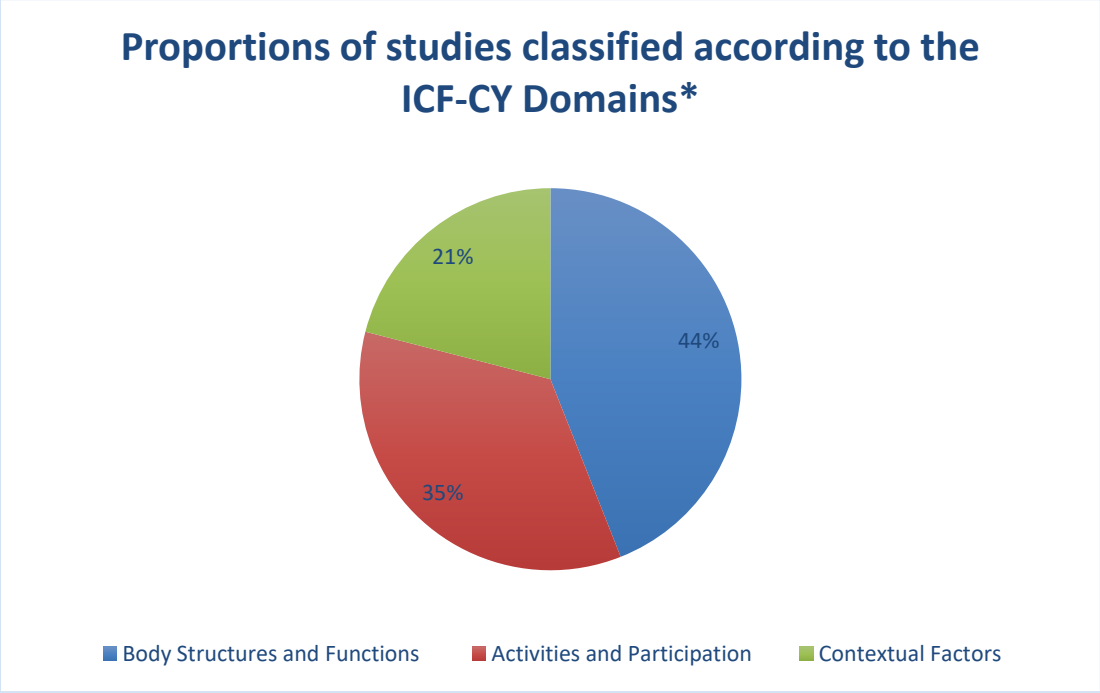

Figure 2: Proportion of empirical studies classified according to ICF-CY domains

**not including grey literature, case studies, dissertations and papers on outcome measures (n=86)*

2.2.2 a) Body structures and body functions

Sensory functions & structures of the nervous system: Sensory processing skills

Forty percent the retrieved papers focused on sensory processing skills (n=45). Sensory processing is often described as a co-existing difficulty among students with attention disorders often interfering with everyday life participation (Cheney, 2008; Cheng & Boggett-Carsjens, 2005; Cheung & Siu, 2009; Davies & Tucker, 2010; Lane, Reynolds, & Dumenci, 2012; Lane, Reynolds, & Thacker, 2010; Parush et al., 2007; Yochman, Alon-Beery, Sribman, & Parush, 2013; Yochman, Parush, & Ornoy, 2004). Sensory integration (SI) therapy has gained popularity among occupational therapists over the years as they apply SI principles with children with learning disabilities, ADHD, autism and behaviour problems (Case-Smith, Weaver, & Fristad, 2014; May-Benson & Koomar, 2010). The importance of examining symptoms of sensory dysfunction among children with ADHD has been highlighted in the literature (Mangeot, Miller, McIntosh, McGrath-Clarke, et al., 2001; Miller, Coll, & Schoen, 2007; Miller, Nielsen, & Schoen, 2012; Parush et al., 1997). There is supportive evidence to propose that sensory processing difficulties, including sensory modulation disorder, be screened as a possible co-existing, but distinct, disorder among children with ADHD as these difficulties may be contributing to behavioural symptoms (Miller et al., 2012; Yochman et al., 2006). Studies have shown that children with ADHD present with over-responsiveness to sensory input or tactile defensiveness (Brezden Papadopoulos & Staley, 1996; Lane et al., 2010; Parush et al., 1997). Children with ADHD also presented with oral sensitivity as reported by Ghanizadeh (2013). A study by Reynolds and Lane (2009) explored the relationship between anxiety and sensory over-responsivity. As children with ADHD often manifest moody behaviours, excessive worry and difficulty shifting attention, they hypothesized that children with ADHD may develop patterns of

anxiety. There is evidence to suggest that children with sensory modulation disorders may display distinct sensory processing differences that may be distinguishable from children with attention disorders, particularly with respect to the tactile, gustatory/olfactory, and movement/vestibular systems (Miller et al., 2012; Yochman et al., 2013).

Studies highlighting sensory-based interventions specifically for children with ADHD were limited. In one study by Miller et al. (2007), they report over 60% of their sample of children with sensory modulation disorder had evidence of ADHD. Sensory integration therapy was effective with these children on cognitive, social and sensory processing scores. A few studies examined the effects of environmental modifications such as the use of sensory-based tools with this population and their effects on behaviour, attention and concentration (Fedewa & Erwin, 2011; Lin, Lee, Chang, & Hong, 2014; Olson & Moulton, 2004a, 2004b; Pfeiffer, Henry, Miller, & Witherell, 2008; Schilling, Washington, Billingsley, & Deitz, 2003; VandenBerg, 2001). The value of tools such as the use of weighted vests, therapy balls or semi-inflated cushions was studied under the premise that targeting the tactile and proprioceptive systems helps children to modulate their responses to sensory input (Olson & Moulton, 2004b). Across the studies, children exhibited decreased in-seat behaviour, decreased levels of hyperactivity, and increased attention span as reported by teachers. Despite these positive trends, it is important to consider there were few studies on these tools, small sample sizes or absence of a control group. An article from the grey literature by Honaker and Rossi (2005a, 2005b) completed a critical appraisal of the evidence in the use of weighted vests with children, including children with ADHD. Three studies were identified and all had low external validity due to the homogenous grouping and small sample sizes. However, the intervention was at least effective for some or most of the participants.

Occupational therapists employed in school settings often become involved with students with ADHD to address their sensory motor concerns and to assist teachers in providing effective educational programs and classroom accommodations (Mulligan, 2001). They may also play a role in helping children develop techniques for relaxation and for effective communication to assist with self-regulation. They may also assist in addressing environmental factors such as sensory-based modifications, parent education, and working with parents to establish habits and routines.

2.2.2 b) Activities and participation

Mobility: "Carrying, moving and handling objects" and "Walking and moving"

Approximately one-fifth (n=27) of the included papers explored co-existing motor skills difficulties (in many cases, in addition to sensory processing skills) among children with attention disorders (Kirby, Salmon, & Edwards, 2007). Motor skills are often a reported concern among children with attention disorders. Attention and concentration deficits may account for the perception that children with ADHD have impaired motor skills, according to parental reports (Doyle, Wallen, & Whitmont, 1995). More recent studies have explored co-existing developmental coordination disorder (DCD) among children diagnosed with ADHD. A large subset of children with DCD (41.2%) also met the criteria for ADHD (Cardoso, Magalhães, & Rezende, 2014; Kirby et al., 2007). This significant overlap of conditions has been reported in other studies as well (Kadesjö & Gillberg, 2001; Pitcher et al., 2003). These children are referred to occupational therapy for screening or assessment to determine the impact of poor gross and fine motor skills on everyday life, such as running, writing, buttoning, using scissors (Brossard-Racine, Majnemer, Shevell, Snider, & Belanger, 2011; Hamilton, 2002; Lavasani & Stagnitti, 2011; Lee, Chen, & Tsai, 2013).

A few studies examined whether medication for attention disorders, such as methylphenidate, have an impact on improving motor skills (Bart, Daniel, Dan, & Bar-Haim, 2013; Bart, Podoly, & Bar-Haim, 2010; Brossard-Racine, Shevell, Snider, Bélanger, & Majnemer, 2012). In a study by Bart et al. (2013), children with a dual diagnosis of ADHD and DCD were tested on motor function and attention before and after taking methylphenidate. Comparison of the motor performance of children on methylphenidate versus without it revealed significant improvements in all the motor and attention subtests. Specifically, 20 out of 30 children in the study no longer would have been diagnosed as having DCD. Thus, results suggest that either attention may serve as an indicator for motor function or that medication may independently affect attention and motor performance. A study by Brossard-Racine et al. (2012) aimed to examine the effect of three months use of stimulant medication in children with or without motor difficulties at baseline. Positive changes in behaviour and motor skills were observed in children with ADHD. This number of medication-naïve children was reduced from 73.5% to 55.1% after 3 months of treatment with stimulant medication. Improvement in motor skills may have been due to an improvement in attention symptoms. Nevertheless, given that more than half of the children continued to present with motor difficulties, the authors suggest this subset of children should be referred for rehabilitation services to facilitate their motor abilities.

Learning and applying knowledge: writing

A common reason for referral to occupational therapy is handwriting problems (Case-Smith, 2002). Children with ADHD can demonstrate poor handwriting performance because of the primary symptoms of inattentiveness, impulsiveness, and hyperactivity. As discussed, several studies examined the fine motor function of children with attention disorders may be impaired in

comparison to typically developing children. Consequently, handwriting is an occupation in which children with ADHD may struggle, whether it be due to poor attention mechanisms, poor visual motor skills, impulsiveness, hyperactivity or poor underlying fine motor skills which can result in illegible writing or inappropriate speed of execution (Doyle et al., 1995; Racine, Majnemer, Shevell, & Snider, 2008; Shen et al., 2012).

Although factors and specific component skills linked to handwriting difficulties have been explored, little evidence is available with respect to occupational therapy intervention to enhance handwriting skills, particularly with children with complex learning and behavioural profiles associated with attention disorders. The use of stability balls has shown a positive trend to increase word legibility (Schilling et al., 2003). Also, there has been mention of handwriting interventions by occupational therapists in the grey literature. Occupational therapists may use specific handwriting programs such as the Handwriting Without Tears™ (Olsen & Knapton, 2008) which has gained popularity over recent years, particularly in the United States, however there was no identified study on the use and effectiveness of this program with children with attention disorders. Occupational therapists may take a developmental or "bottom-up" approach and thus work on the underlying motor or component skills such as shoulder stability, wrist flexion and bilateral coordination skills (Orloff, 2006). In terms of implications for occupational therapy practice, there is agreement that early intervention with handwriting may lead to improvement in written communication and in academic achievement (Rosenblum, Epsztein, & Josman, 2008).

Major life areas: Play & leisure

A child's mechanism of learning to socialize and develop relations with others is through play. Given the behavioural and social difficulties among children with ADHD, play can be a challenging activity for this group of children and may often be a target occupational performance area for occupational therapists.

Children with ADHD may seek out playful social interactions as much as their typically developing peers but they may experience difficulties in sustaining these interactions (Cordier, Bundy, Hocking, & Einfeld, 2009). They may not be as playful and exhibit difficulty in showing interpersonal empathy towards their playmates (Cordier, Bundy, Hocking, & Einfeld, 2010a; 2010b) and difficulties with intrinsic motivation and internal control (Leipold & Bundy, 2000). The primary symptoms associated with ADHD such as impulsiveness, inattention and hyperactivity interferes with their play abilities. For instance, a child with ADHD may find it challenging to remain focused on the play activity due to inattention, will not persist with the activity, will have difficulty negotiating during play or they may initiate play destructively due to impulsivity (Cordier et al., 2010a; Leipold & Bundy, 2000). Occupational therapists may work on the "play language" skills in addition to the sensory-motor skills needed to engage in play, such as sharing, requesting, organizing play and so on.

With respect to leisure participation, children with ADHD show significantly lower preference to participate in leisure, physical, social, and formal activities than their typically developing peers (Engel-Yeger & Ziv-On, 2011; Shimoni et al., 2010). Engel-Yeger and Ziv-On (2011) examined the effect of sensory processing difficulties and their influence on participation and postulated that a child's poor sensory processing will affect his/her emotional responses and

thus hinder their involvement in life situations such as leisure activities. In this study, the children with ADHD, who presented with difficulties in auditory filtering and low energy level on sensory measures, preferred to participate less in physical activities, as well as social, skill-based and formal activities. The authors made recommendations that sensory processing skills should also be considered when devising interventions. Clinicians can suggest environmental accommodations or provide strategies to parents to meet the sensory needs of the child and promote optimal participation in chosen leisure activities.

Play-based interventions have been shown to have positive and long-term efficacy in developing the social play skills of children with ADHD (Wilkes, Cordier, Bundy, Docking, & Munro, 2011; Wilkes-Gillan, Bundy, Cordier, & Lincoln, 2014a, 2014b). These play-based interventions have several components including therapist feedback and parental involvement. Fourie, Van Vuuren, Venter, and Nel (2007) explored the use of Theraplay for children with ADHD. In this study, "Theraplay" is defined as an attachment-based therapeutic approach for children and parents that focuses on building a relationship using activities which include touch and physical contact. The results of this study found that the children with ADHD in the experimental group improved significantly with respect to emotional behaviour.

Domestic life: Household activities

A few studies have explored children's participation in activities of daily living, including carrying out household tasks. It is well documented that children with ADHD may have difficulty attending and completing these types of tasks (Segal & Frank, 1998).

Increased participation in daily routines at home, school and in the community is an intervention goal for children with ADHD ((AAP), 2001). Children with ADHD participate less

in household tasks in comparison to their typically developing peers (Dunn, Coster, Cohn, & Orsmond, 2009). Children with attentional difficulties differ from typically developing children in participating in daily tasks in that they require more assistance to complete them (Dunn et al., 2009). Parents may schedule their daily activities according to their children's ability to concentrate and are likely to use more support strategies to engage children in daily tasks (Dunn, 2005). A child's age, the presence of an older sibling and parental stress were significant predictors of the amount of assistance the children received to do household tasks.

General tasks and demands: Completing homework

Completing homework is an important activity that is often difficult for children with ADHD to do independently. It can be defined as a home-based occupation and is of importance to occupational therapists who may intervene in helping develop skills needed to do homework, such as fine motor and organizational skills (Segal & Hinojosa, 2006). A child with ADHD may have difficulty focusing, attending, or cooperating with the homework task, but not necessarily the content. As parents are typically involved in the homework process, these issues can affect parent-child interactions and establishing a sustainable routine (Segal & Hinojosa, 2006). Establishing a routine, use of enabling strategies or cues, and making accommodations to the routine can help support a child's engagement in homework (Segal et al., 2005). Occupational therapists possess skills in activity analysis, adaptation, and modification to help parents address these factors. Interventions should focus not only on a child's skill development, but also consider the role of the activity setting and the values and priorities of the family (Segal & Hinojosa, 2006).

2.2.2 c) Environmental factors

Support and relationships: Parenting and family environment

As highlighted, participating in daily life activities such as homework and chores can be particularly challenging for children with ADHD. As a result, parent-child interactions can be adversely affected. Mothers of children with ADHD reported little family support, high perception of child-related demands and less confidence in their success in mothering their children (Cronin, 2004). Mothers may have a more negative view of themselves if their child would be identified as socially "different" as a result of poor management of behaviours associated with ADHD (Cronin, 2004). Although the literature related to occupational therapy and family involvement with children with ADHD is scarce, occupational therapists can address parenting skills, teach adaptive strategies, reconstruct daily occupations, help build positive routines and improve parent interactions with their children (Cronin, 2004; Lee et al., 2013; Segal, 2000).

Products and technology: Use of assistive technology and adaptive equipment

Only two papers discussed the uses of assistive technology, specifically information and communication technology, for children with ADHD. Students with ADHD participate in the same educational settings as other students. In Sweden, Bolic, Lidström, Thelin, Kjellberg, and Hemmingsson (2013) investigated the extent to which students with ADHD used computers in middle and high school settings and their level of satisfaction with computer use. Results indicate fewer students with ADHD were provided with their own computer in comparison to students who presented with physical disabilities. The study recommends occupational therapists to take on active roles to promote the use of computers among children with ADHD to optimize

educational outcomes. One other study explored the use of a haptic software and hardware to help children with various diagnoses, including children with ADHD, with writing (Palsbo & Hood-Szivek, 2012). Functional improvements in writing legibility and fluidity were observed after 15-20 sessions of repetitive motion training.

As mentioned previously, several studies explored the use of adaptive equipment under the premise of addressing sensory concerns associated with ADHD, such as incorporating the use of stability balls and weighted vests for these students. Preferential seating (e.g. having the student sitting in the front of the classroom or closer to the teacher) has also been reported by teachers to be useful with respect to improvement in attention and focus (Mulligan, 2001).

Attitudes, Services, Systems and Policies: Service Delivery and Service Provision

In the literature, occupational therapists report they see children with ADHD as part of their overall caseload and for associated problems such as sensory, perceptual, motor and functional difficulties. In a study by Chu (2003), a total of 46.8% of occupational therapists in the UK stated that their level of knowledge and skill were at the "basic" and "poor" levels. Occupational therapists do show a desire to know more about ADHD and overlapping conditions with ADHD (e.g. such as ADHD and DCD) (Baudinette, Sparks, & Kirby, 2010). In terms of knowledge needs expressed by occupational therapists, Cramm, Krupa, Missiuna, Lysaght, and Parker (2013) examined occupational therapists' perceptions on how executive functioning is recognized and addressed in occupational therapy for children and youth. Executive functioning difficulties are often compromised in children with ADHD. Many participants remarked that they may not be aware of the effects of poor executive functioning on occupational performance, rather they focus on the sensory and motor factors contributing to performance issues.

Participants further expressed little confidence in addressing these higher level cognitive skills associated with executive functioning. For future implications in occupational therapy, the authors suggest occupational therapists learn to address executive functioning issues through inter-professional relationships and professional development opportunities.

2.2.3 Assessments and outcome measures

Seven papers specific to outcome measure development or testing were included in this scoping review. All the outcome measures included constructs which fell under the "activities and participation" level according to the ICF-CY taxonomy.

One study by Bart, Rosenberg, Ratzon, and Jarus (2010) introduced the Performance Skills Questionnaire (PSQ) and its initial validation. It is a performance skills questionnaire for parents of pre-school children aged 4-6 years with developmental disabilities, including children with attention disorders. The subtests cover three domains: motor skills, process skills and communication skills. The questionnaire was developed to be easy to administer and designated to be a reliable and valid instrument to measure performance skills. (Refer to Appendix B for more information on psychometrics).

The Dynamic Occupational Therapy Cognitive Assessment for Children (DOTCA-Ch) (Katz, Golstand, Bar-Iian, & Parush, 2007) is a dynamic criterion-references assessment of cognitive abilities and learning potential for children with cognitive and learning difficulties. This occupational therapy assessment can provide a baseline measure for intervention in occupational therapy treatment as it can identify potential areas of cognitive strength so that children may benefit from mediated learning. The battery consists of subtests in five cognitive domains: orientation, spatial perception, praxis, visuo-motor construction, and thinking

operations. The DOTCA-Ch psychometric properties are strong with respect to inter-rater reliability, internal consistency, and ecological validity. (Refer to Appendix B for more information on psychometrics).

Another study explored the clinical utility of the Assessment of Motor and Process Skills (AMPS) with children (Payne & Howell, 2005). The AMPS is a top-down standardized assessment of functional, which can be administered to children between the ages of 3 to 15 years with a variety of diagnoses, including ADHD. There is extensive evidence on its reliability and validity (Payne & Howell, 2005). This study highlighted the AMPS is useful for children with ADHD, among the range of diagnoses. Furthermore, the AMPS helped to identify motor and process skill difficulties among children with ADHD. The AMPs can support the therapist to make appropriate activity recommendations or compensatory strategies to address these underlying difficulties.

Romero Ayuso and Kramer (2009) examined the use of the Child Occupational Self-Assessment (COSA) developed by Kramer et al. (2005). It is an assessment tool designed to capture a children's perceptions regarding their occupational competence and importance of everyday life activities. The assessment includes items and statements related to school, home and community life. In this study, the COSA was translated into Spanish by the first author who is a native Spanish speaker. The second author, who is also an author of the COSA, provided clarification on the intended meanings of the COSA items. Although this study focused on the Spanish version of the COSA, results show this tool exhibits good psychometric properties, including internal consistency and construct validity, when used with Spanish children with ADHD. Authors identified that participants with ADHD exhibited self-awareness and reported difficulties with certain COSA items and reflected the deficits (i.e. executive function deficits)

typically associated with an attention disorder. Children's responses on the COSA can help identify issues that children are more likely to be motivated to improve during therapy (Romero Ayuso & Kramer, 2009).

Rosenblum, Frisch, Deutsh-Castel, and Josman (2014) examined the use of the Do-Eat assessment (Josman, Goffer, & Rosenblum, 2010) with children with ADHD. The Do-Eat is a performance based assessment and parent questionnaire. Internal consistency analyses revealed an acceptable to high degree of correspondence between the items of the assessment and parent questionnaire. The Do-Eat scores in this study distinguished between children with ADHD and typical children. The authors also found the Do-Eat provides indications of poor executive functioning on daily task performance. The Do-Eat also revealed sensorimotor differences between children with ADHD and typical controls. Despite having the necessary abilities to perform ADLs, children with ADHD required more frequent verbal cues to complete the tasks. Furthermore, ecological validity of the Do-Eat was demonstrated by the correlations found between the scores and the parents' questionnaire answers. Overall, the Do-Eat can be a practical assessment tool for use in occupational therapy to detect the daily functional deficits of children and ensure that important information from parents is included in the evaluation process.

Van Waelvelde et al. (2012) evaluated the psychometric properties (intra-rater, inter-rater, and test-retest reliability, convergent and discriminant validity) of the SOS test ("Systematische Opsporing van Schrijfmotorische problemen" or "Systematic Screening for Handwriting Difficulties") on Flemish children (Smits-Engelsman, Stevens, Vrenken, & Van Hagen, 2005). The test consists of having the child copy a text for 5 minutes. The sample is evaluated using 6 criteria and writing speed is also calculated. The SOS was administered to 860 Flemish children between the ages of 7 to 12 years old. Inter-rater and intra-rater reliabilities

were found to be excellent. The test-retest reliability was moderate. Convergent validity was also confirmed. The SOS was also allowed for discrimination of handwriting patterns between typically developing children and children in special education. The authors stipulate the clinical implications of this tool in the evaluation of writing of children with various learning or developmental difficulties, including children with ADHD. Regarding this specific writing assessment, it is important to mention the relevancy and applicability of results of using such a tool may be limited to the written language in which the assessment was carried out (i.e. Dutch language).

2.3 Discussion on scoping review findings

The aim of this scoping review was to provide an overview of the current literature regarding the involvement of occupational therapy for children with attention disorders. Results indicate that the literature specifically related to occupational therapy with children with attention disorders is expansive in breadth, however lacking in depth in terms of empirical research. Nevertheless, the research does indeed highlight that occupational therapists intervene at all levels of the "child" as classified by the ICF-CY (Figure 3).

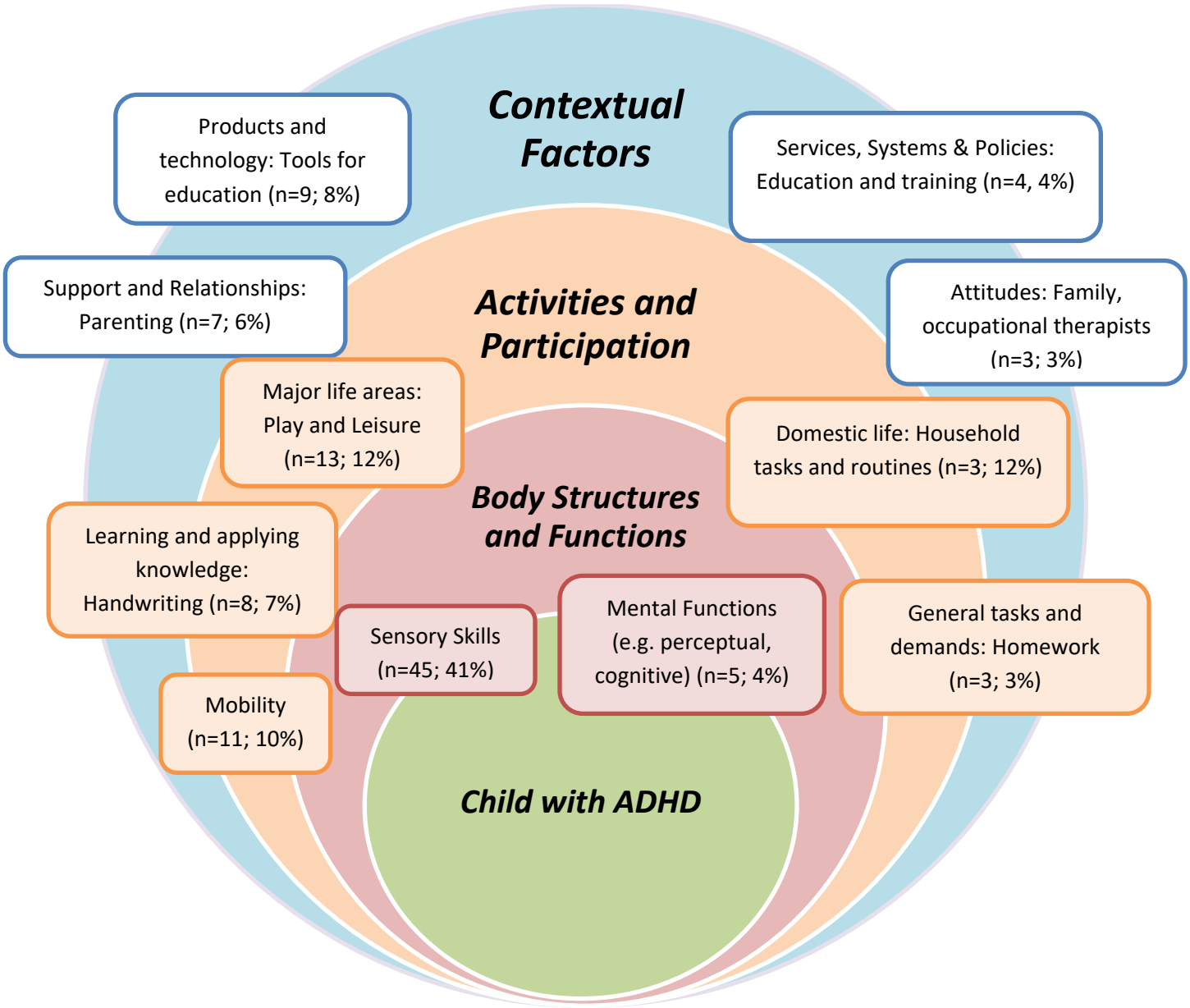

Figure 3: Schematic representation using ICF-CY to classify scoping review results

2.3.1 Study methodologies and grey literature: The need for evidence-based practice

Considering the findings of the present scoping review, there is a clear need for high quality evidence and rigorous research methods. A large proportion of the studies were observational and empirical experimental/intervention studies were few. It is imperative for occupational therapy research to advance with respect to intervention research with clearly

specified protocols. Frequency, duration, and dosage of therapy interventions should be clearly stipulated and replicated in experimental research designs. However, there is a lack of evidence regarding occupational therapy interventions which hinders its advancement with respect to evidence-based occupational therapy practice (Miller, Schoen, James, & Schaaf, 2007). With respect to children with attention disorders, given the complexity of the diagnosis on a child's functioning and learning, the results of the review clearly highlight how engagement in various occupations is affected among these children. Thus, there is a need for exploration of real-life, feasible interventions for these children at home, at school and within the community.

Furthermore, these scoping review findings brought to light a wealth of information emerging from the grey literature. Occupational therapists are reporting about intervention programs, strategies and techniques for children with attention disorders, however not necessarily in academic journals but rather informally through news columns, case histories or commentaries. Another possible explanation can be that these interventions may be documented in the academic literature, but not necessarily for children with attention disorders or not in the field of occupational therapy practice. As mentioned, ADHD is often comorbid with other disorders such as learning disabilities, autism spectrum disorder and developmental coordination disorder (Missiuna et al., 2012; Watling, Deitz, Kanny, & McLaughlin, 1999). Thus, further research specific to the application of occupational therapy interventions to the population of children with a primary diagnosis of ADHD is needed.

Another possible reason for the lack of empirical research regarding occupational therapy intervention for children with ADHD may be due to the lack of training or knowledge occupational therapists have regarding ADHD (Chu, 2003a; Chu, 2003). Occupational therapists may not have the necessary knowledge in the areas of evaluation, treatment according to

evidence-based practice, goal setting and documentation. There is evidence to show that therapists do not routinely integrate available research into their practice (Thomas & Law, 2013). Moreover, there appears to be a need for occupational therapists to take part in research initiatives to promote the development of the evidence. In doing so, participation in research may provide clinicians with the knowledge and skillset that may prompt perspective changes regarding treatment interventions (Thomas & Law, 2013). Occupational therapy interventions must use a wide range of conceptual perspectives to address the individual and varied needs of their clients (Polatajko & Cantin, 2010). Thus, the scope of occupational therapy involvement can add to the complexity of conducting research in the field specific to the population of children with attention disorders.

2.3.2 Implication at the level of "Body Structures and Body Functions"

Sensory processing

Based on the findings of the scoping review, significant emphasis was made on the sensory processing skills as well as the motor skills of children with attention disorders. This further highlights the potential importance of occupational therapy in addressing the secondary symptoms related to this disorder.

Several papers included in the scoping review explored the sensory processing or sensory modulation skills of children with ADHD (Cheney, 2008; Dunn & Bennett, 2002; Miller et al., 2012; Mulligan, 1996; Parush et al., 1997; Yochman et al., 2013). Difficulties processing and integrating sensory information are thought to be found in children with a variety of diagnoses, including children with ADHD (Polatajko & Cantin, 2010). Results of sensory integration therapy have shown positive outcomes in sensorimotor skills and motor planning; socialization, attention, and behavioral regulation; reading-related skills; participation in active play; and

achievement of individualized goals (May-Benson & Koomar, 2010). Several papers in the grey literature highlighted the use of sensory-based tools such as weighted vests or items and alternative sitting (e.g. therapy balls) to assist with attention. However, rigorous study designs with adequate sample sizes are necessary to determine the effectiveness of such tools. The evidence for sensory integration therapy (SIT) is weak and comparing sensory integrative therapy to an alternative intervention has been found to yield a small and non-statistically significant difference (Leong, Carter, & Stephenson, 2015). Published findings studying sensory-based treatment show limited or inconclusive empirical support (Lang et al., 2012). Thus, occupational therapists must be aware of the degree of effectiveness of these sensory-based interventions.

Nevertheless, occupational therapists are typically involved in addressing sensory processing patterns in relation to a child's ability to self-regulate (Dunn, 2001). Regarding the terminology used within the evidence, the literature in the education and psychology fields often use the term "self-regulation." Self-regulation is a term often used in the literature when referring to a child's ability to control and manage one's own feelings, behavior and thoughts and adapting them to the demands of the environment. It includes the ability to inhibit first responses, to resist interference from irrelevant stimulation and to persist on relevant tasks even when we don't enjoy them (Paris & Murray-Slutsky, 2016). In the occupational therapy literature, self-regulation is often linked to sensory processing skills, such that sensory processing is foundational to self-regulation, as the body must take in sensory cues from the environment, process them and prioritize important input to perform daily activities.

There are several programs that address self-regulation, several of which were created by occupational therapists. Studies related to the use of these programs in occupational therapy for

children with ADHD were not identified via database searching, but mainly through searching the grey literature and by using search engines (e.g. Google). Examples of programs include "How Does Your Engine Run?" by Williams and Shellenberger (1996); "The Zones of Regulation" by Kuypers and Winner (2011); "Take Five!" by Williams and Shellenberger (2001); and "The Incredible 5-point Scale" by Buron and Curtis (2012). Moreover, there is The Tool Chest developed by Henry (2001) which addresses self-regulation by improving focus through incorporating movement or sensory-based activities and strategies in the classroom. Occupational therapists may also use sensory-based strategies such as the use of calming music, alternative seating, or incorporation of varying physical postures (e.g. yoga). These reportedly have yielded positive effects on students with attention difficulties and poor on-task behavior (Worthen, 2010). Oftentimes, these strategies are taught to teachers and staff in the school setting. In occupational therapy practice, the use of these specific self-regulation programs for children with ADHD may be an important research and practice avenue to further explore.

Overall, although this review focused on the occupational therapy literature, self-regulation strategies appear to be an effective as part of a comprehensive multimodal treatment approach for children with ADHD to help them recognize and become aware of their physical feelings, manage their emotions and control their impulses. Given occupational therapists' knowledge in sensory processing and motor development, they may be involved within the health and educational settings to assist children in managing their primary symptoms of impulsivity and hyper-reactivity, and supporting their participation in activities of daily living.

2.3.3 Implication at the level of the environment: Teachers and parents

Children with attention disorders present with multifaceted and complex profiles in the areas of sensory processing and motor skill development as highlighted in the findings. This

highlights a need for occupational therapy intervention. The results also indicated the involvement of occupational therapists at an environmental level. For example, occupational therapists can assist parents and teachers in supporting the occupational performance of children with ADHD such as with homework, household chores and facilitating parenting skills (Lee, Niew, Yang, Chen, & Lin, 2012; Mulligan, 2001; Stancliff, 1998; Wilkes-Gillan et al., 2014b). School-based occupational therapists typically work as consultants and work with teachers to help implement self-regulation strategies, modify the work tasks and suggest environmental modifications to assist the child's functioning in the classroom (Reid, Chiu, Sinclair, Wehrmann, & Naseer, 2006; Villeneuve, 2009). Occupational therapists can assist in empowering teachers and parents by taking on the role as coaches. Although this scoping review exercise did not reveal articles specific to occupational therapy service delivery for children with ADHD, there are certain delivery models and approaches which may be pertinent to investigate. For example, indirect service delivery models which target caregivers and educators, such as the Occupational Performance Coaching and the Partnering for Change model (P4C), may merit further research with respect to working with children with attention disorders, given the high prevalence of the disorder (Graham, Rodger, & Ziviani, 2010; Missiuna et al., 2012).

2.4 Limitations of the scoping review

The ICF-CY was used as a primary classification system to categorize the studies of the scoping review. Its fundamental properties align well with the profession of occupational therapy such that it includes both perspectives of remediation at the impairment level and enabling participation (Cramm et al., 2012). However, the comprehensiveness of the ICF-CY also made categorization of the studies challenging. Several levels of ICF-CY were identified in a single study - for example, the effect of sensory processing at the level of body structures/functions on

participation or leisure activities. In some instances, there were inconsistencies between the underlying constructs of the outcome measures in comparison to the underlying constructs of the outcomes (e.g. outcome measures focusing on 'body structures' and outcomes at 'participation' level). Thus, the author and research team based decisions according to the main underlying constructs, objectives or themes of the studies/papers.

Decision-making to include or exclude studies was mainly carried out by the primary author, although there was collaboration between the primary author and the research supervisor to ensure agreement.

In terms of the search strategy, to ensure a broad search of the literature, the search strategy was kept simple, with "occupational therapy" and "attention disorder" as the two main search constructs. However, this may have restricted the inclusion of other pertinent studies or papers. Only studies that had children with attention disorders as the main target population were included. As mentioned, ADHD is often co-existing with other disorders, such as learning difficulties or developmental coordination disorder. Broadening the criteria of the target population may have resulted in a greater number of entries.

Many observational papers and few experimental papers were found through this scoping exercise. Although critical appraisals of the included studies are not necessary in scoping reviews, a quality analysis of the experimental papers may be considered to ascertain the level of the evidence. The grey literature added to the general scope of the scoping review. Given the expansive nature of searching within the grey literature, other pertinent information may have been missed. Furthermore, additional valid articles or papers may have been missed as only English-language studies were included in this scoping review.

CHAPTER III: SURVEY OF OCCUPATIONAL THERAPISTS IN CANADA

To further this knowledge synthesis, a survey of occupational therapists working with children with attention disorders was done to identify knowledge or practice gaps by comparing the findings of the scoping review with the current and actual practice patterns of therapists.

3.1 Survey methods

3.1.1 Survey development

A cross-sectional survey of a convenience sample of Canadian occupational therapists was conducted to capture occupational therapists' clinical practices when working with children with attention disorders. The domains and items for the survey were based on the initial scoping review, the clinical experience of the author, discussion with research committee members, and on previously developed questionnaires (Chu, 2003). Consultation of questionnaires found in the knowledge translation literature also assisted with survey development by serving as a template of domains and items to include and with framing the questions (Korner-Bitensky, Barrett-Bernstein, Bibas, & Poulin, 2011; Korner-Bitensky et al., 2006; Thomas & Law, 2014).

The research committee reviewed the first draft of the survey. No changes to the domains were made, however suggestions and feedback were given, such as: clarification of wording and definitions, adding categories to multiple response questions, aligning questions pertaining to assessment and intervention, grouping assessments into categories to facilitate selection, item reduction when questions were redundant or not relevant to the research objectives (e.g. questions related to clinical decision making), and modifying the Likert scale for questions pertaining to professional development. Following discussion and feedback, a subsequent draft was reviewed by rehabilitation specialists for clarity and format. Minor formatting changes were made. The survey was translated from English to French by a professional translator whose

mother tongue is French. To pre-test the questionnaire, a group of 5 rehabilitation specialists completed the survey. Rehabilitation specialists included: a physical therapist working in private practice with experience in pediatrics, an occupational therapist working with adults, an occupational therapist working with children with orthopedic conditions, an occupational therapist working with children with hearing impairments, and an occupational therapist working in research. Occupational therapists working with children with attention disorders were not included in the pilot group to not take away from the sampling pool. Three of the therapists completed the English version, and two completed the French version of the survey. No changes were made to the survey except for adding a definition and rewording a question. No items were removed. A backward translation of the survey from French to English was carried out by a bilingual research assistant with experience working in rehabilitation research. Both versions of the survey were compared to check for discrepancies in wording, clarity of items and format of the survey. Minor grammatical changes were made to 2 questions. A final version of the questionnaire was then completed.

The final draft of the survey consisted of 35 questions. The sections of the survey included: demographic and employment information, occupational therapy involvement with children with attention disorders, assessment practices, intervention practices, professional development and clinical decision making. An open-ended question related to knowledge inquiry was also included (i.e. what would therapists like to learn more with respect to the topic). Survey questions and items were a combination of 'yes/no' questions, multiple choice and multiple response 'check box' formats. An online survey platform (FluidSurveys) was used to disseminate the survey. Respondents accessed the survey by clicking on a link they received via email. (Refer to Appendix D or E.)

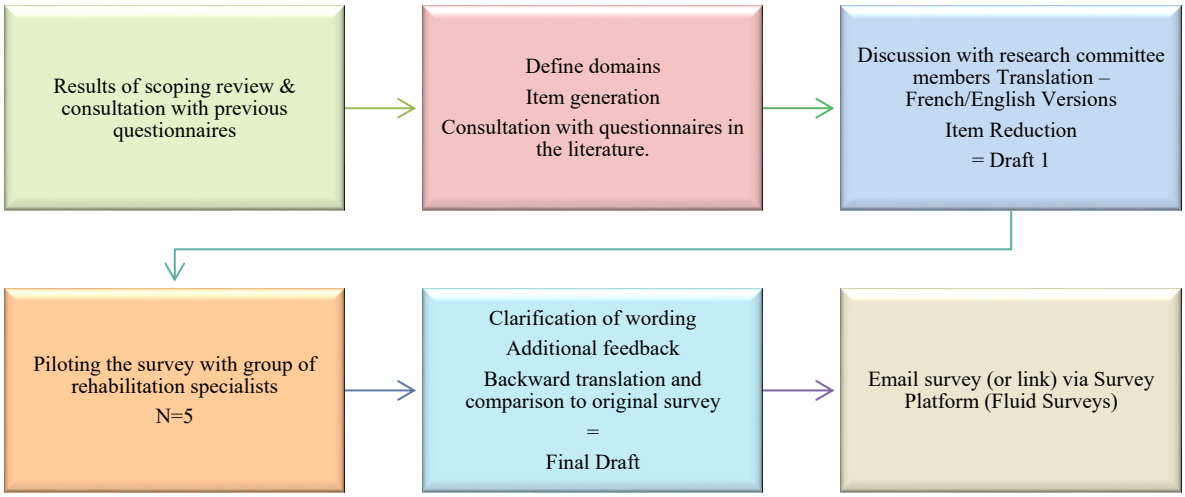

Figure 4: Outline of survey development

3.1.2 Sample population

To obtain a representative sample, a web-link to access the survey was e-mailed to occupational therapists across Canada. Eligibility criteria to participate included practitioners working with children/youth between the ages of 3 to 17 years, presenting with a diagnosed attention disorder (i.e. ADHD) or un-diagnosed attention difficulties. Furthermore, participants were required to have at least one year of work experience.

A mailing list of members of the Canadian Association of Occupational Therapists (CAOT) was obtained. Members on this list agreed to be contacted for research purposes. Participants on this list worked with all age ranges (pediatrics and adults) to obtain a larger sample set. There was a total of 420 CAOT members on the final list. Professional organizations were contacted however they did not provide mailing lists, except for the Ordre des ergothérapeutes du Québec (OEQ) which had a protocol to follow when contacting members for research. The OEQ list consisted of 1296 members who met the criteria and who agreed to be contacted for research were also sent the link to the survey. The survey was initially emailed in

December 2015. Reminders to participate were re-sent in February 2016 and May 2016. The survey was closed June 1st, 2016.

3.2 Survey results

Out of 1716 emails sent, 20 emails were 'undeliverable.' Therefore, a total of 1696 received the survey link. The survey was completed by 202 recipients, for a response rate of 12%. However, 172 surveys were completed fully for a completion rate of 10.1%.

3.2.1 Demographics & characteristics of participants

Respondents consisted mainly of women (n=164; 95.3%). The majority of respondents were in the 30-to-39 year age range (37.8%) (Table 2), with a mean of 13.7 years of experience working as an occupational therapist and an average of 10.9 years working as a pediatric therapist. Most respondents held a Bachelor's degree (n=112; 65%) followed by an entry-level Master's degree at 33.1%. Most of the respondents were from the province of Quebec (n=76; 44.2%), followed by Ontario (n=24; 14%). This discrepancy is accounted for by the fact that the provincial occupational therapy order of Quebec had a separate protocol to contact their members to participate in research.

Table 2: Demographics and participant characteristics

Age	**N**	**%**
age 20 to 29	33	19.2
age 30 to 39	65	37.8
age 40 to 49	51	29.7
age 50 to 59	20	11.6
age 60 to 69	3	1.7
Total	172	100.0

Gender	**N**	**%**
Female	164	95.3
Male	8	4.7
Total	172	100

Province	**N**	**%**
Alberta	19	11.0
British Colombia	17	9.9
Manitoba	11	6.4
New Brunswick	2	1.2
Nova Scotia	7	4.1
Ontario	24	14.0
Prince Edward Island	2	1.2
Quebec	76	44.2
Saskatchewan	11	6.4
Northwest Territories	3	1.7
Total	172	100.0

Qualification degree for OT practice	**N**	%
Diploma	2	1.2
Bachelor's	112	65.1
Entry level Master's	57	33.1
Other	1	.6
Total	172	100.0

Years practicing as an OT	
Mean	13.67
Median	13.00
Std. Deviation	9.230
Range	36
Minimum	1
Maximum	37

Years practicing as a pediatric OT	
Mean	10.88
Median	9.00
Std. Deviation	8.187
Range	35
Minimum	1
Maximum	36

Approximately 70% of occupational therapists worked full time (>35 hours per week). 33.2% of respondents reported working in school or pre-school settings, followed by private practice and rehabilitation centers (Table 3). When asked about work roles, 89% of occupational therapists identified "clinician" as their primary work role. The second most commonly reported work role was "consultant" (Table 3).

Table 3: Employment characteristics

Employment status	**N**	**%**
Part-time (<10 hours per week)	1	.6
Part-time (11 to 20 hours per week)	16	9.3
Part-time (21 to 30 hours per week)	35	20.3
Full-time (>31 hours per week)	120	69.8
Total	172	100.0

Work settings	**N**	**%**
General hospital setting	9	5.2
Children's hospital	7	4.1
Rehabilitation center	40	23.3
Community-based setting	29	16.9
Primary health-care setting	8	4.7
Home-based care	21	12.2
Daycare, pre-school or school-based	92	53.5
Private practice	58	33.7
Research center	1	0.6
Other	12	7.0
Total*	277	161.0

Work roles	**N**	**%**
Clinician	153	89.0
Manager	12	7.0
Consultant	67	39.0
Case manager	6	3.5
Researcher	4	2.3
Other	2	1.2
Total*	244	141.9

**Participants could select more than one answer*

3.2.2 Respondents' provision of services

More than 26% of participants reported that more than half of their caseload consists of children or youth with attention disorders (Table 4). Respondents indicated other professionals or teachers typically refer children with attention disorders for occupational therapy services. Many occupational therapists (n= 158; 91.9%) indicated they provide assessment/evaluation services.

The second most common service was school-based consultation, followed by treatment services at 71.5% of respondents' reports (Table 4).

Table 4: Provision of services

Proportion of caseload consisting of children with attention disorders (AD)	**N**	**%**
Less than 10%	15	8.7
11-25%	40	23.3
26-50%	56	32.6
51-75%	45	26.2
76-100%	16	9.3
Total	172	100
Referral sources	**N**	**%**
Parents	88	51.2
Referral from IDT**	74	43.0
Professionals	109	63.4
Physicians	73	42.4
Teachers	109	63.4
Total*	453	263.4
OT services for children with AD	**N**	**%**
Assessment services	158	91.9
School-based consultation	148	86.0
Treatment	123	71.5
Home-based intervention	87	50.6
Other services	1	0.6
Total*	517	300.6

* *Participants could select more than one response*

***IDT=Interdisciplinary team meeting*

3.2.3 Assessment practices

With regard to frames of references used by occupational therapists when working with children/youth with attention disorders, the most commonly used theoretical model was Sensory Integration (n=115; 77.2%). This was followed by occupation-based models such as the Canadian Model of Occupational Performance – Engagement (n=91; 61.1%) and the Person-Environment-Occupation Model (n=62; 41.6%). The Cognitive Orientation to Occupational Performance model was also a common model used among occupational therapists (n=76; 51%). Other common frames of reference were the Neurodevelopmental Treatment approach (43.6%) and the theory of Motor Learning (40.9%).

The most common reason for assessment is to develop an intervention plan (n=143; 83.1%), followed by consultative purposes (n=109; 63.4%) (Table 5). The most common skills assessed in occupational therapy are sensory/perceptual skills, fine motor skills, and school functioning. The least common areas of focus addressed by occupational therapists are social and communication skills and cognitive skills (Table 5).

Participants were asked to select the range of assessment measures they typically use with children with attention disorders. Respondents tend to use standardized measures that address sensory processing skills (n=165; 95.5%), visual motor and visual perceptual skills (n=158; 91.9%), and motor skill assessments (n=146; 84.6%). Most respondents indicated they use informal evaluation or screening tools (n=169; 98.3%). These can include unstructured interviews, ‘in-house’ questionnaires or observations of the child. The least commonly used assessments were those addressing behavioural constructs (n=33; 19.2%) and cognitive skills (n=5; 2.9%). The most frequently reported assessment tools are listed in the Table 6.

Table 5: Assessment practices

Reason for assessment	**N**	**Percent of Cases (%)**
Develop intervention plan	143	83.1%
Consultative purposes	109	63.4%
Diagnosis	67	39.0%
Rule out comorbidity	42	24.4%
Other	2	1.2%
Research	1	0.6%
Total*	364	211.6%
Skill assessed in OT	**N**	**Percent of Cases (%)**
Sensory/perceptual skills	163	94.8
Fine motor skills	162	94.2
School functioning	158	91.9
ADLs	136	79.1
Physical environment	131	76.2
Gross motor skills	119	69.2
Emotional regulation	110	64.0
Play & leisure	108	62.8
Visual/ocular motor skills	87	50.6
Social environment	73	42.4
Communication and social skills	65	37.8
Cognitive Skills	49	28.5
Other	6	3.5
Total*	1367	794.8

* *Participants could select more than one response*

Table 6: Commonly used assessment tools by OTs for children with attention disorders

Type of assessment	**Names of assessments**	**N (Total N=172)**	**Percent of cases %**

Developmental and motor assessments	BOT	96	55.8
	M-ABC	84	48.8
	PDMS	59	34.3
	MFUN	26	15.1
	MAP	26	15.1
	Talbot	22	12.8
Sensory processing assessments	Sensory Profile	154	89.5
	SPM	80	46.5
Visual motor and visual perceptual assessments	VMI	151	87.8
	TVPS	63	36.6
	MVPT	36	20.9
Occupational performance assessments	COPM	52	30.2
	PACS	23	13.4
Writing/printing assessments	Print Tool (HWT)	41	23.8
	McMaster	35	20.3
	ETCH	30	17.4

BOT = Bruininks-Oseretsky Test of Motor Proficiency; M-ABC = Movement Assessment Battery for Children; PDMS = Peabody Developmental Motor Scales; MFUN = Miller Function and Participation Scales; MAP = Miller Assessment for Preschoolers; Talbot= Batterie d'Evaluation Talbot; SPM = Sensory Processing Measure; VMI = Beery-Buktenica Developmental Test of Visual Motor Integration; TVPS = Test of Visual Perceptual Skills; MVPT = Motor-Free Visual Perception Test; COPM = Canadian Occupational Performance Measure; PACS = Pediatric Activity Card Sort; Print Tool = Handwriting Without Tears™ Print Tool; McMaster = McMaster Handwriting Assessment Protocol; ETCH = Evaluation Tool of Children's Handwriting

3.2.4 Intervention practices

With respect to children/youth with attention disorders, occupational therapists reported intervening in the areas of fine motor skills (75.4%), sensory processing skills (80.7%), and school functioning (83.6%). They further intervene with children with attention disorders through physical environmental modifications and via consultation services (Table 7). In terms of frequency of occupational therapy sessions, a large proportion of respondents indicated they provide sessions 2-3 times/per month (25.5%) or see clients once a week (29.1%). Almost one quarter (24.7%) of therapists indicated provision of occupational therapy services at a less frequent rate of 2-3 sessions per year or less. A subset of respondents (45.5%) indicated the

duration of occupational therapy treatment or intervention typically lasts 5 months or more and 14.5% of occupational therapists specified they provide a one-time consultation only.

Table 7: Focus of occupational therapy interventions

	N	Percent of Cases** (%)
School function	143	83.6
Sensory processing	138	80.7
Consultation	137	80.1
Physical environmental accommodations	136	79.5
Fine motor skills	129	75.4
Emotional regulation	109	63.7
ADLs	98	57.3
Social environmental accommodations	79	46.2
Gross motor skills	73	42.7
Leisure/play skills	68	39.8
Vision/ocular motor skills	58	33.9
Communication/social skills	44	25.7
Cognitive skills	28	16.4
Other	10	5.8
Total*	1250	731.0

**Participants could select more than one response*

*** Based on 171 responses, N=1 missing*

A large proportion of respondents (87%) reported they provide direct and individual services to children/youth with attention disorders (Table 8). The second most common type of service delivery was consultation, at 63.3% of respondents, as specified on the survey. Lastly, 40.2% of survey participants reported they intervene within the classroom setting.

Table 8: Delivery of occupational therapy services

	N	Percent of Cases (%)
Individually	147	87.0
Consultation	107	63.3
Classroom intervention	68	40.2
Group of 2-5 children/youth	52	30.8
Group of 6 or more children/youth	11	6.5
Total*	385	227.8

**Participants could select more than one response*

***Based on 169 responses, N=3 missing*

Professional development related to knowledge about attention disorders

Occupational therapists were asked whether they attended any professional development (PD) courses over the past year related to interventions for children with attention disorders. More than half (57.6%) reported they did not. When asked about attendance to a PD session in the past five years, 29.1% indicated they have not attended a course or workshop, and 26.7% reported they attended one course/workshop related to attention disorders. There was 29.7% of respondents who attended 2-3 courses on this topic in the past 5 years.

Clinical decision-making regarding children with attention disorders

Occupational therapists were surveyed regarding clinical decision-making in relation to working with children with attention difficulties. The following key findings were extracted from the survey results:

- 58.7% *often* use knowledge gained from professional development courses to make clinical decisions.
- 64.5 % of respondents reported they *agree* they make clinical decisions based on the knowledge gained from their professional experiences.
- 66.3% of participants *agree* their clients' wishes are the most important factor for clinical decision-making.
- 45.8% report they *sometimes* use search engines (e.g.: "Google") to make clinical decisions; whereas 31.6% indicated they *rarely* use search engines.
- 43.5% stated they *often* consult with colleagues to assist with clinical decision-making, whereas 42.4% stated they *sometimes* consult with their coworkers.
- 65.3% of respondents *agreed* that there is an expectation to practice in an evidence-based manner in their work setting.

Respondents' reports

Using an open-ended question, respondents were asked about what information they would like to know with respect to occupational therapy for children with attentions disorders. There were 49 responses (28.5%). Of these, 32.7% respondents mentioned they would like to learn more about assessments, including behavioural and cognitive assessments. Almost two thirds of respondents (65.3%) reported they would like to learn about interventions, treatment activities and programs to use with children with attention disorders. One respondent indicated learning about "non-sensory approaches." Almost a third of respondents (n=14; 28.6%) indicated they would like to know more about evidence-based practices, research, knowledge or theory related to working with this population. Several indicated learning about alternative

interventions to medication. A common theme of *effective* and *best approaches to use* emerged from the comments, according to the following statements: “best way to help them with concentration,” “learn the best approach for the population,” “what really works for this clientele,” “effective early intervention strategies with lasting effects,” and “evidence behind intervention approaches.” A few comments were made with respect to the consultant role as respondents indicated they would like to learn about “techniques for parents, teachers and school assistants to use” and “ways to clearly explain to parents if it is sensory or behavioural.” One respondent stated a need to learn about interventions and evidence “to be a better consultant.”

3.3 Discussion of survey results

This purpose of the survey study was to explore the level and nature of involvement and current practice patterns of Canadian occupational therapists providing services to children with attention disorders. Overall, results show that occupational therapists typically base their assessment and interventions on a sensory integrative approach, focusing on sensory processing and motor skills, largely provide assessment services, working mainly in schools/pre-school settings and private settings, and they identify their own occupational roles as “clinicians” as well as “consultants.”

Emphasis on underlying sensory and motor skill development

Similar to the scoping review results, a significant portion of occupational therapy respondents treat underlying deficits at the level of sensory processing and motor skills, as seen by the results of the question on assessment practices (sensory/perceptual skills: 94.8%; fine motor skills: 94.2%). This was exemplified by the most common standardized assessment tools

occupational therapists use. For example, the four most commonly used outcome measures were the Beery-Buktenica Developmental Test of Visual Motor Integration (Beery, Buktenica, & Beery, 1997), the Sensory Profile (Dunn, 1999), the Bruininks-Oseretsky Test of Motor Proficiency (BOT-2) (Bruininks, 2005), and the Movement Assessment Battery for Children (Henderson, Sugden, & Barnett, 2008). Although occupational therapists reported the use of these standardized assessment tools, almost all respondents reported using some form of informal or non-standardized assessment tool. This is reflective that occupational therapists use a variety of testing methods to gather information on occupational performance difficulties and individual client factors. According to best practice standards in the US, the focus of assessment goes beyond evaluation of performance skills and includes attention to major areas of occupation, client factors and contextual and environmental factors (Coster & Clark, 2013). Given that children with ADHD present with difficulties in many occupational performance areas, occupational therapists in Canada appear to be addressing a wide range of domains. The results show occupational therapists will focus on sensory processing, fine motor skills and school functioning. There is an emphasis on assessing and treating underlying body skills or functions. This may be due to that participation is indeed a more complex construct to directly measure in comparison to measuring the mechanisms underlying a child's functional abilities (Bendixen & Kreider, 2011). It is important to go beyond medical and clinical assessments and to focus on how children and their families experience illness (Bendixen & Kreider, 2011). However, as per the results, the use of these types of ecological tools or tools grounded in occupational therapy were not used as frequently: i.e. the School Function Assessment (SFA) (Coster, Deeney, Haltiwanger, & Haley, 1998) (n=20; 11.6%), the Assessment of Motor and Process Skills (AMPS) (Fisher & Jones, 1999) (n=16; 9.3) and the Pediatric Evaluation of

Disability Inventory (PEDI) (Haley, Coster, Ludlow, Haltiwanger, & Andrellos, 1992) (n=10; 5.8%).

It is important to consider that over 50% of respondents indicated they work in school or pre-school settings. Thus, occupational therapists may assist in implementing sensory-based strategies in the general education classroom, to help improve student's academic performance (Worthen, 2010). This is of importance as children with ADHD may demonstrate more impairment than typically developing children with respect to behavioural difficulties associated with modulating sensory responses (Cermak & Mitchell, 2006; Miller et al., 2012; Parush et al., 1997). Occupational therapists can explain how underlying sensory processing difficulties can contribute to the symptoms associated with ADHD. Well-established and psychometrically sound tools, such as the Sensory Profile (Dunn, 1999), are often used to obtain comprehensive information about a child's sensory processing skills and how they may hinder a child's participation in self-care, leisure and school activities. Based on the child's profile, the therapist may tailor the sensory-based recommendations to accommodate to the child's needs.

Occupational therapists are also involved in the assessment and intervention of motor skills, namely through the development of fine motor skills to improve function in daily childhood activities such as writing, coloring and self-care tasks. Children with ADHD often present with motor impairments such as poor manual dexterity and have poor quality of handwriting (Flapper, Houwen, & Schoemaker, 2006). As mentioned, ADHD is highly comorbid with DCD, with a comorbidity rate as high as 50% (Kadesjö & Gillberg, 2001; Pitcher et al., 2003). Thus, in line with the results from the scoping review, occupational therapists may be contributing to functional and educational outcomes by addressing fine motor issues in school or community-based settings. Furthermore, based on the survey results, occupational therapists may

be consulting or collaborating with teachers and/or parents. Fine motor activities or recommendations provided by therapists are often perceived as helpful and useful to parents and teachers even indirectly through consultative services (Bayona, McDougall, Tucker, Nichols, & Mandich, 2006).

Service delivery of occupational therapy

The survey results brought to light that a large majority of occupational therapists will provide assessment services (91.9% of respondents) and consultation services (86%), which were both rated more frequently than the provision of treatment services (71.5%). This is likely due to the expanding role of occupational therapists employed as consultants in school-based or community-based teams. Therapists may conduct an assessment and devise a recommendation plan to be used by the parents or teachers, rather than a treatment plan to be carried out directly by the therapist. They may work with the teachers to apply strategies or adapt instructional activities to facilitate the development of sensory and motor performance as well enable participation (Case-Smith & Holland, 2009).

More than a third of the respondents indicated that they provided services in school and day-care settings. In Canada, methods for providing occupational therapy in schools varies from province to province (Villeneuve, 2009). Since many children with attention disorders are in typical or mainstream classrooms, caseloads may be large and therefore an efficient model of service delivery is required.

The goal of consultation in a school-based setting is to support teachers in their teaching roles. Therefore, therapists not only gather knowledge related to the child for intervention planning, but also assess the learning needs of the consultee. There is evidence to suggest the

effectiveness of using a consultative model as a service delivery model (Polatajko & Cantin, 2010). In a consultative model, the recipients of the occupational therapy service, i.e. teachers and/or parents, need a clear understanding of the roles and responsibilities of the occupational therapist. Alternately, occupational therapists need to have a sound understanding of governmental, community-based and school board policies. They must also possess the knowledge related to the curriculum and related competencies (Villeneuve, 2009). Therefore, it is imperative to align service delivery, assessment and intervention practices within this consultative model. Occupational therapists appear to be working with cases on an individual basis, although consultatively, by addressing underlying body structures or body function impairments (e.g. deficits in sensory processing) to enhance their performance in activities and participation. For instance, a therapist may carry out an assessment on an individual student and discuss the findings with the teacher/parent to provide recommendations or suggest strategies to improve function. However, this type of approach can be inefficient given the high prevalence and complex profiles of children with ADHD in mainstream education classrooms. The consultative model can be an effective form of service delivery, however further emphasis should be placed on overall capacity-building of teachers to educate them on how to work with a variety of children with different learning or functional profiles.

Occupational therapists' clinical decision-making

Occupational therapists (58.7%) report they use knowledge gained from professional development courses to make clinical decisions related to children with attention disorders. Additionally, 64.5% indicate they tend to base their clinical decisions on their professional work experience. This finding is congruent with research showing that occupational therapists' clinical reasoning and ways of intervening are influenced by their level of expertise and their personal

context (Carrier, Levasseur, Bédard, & Desrosiers, 2010). Many participants (65.3%) agreed that there is an expectation to work in an evidence-based manner. Moreover, almost half of the respondents indicated they will 'sometimes' use search engines (e.g. Google), although there was no specification indicated on the survey if therapists search for therapy ideas or facts/knowledge about a condition, or if they use Google or Google Scholar. Approximately 80% will "sometimes or often" consult with their coworkers to make clinical decisions. This finding can lead to more queries about evidence-based practice, specifically to the barriers and facilitators in making decisions with respect to children with attention disorders. Although it was not addressed in depth in this study, determining the resources therapists have access and use can provide more information on the knowledge-practice gap. As the domain of clinical decision-making was not a main area of focus in this research project, the exact obstacles to research uptake is unclear. Nevertheless, the findings appear to be consistent with the literature, as there is a predominant need to understand the processes related to the practitioner and the context involved in the acquisition of evidence-based practice in the field of occupational therapy (Thomas & Law, 2013).

3.4 Limitations of the survey study

It is important to mention several limitations of the survey study. Although the survey was disseminated via an online platform, the response rate was still relatively low at approximately 10%. Furthermore, there was a discrepancy in the distribution of the survey across provinces. The province of Québec followed a separate protocol to contact members who had agreed to participate in research. Also, the survey was emailed to CAOT members which may not be representative of the number of Canadian therapists working in pediatrics as there were only 420 members on the distribution list, and this number included therapists working with

youth and adults. Moreover, only those who had agreed to be contacted for research purposes were e-mailed the survey link.

There were several limitations with respect to the survey structure. Most of the survey questions were close-ended in multiple choice or check box formats. Including more open-ended questions may have led to greater elaboration on the perspectives of occupational therapists working within this population. Respondents could have provided more detailed information on the types of interventions they implement with children with attention disorders, which could have added richness to the data.

As for data analysis, only descriptive analyses were reported in this project. Future research can further investigate whether several variables (e.g. work experience, age, level of education) affect occupational therapists' practice patterns with respect to assessment, intervention and clinical decision-making with respect to this population.

CHAPTER IV: SYNTHESIS OF FINDINGS – Implications for practice and future research

Knowledge to Action – Where do we go from here?

In synthesizing the results of the scoping review and survey findings, there is a clear indication that the symptoms associated with ADHD negatively impact many occupational performance areas of a child's life. The secondary consequences extend beyond the core symptoms of inattention and distractibility. Despite the typical intervention of pharmacological treatment, there is an apparent and urgent need to address these aspects in such an increasingly prevalent condition. There must be a clear differentiation between ADHD symptoms and their impact on functioning, as this is crucial for a better understanding of how ADHD as a neurodevelopmental disorder can influence individual functioning (Bölte et al., 2013; Üstün, 2007). Occupational therapists, as highlighted in the breadth of the evidence, are emerging as specialists to assess and intervene regarding these functional difficulties. However, it is clear more rigorous research needs to be carried out with respect to assessment, intervention and service delivery. Sound theoretical and practical knowledge is necessary among practitioners and all implicated stakeholders who work with these children daily, including parents and teachers.

Knowledge translation looks to tease apart how the context may change what knowledge is needed, how it would be used, and what strategies might be possible or effective in each particular setting to promote knowledge uptake (Cramm & White, 2011). Implementation of evidence-based practice requires whole-system change at the research design, practitioner, and institution levels (Burke & Gitlin, 2012). As knowledge translation is the conceptual framework that was used to guide this project, potential gaps, recommendations and directions for future research and practice are highlighted. The Knowledge-to-Action framework (Graham et al.,

2006), specifically the *knowledge creation* phase, guided the project and future avenues in the field of occupational therapy with children with attention disorders. The purpose of the scoping review and survey was to inquire into the general state of the existing knowledge and to determine whether sufficient knowledge exists to generate knowledge tools and/or products, or identify gaps between available knowledge and practice. Gaps at various levels of the cycle are described: gaps at the research level, gaps at the practice level, gaps at the care provider level and gaps at the organizational and societal levels.

Gaps at the research level

Despite the lack of strong empirical research evidence with respect to occupational therapy for children with attention disorders, several recommendations are proposed based on the present findings. The results of the current study highlight the importance of including occupational therapists in the case management of children with attentional disorders. Occupational therapists should be part of multidisciplinary teams in hospitals, health care centres, and school-based settings to provide their expertise in the areas of sensory-motor development, task analysis of activities, and knowledge of environmental factors to promote participation in daily activities. Occupational therapists can, and do make contributions in the evaluation and treatment process to develop multifaceted interventions for the heterogeneous profiles seen so frequently in this group of children (Chu, 2003). Given the lack of empirical data, this brings to the forefront that without adequate knowledge or evidence to create "best-practices," it will be very challenging for therapists to be involved in the assessment and treatment of children with ADHD (Chu, 2003). Therefore, rigorous research specific to occupational therapy interventions with children with attention disorders is necessary to add to the evidence-based literature. Interventions that are viewed as too intensive, demanding too

much time or effort, and not adequately packaged or manualized have been found to be less likely to be implemented (Glasgow & Emmons, 2007). Therefore, researchers are encouraged to design interventions to be as broadly applicable as possible (Clark, Park, & Burke, 2013). Lastly, it will important to take into consideration the context in which these services are provided. Since therapists are working as consultants, intervention approaches associated with that role are necessary. As mentioned, one model to consider is the "Partnering for Change (P4C)" model (Missiuna et al., 2012). This model was initially developed for children with developmental coordination disorder. It was created as a novel way for occupational therapists to provide school-based services to children with special needs. Working collaboratively with educators and families, therapists provide services to whole schools and help create classroom environments that are conducive to academic success. To date, there has been no research on the implementation of P4C model with children with ADHD.

Gaps at the practice level: Need for ecological approaches, assessments and interventions

With respect to future intervention/practice research, the scoping review, the review of the grey literature and the survey results brought to light various assessment measures, programs, and interventions which merit further exploration. In terms of assessment tools, occupational therapists typically use measures of motor, sensory and perceptual skills when working with this population. Using the ICF-CY to classify these measures, they largely address component skills related to "body structures and body functions." Occupational therapists focus their attention predominantly on remediation of underlying deficits to improve participation in everyday activities (Miller et al., 2007). Assessing these component skills allows therapists to obtain a functional profile of the child. However, occupational therapists are historically considered as holistic and client-centered interventionists and are implicated at all levels of the "person,"

therefore alignment of assessment practices and interventions should also be emphasized. Furthermore, the influence of environmental barriers and facilitators will affect the chosen interventions for each client. For example, several comprehensive and occupation-based assessments with strong psychometric properties were identified in the scoping review, but not typically used based on the survey results. To name a few of these ecological assessment tools, the COSA, the DO-EAT, the AMPS were comprehensive, occupation-based assessments permitting the therapist to capture a child's performance in real-life contexts. In contrast, based on the survey results, the most commonly used assessments mainly addressed sensory processing skills, motor development and visual-motor or visual perceptual skills. These findings are consistent with a previous research study, where commonly used outcome measures in pediatrics were those addressing sensory, motor and visual perceptual skills (Mohammed-Alotaibi, Reed & Shahan Nadar, 2009). The reasons for this may be their availability in clinic, their ease of use, and they may be the tools occupational therapists were exposed to during their schooling (Mohammed-Alotaibi, Reed & Shahan Nadar, 2009). Considering respondents had an average of 13 years of work experience, respondents may use assessments based on availability in their work setting or those used by colleagues, in addition to the measures they were exposed to during their occupational therapy training and education.

Although occupational therapist can intervene at all levels of the "child" as per the ICF-CY framework, according to the scoping review results there are no "best practices" for ecological interventions or treatment for attention disorders. As mentioned, occupational therapists may provide helpful strategies or recommendations to target sensory processing skills and/or motor skills. Occupational therapists may suggest the use of sensory-motor tools such as stability balls as alternative sitting or use of weighted vest to help self-regulate (Fedewa &

Erwin, 2011; Olson & Moulton, 2004b; VandenBerg, 2001), and may recommend movement breaks, work on fine motor skills, adjust the physical environment or develop strategies with the child for organization or homework (Brossard-Racine, Annette, Michael, Snider, & Belanger, 2009; Mulligan, 2001; Segal & Hinojosa, 2006). The range of interventions is individualized to fit the needs of the child, which is fundamental to occupational therapy practice. In this study, the survey results did not allow for elaboration on specific therapeutic tools used by occupational therapists, however the breadth of involvement is consistent with previous finding of the literature review with a key focus at the 'body' level. Implementation of ecological and manualized occupational-therapy-specific interventions for children with ADHD was not highlighted in overall results.

As mentioned, there are self-regulation programs which merit further research with this population. Additional research is also needed in the areas of cognitive or behavioural interventions in the scope of occupational therapy practice. One such example is the Cog-Fun (Hahn-Markowitz, Manor, & Maeir, 2011; Maeir et al., 2014) which focuses on the acquisition and transfer of cognitive strategies to enable occupational performance in the child's natural environment. This intervention can prove useful for children with executive functioning deficits, common in children with attention disorders.

Gaps at the practitioner level: knowledge and skills of occupational therapists working with children with attention disorders

Although not examined in great depth in the current study, occupational therapists did report a need to know more about assessments and interventions to use with children with attention disorders. These findings are consistent with previous research findings in which

approximately 47% of pediatric occupational therapists in the United Kingdom working with children with ADHD reported their level of knowledge in the assessment and treatment of ADHD to be at "basic" or "poor" levels (Chu, 2003). Thus, not only is there lacking specific evidence with respect to interventions, there also appears to be a gap at the level of clinicians – specifically their perceived capacities to address the issues/symptoms surrounding this diagnosis. The vast majority of research in the area of intervention for children with ADHD has focused on issues and strategies pertaining to managing social behaviour and demeanour in the classroom, primarily via medication and contingency management (DuPaul & Stoner, 2004). Thus, professionals working with children with ADHD may take on an educative approach to teach children the skills and knowledge necessary to replace problematic behaviours with acceptable ones. This is representative of a "top-down" approach, or cognitively oriented method to address the behavioural and executive functional deficits typically seen in children with ADHD. However, based on the results of the present study, occupational therapists may not be familiar with the concepts of behavioural management as it relates to cognitive skills, namely executive functioning (Cramm, Krupa, Missiuna, Lysaght, & Parker, 2013). Furthermore, according to the survey results, cognitive and behavioural assessments/interventions were the least frequently reported by occupational therapists. Therefore, there is an apparent need for occupational therapists to improve their knowledge of "top-down" skills and occupation-based performance assessments and interventions that demand analysis of the occupational performance in context. The literature suggests that without explicitly considering executive functioning and its relation to occupational performance, occupational therapists may be neither identifying the issues accurately nor addressing them in an effective way (Connor & Maeir, 2011). Global metacognitive or executive strategy frameworks, such as the Cognitive Orientation to daily

Occupational Performance (CO-OP) approach (Missiuna, Mandich, Polatajko, & Malloy-Miller, 2001; Polatajko et al., 2013), have been described as useful for supporting the executive occupational performance, involving verbal self-instruction techniques, goal management training, and/or problem solving training in clinical applications with individuals who have executive functioning difficulties (Cramm et al., 2013). This in-depth understanding of cognitive approaches can further afford occupational therapists insight into the difficulties the child may have with execution of tasks and activities in addition to their sensory-motor deficits. For example, the application of the CO-OP model with children with attention disorders may be helpful to manage the condition, however systematic study is needed to further advance the body of evidence related to using this approach with this population. Generally, needs assessments may be warranted to determine the size and nature of the gap between occupational therapists' desirable knowledge, skills, attitudes, behaviours and outcomes and their "felt needs" as based on the synthesis of the scoping review and survey results (Straus et al., 2009).

Gaps at the organizational level: advocacy for the role of occupational therapy for children with attention disorders and need for efficient models of service delivery

A gap also exists in the general awareness of the role of occupational therapy for children with attention disorders. Increased advocacy is necessary for the role of occupational therapy to flourish. Occupational therapists need to be knowledgeable about ADHD, however implicated stakeholders must also become aware of the contributions occupational therapy can make to the management of ADHD in health care teams. In working in multidisciplinary teams, if the role of the occupational therapist is not clearly defined or if collaboration is minimal, various members may have very narrow view of what sorts of problems could be addressed by occupational therapists (Cahill & Lopez-Reyna, 2013).

It will also be important to carefully select appropriate and feasible models of service delivery. For example, consultative service delivery is a 'new' model that may warrant further investigation, especially since over 50% of occupational therapists already identify with the "consultant" role along with the traditional "therapist" role. Increased caseloads and wait-lists, lack of time to build relationships and systemic issues are barriers which can influence why occupational therapists adopt the roles of consultants with teachers and/or parents rather than working directly with the children (Case-Smith & Holland, 2009).

Since collaborative consultation is being adopted as a preferred service delivery model, other contextual barriers can come into play (Bayona et al., 2006). These can include lack of time to engage in formal meetings, lack of receptiveness by teachers, difficulties with communication, infrequent visits, and confusion about the role of occupational therapy must also be considered for this service delivery to be effective (Bose & Hinojosa, 2008; Case-Smith & Cable, 1996; Fairbairn & Davidson, 1993; Reid et al., 2006). Evidence surrounding occupational therapy consultation as an intervention for children with ADHD is scarce. Thus, occupational therapists need to be well versed in taking on the roles of consultants and learn how to act as collaborators, mentors or coaches with this population. One model of interest is Occupational Performance Coaching (OPC) (Graham et al., 2010), which has shown to be an innovative way for occupational therapists to provide services to enhance the knowledge and skills of teachers or parents (Graham et al., 2010; Hui, Snider, & Couture, 2016). However, for implementation of a new model to be successful, implementation science emphasizes that it is not enough for an intervention to just 'work.' To have an impact, it must also have *reach,* which is defined as the capacity to be broadly applicable to the potential adopters within a given context (Clark et al., 2013; Glasgow & Emmons, 2007).

Gaps at the societal level: Need for consensus on the identification and implications related to ADHD

The healthcare system in Canada is faced with many challenges due to rising costs of public health care, long wait-times for health services and inefficient delivery of care (Muzyka, Hodgson, & Prada, 2012). Most children who are identified as needing specialized health care can access these services through hospitals and treatment centres across the country. However, many children who need support to facilitate their development often do not meet the criteria for services provided through those venues. Moreover, many children are not identified as needing health services until they enter school (Missiuna, Stewart, & Dix, 2015). Children with ADHD fall into this category. The Centre for ADHD Awareness, Canada (CADDAC) drafted a report, the 2010 Provincial Report Card: ADHD in the School System (Centre for ADHD Awareness, 2010). This report aimed to outline whether children ADHD have equitable access to educational accommodations, across all of Canada, as do other students with impairments. The report card highlighted only three provinces received a "Good" grade (Alberta, Newfoundland/Labrador and Saskatchewan). In these provinces, the ministries of education have systems in place where children with ADHD are recognized as having a legitimate neurobiological disorder, and thus are eligible for academic support and remediation. Five provinces (Manitoba, New Brunswick, Nova Scotia, Prince Edward Island, Northwest Territories) received a "Satisfactory" grade, albeit with a variety of concerns in either the identification or inclusion of these children in education settings. Three provinces (Quebec, Ontario, and British Columbia) received an "Unsatisfactory/Fail" grade. These jurisdictions fail to provide access to services, as students with ADHD are not recognized as having a disability (Centre for ADHD Awareness, 2010). Children with ADHD may be identified as requiring special education if they have an additional

disability which qualifies them as meeting the criteria for another disability category (e.g. "behaviour", "physical" or "communication" categories). This report card highlights not only the disparity and variability in understanding the negative health and academic outcomes associated with ADHD, but also the discrepancy in the identification of students with ADHD across Canada. The lack of clarity at such a societal level undoubtedly plays a large role in the allocation of services, not only for occupational therapy services, but health-care and school-based services in general. There needs to be a consensus at the national level vis-à-vis the eligibility of students with ADHD to receive special education and health care services. In line with the KT framework, knowledge and recognition of the adverse health outcomes must be disseminated from a much broader contextual perspective. National practice guidelines on the assessment and treatment of ADHD also stipulate the need for a multidisciplinary and comprehensive approach to ADHD management. The Canadian ADHD Resource Alliance (CADDRA) is a non-profit, multidisciplinary alliance of healthcare professionals working in the field of ADHD. The guidelines state that appropriate referrals to other medical or paramedical professionals, including occupational therapists, be made to address the associated problems with ADHD, recognizing the chronicity of the disorder and its impact on life domains (CADDRA, 2011).

CONCLUSION

Children with attention disorders present with chronic impairments which span across the health-related domains of body structures and functions, activity limitations and participation within the environment. This research adds to the existing body of literature and confirms that children and youth with attention disorders present with highly complex behaviour, health and functional profiles. Occupational therapists are in a growing role to promote not only the functioning of these children in day-to-day activities, but also to promote health and overall well-being. The role of occupational therapists with this population is broad. With their knowledge of physical skill development, mental health, and task analysis, occupational therapists are in a vital position to provide therapeutic interventions to address self-regulation problems, co-existing fine motor and coordination difficulties, difficulties with activities of daily living and environmental barriers. Furthermore, they take on the roles of consultants and mentors by facilitating the education and training of implicated individuals, such as parents and teachers. For future research, recommendations to address several gaps in the spheres of research, practice, practitioner attitudes and knowledge, and organization have been identified.

Key "take-home" messages

- The breadth of the literatures is wide, however there a need for more experimental research to add to the observational body of research currently available.

- Occupational therapists are holistic rehabilitation specialists who have a sound knowledge and understanding of sensory-motor development. Children with ADHD often present with co-existing sensory, perceptual and motor deficits which affords an important role for occupational therapists to intervene.

- Occupational therapists can intervene at all "levels" of the child: body structures and functions, activities and participation, and environment. Future research initiatives are needed in ecological occupational therapy assessments and interventions, particularly with respect to activity limitations and participation restrictions.

- Consistent with the scoping review findings, occupational therapists across Canada tend to address sensory processing, motor skills development (mainly fine motor skills) and overall school function. They are less involved with respect to cognitive and behavioural interventions.

- Canadian occupational therapists frequently identified with the 'consultant' role. Indirect service delivery or consultation models for children with attention disorders warrant further investigation.

- At a much broader level, there needs to be a consensus across the country about the biopsychosocial and multidisciplinary management of children with attention disorders, given the persistent and lifelong impacts of the disorder in all areas of functioning.

Appendix A: Data Tracking Table for Scoping Review

Title of study & Author	Year of publication	Country	Population/ Participants	Setting	Primary category	Type of study or intervention (include description, duration, frequency)	Outcome Measures	Results & practice implications	ICF-CY Constructs
Vestibular and visual rotational stimulation as treatment for attention deficit and hyperactivity (Arnold, L., Clark, David L., Sachs, Larry A., Jakim, Stephanie, Smithies, Chris)	1985	USA	Children in kindergarten to grade 3. Children had to meet DSM-III criteria for ADHD, N=30) **ELEMENTARY**	Not indicated(?)	sensory processing - vestibular/ visual	Split Latin square cross-over design. Three condition series: [control, combined visual and vestibular, or just vestibular] or [control, combined, or just visual]. Duration: Each series lasted 12 weeks, 4 weeks on each condition and 2 sessions per week.	Measures collected at screening (baseline 10, prior to treatment (baseline 2) every 2 weeks for 12 weeks, and at one year follow-up. Measures: Davids Hyperkinetic Rating (completed by teachers and parents), checklist of behavioral criteria for ADD with hyperactivity (for teachers), Conners Short Form Questionnaire for Parents.	Two-way analysis of variance of pooled subjects showed *p<0.005* for Davids Hyperkinetic Rating Scale (from baseline 2 to follow-up) and *p<0.05* for Conners. Trend for vestibular stimulation alone compared to other conditions to have the greater effect.	BSF
Multifamily parent-child group therapy for behavior and learning disorders (Arnold, L., Sheridan, K, Estreicher, Donna)	1986	USA	Children between ages 4-12 years old with behaviour disorders, including attention deficit disorder. Parents are also involved in the group therapy. **ELEMENTARY**	children were attending Child Psychiatry clinic	sensory processing,	Grey literature. Description and discussion of a multimodal group therapy program including mental health professionals and an occupational therapist in the treatment of behavior and learning disorders among children with hyperkinetic disorder or attention deficit disorder. Role of the occupational therapist was to provide activities based on principles of sensory integration. Sessions lasted approximately 1h45min, divided into three segments (15 minute session including the children and their parents, 40-50 minute session with children in OT and parents with mental health professional, 30-minute segment of parents and children together). Duration of treatment was not specified. Includes comments and case examples.	N/A	An informal follow-up was conducted 6-18 months after the first visit. Thirty-six families took part in a telephone interview; 93% of the parents who had attended 4 or more times reported that the family had benefitted from the experience (e.g. more responsible behaviour from the child, higher self-esteem, reduced frustration, etc.)	BSF
Influence of methylphenidate on motor performance and attention in children with developmental coordination disorder and attention deficit hyperactive disorder	2013	Israel	Children aged 5.10 - 12.7 years diagnosed with both DCD and ADHD. All participants were treated regularly with methylphenidate N= 30. **ELEMENTARY**	?? Not indicated	medication effects, DCD	Observational, pre-post. No intervention - to determine the effectiveness of meds MPH on motor coordination. Two sessions of data collection were held. Half the parents were instructed to provide their child the medication before the first session, and half were asked to provide the medication the	Online Continuous Performance Test, Conners' Parent Rating Scale, Developmental Coordination Disorder Questionnaire, Movement Assessment	Significant differences in all subtests of motor performance among children with MPH vs without. Positive influence on attention functions.	BSF

(Bart, O.; Daniel, L.; Dan, O.; Bar-Haim, Y)						second session. The assignment to each group was random.	Battery for Children (M-ABC2).		
A preliminary study on the effect of methylphenidate on motor performance in children with comorbid DCD and ADHD (Bart, O.; Podoly, T.; Bar-Haim, Y.)	2010	Israel	N=18 children; 13 boys; mean age = 8.3 (range= 5.3-11.5) diagnosed with comorbid DCD and ADHD. **ELEMENTARY**	Public child development clinics.	medication effects, DCD	single-case design. Double-blind within-subject research design. Data collected over two sessions 4-14 days apart. In one session, children took MPH and in the next session, they took a placebo pill. This was done to determine whether there was a practice effect	Schedule for Affective Disorders and Schizophrenia for School-Age Children-Kiddie-Sads-Present and Lifetime Version (K-SADS-PL); Movement Assessment Battery Checklist; Movement Assessment Battery for Children (M-ABC)	Planned contrasts used to compare performance of children on each MABC subtests. Impact of MPH on DCD percentile scores indicated scores went from clinical to "suspected DCD" range. Two thirds of the children continued to perform poorly on the motor tasks (not significant improvement in static balance). Design of the study does not allow for the conclusion that attention deficits are the only or primary cause for the motor difficulties in children with DCD.	BSF
Survey of paediatric occupational therapists' understanding of developmental coordination disorder, joint hypermobility syndrome and attention deficit hyperactivity disorder (Baudinette, Karina; Sparks, Jennie; Kirby, Amanda)	2010	UK	Pediatric occupational therapists working in the UK. N=238 (24% response rate).	N/A	OT knowledge, attitudes, beliefs	Cross sectional. Survey addressing the awareness and knowledge about of pediatric OTs in UK with regard to: DCD, ADHD, and joint hypermobility syndrome as well as their training needs. Purposive sampling method. Mail-in questionnaire.	N/A	225 responses included in analysis. 23% reported poor or basic level of knowledge of ADHD.	E
Incorporating evidence into practice (Berg, C., LaVesser, P.)	2005	USA	N/A	N/A	OT knowledge, attitudes, beliefs	Grey literature. Article is an appraisal of the evidence on using a weighted vest for children with attention difficulties. Discussion on key findings from three studies. Highlights the process of incorporating evidence into practice (forming a clinical question, search and sort the evidence, appraise the evidence, apply the findings to practice, reassess the process.)	N/A	N/A	BSF

Computer use in educational activities by students with ADHD (Bolic, V. L., Helene, T. N., Kjellberg, A. Hemmingsson, H.)	2013	Sweden	Students aged 12-18 years old with ADHD (n=102) were pair-matched (sex and age) and with children from general population and children with physical disabilities. **HIGH SCHOOL**	school setting	assistive technology	Questionnaires were completed by the students. Cross-sectional group comparison to children with physical disabilities and children from the general population. The data for this study are based on 15 closed-ended questions (10 of these had between 4 and 12 statements). Overall the questions focused on computer use in school, including the use of a computer for a variety of educational activities, the frequency of computer use, and satisfaction with computer use in school.	N/A	Chi-squared test showed no significant difference concerning access to computers in schools. Fewer students with ADHD were provided their own computer compared to students with physical disabilities. Children with ADHD had limited participation in 4 out of 7 educational activities. Students w/ ADHD reported significantly lower use of a computer for almost all educational activities compared to reference groups. Imp. for OTs to develop strategies for computer use in ed. settings and to promote its use among children with ADHD.	A/P
Andrea asks. Nancy VandenBerg, OT. (Brachtesende, A.)	2004	USA	N/A	N/A	sensory processing	Grey literature. Interview with OT, Nancy VandenBerg, who talks about her Masters research on the use and effectiveness of weighted vests on children with ADHD. She talks about the experience of being able to offer alternative strategies for children who present with these difficulties.	N/A	N/A	BSF
Occupational therapy assessment of neurodevelopmentally disordered children and adolescents (Brezden Papadopoulos, R. J., Staley, D.)	1997	Canada	N=52 were children and adolescents ages 6-16. **MIXED**	Hospital - Neurodevelopmental Disorders Clinic	sensory processing, assessment	Cross-sectional. Questionnaires were completed by parents. Items related to tactile, auditory, olfactory, visual, gustatory, vestibular, muscle tone, coordination, reflex integration, and development. Questionnaire mailed and completed before initial appt. 48.1% met the DSM-III diagnosis for ADHD.	Sensorimotor History Questionnaire (Montgomery & Richter, 1977)	Results indicate an increased sensory sensitivity regarding tactile, auditory, olfactory and visual sensation. Children w/ ADHD vs. non-ADHD report greater problems in dealing with excessive auditory and visual stimuli. Children experiencing neurological dysfunctions include sensory misperceptions.	BSF
Handwriting capacity in children newly diagnosed with Attention Deficit Hyperactivity Disorder (Brossard-Racine, M.; Majnemer, A; Shevell, M.; Snider, L.; Bélanger, S. A.)	2011	Canada	N= 40 medication naïve children with ADHD (mean age = 8.1 years old) **ELEMENTARY**		handwriting, motor skills	Cross-sectional. Following diagnosis at a hospital or community-based clinic, a physician introduced the study to parents. An OT who was blinded to the study hypotheses performed the handwriting and motor evaluations. All evaluations were independently scored by another OT.	Evaluation Tool of Children's Handwriting-Manuscript, the Movement Assessment Battery for Children (M-ABC), the Developmental Test of Visual Motor Integration (VMI) and the Conner Global Index	An important subset exhibited manual dexterity difficulties. Handwriting performance was extremely variable in terms of speed and legibility. VMI was the most important predictor for legibility, as was the MABC-ball skills subtest. Greater age was associated with better overall legibility and speed.	A/P

Exploring the neural mechanisms that underlie motor difficulties in children with Attention Deficit Hyperactivity Disorder (Brossard-Racine, M. Majnemer, A. Shevell, M. I.)	2011	Canada	Included articles --> related to children and adolescents with ADHD. **MIXED**	N/A	sensory processing, motor skills	Structured review to examine the existing evidence in the literature that directly examines the relationship between neuroimaging findings and motor disturbances in children with ADHD.	N/A	Review highlights that there is a lack of comprehensive studies that specifically examine the relationship between motor performance difficulties in children with ADHD and associated abnormalities in brain structure or function.	BSF
Motor skills of children newly diagnosed with Attention Deficit Hyperactivity Disorder prior to and following treatment with stimulant medication (Brossard-Racine, M., Shevell, M., Snider, L., Bélanger, S. A., Majnemer, A.)	2012	Canada	N= 49 medication naïve children with ADHD **ELEMENTARY**	home or at the hospital	motor skills	Single group pre-post. A cohort study of 49 medication-naïve children (39 male; mean age 8.4 ± 1.3 years) with ADHD was conducted. Children were evaluated using the Movement Assessment Battery for Children and the developmental test of visual motor integration at diagnosis and again three months following daily treatment with a stimulant medication.	Movement Assessment Battery for Children (M-ABC) (Henderson & Sugden, 1992), Developmental test of visual motor integration (VMI) (Beery, Buktenica, & Beery, 2005), Parents' Conners' Global Index (CGI-P) (Conners, 2001)	Motor impairment persisted in 55.1% of the sample. The severity of the behavioural symptoms was significantly associated with balance skills in children without motor impairments ($r2 = 0.30$, $p < 0.01$) and with visual motor integration skills in children with persisting motor difficulties ($r2 = 0.27$, $p < 0.01$). Attentional difficulties negatively affect the motor skills of children with ADHD. Following the use of stimulant medication, an important subset continued to demonstrate motor difficulties. The improvement in behaviour was insufficient to resolve motor problems and these children should therefore be targeted for rehabilitation services.	BSF
Motor skills in Brazilian children with developmental coordination disorder versus children with motor typical development (Cardoso, A., Castro, L., Rezende, M. B.)	2014	Brazil	N=181 children aged 7-8 years old. Excluded: children with physical handicaps, neurological disorders such as CP, ASD, MD; subnormal vision or hearing, cognitive deficit, orthopedic problems or recent orthopedic injuries. **ELEMENTARY**	School setting (public and private schools)	motor skills, DCD	Cross-sectional/observational study. 793 Brazilian children were screened with the DCDQ. 91 children who were at risk for DCD as per DCDQ scores were compared to 90 (typical developing group). Out of the 91 children at risk, they were tested with DCDQ and M-ABC and were considered to have DCD (n=34) and the remaining children were placed in TD group (n=147). Both groups of students were assessed with motor and cognitive assessments over 2 sessions during school hours (at their schools).	Assessment of Motor Coordination and Dexterity-AMCD (Magalhaes et al., 2008), Development Coordination Questionnaire - Brazilian version (Prado), Movement Assessment Battery (MAB-2) (Henderson et al., 2007), Swanson, Nolan and Pelham IV Scale (SNAP-IV; Swanson et al., 1999), Raven's Progressive Coloured Matrices - Brazilian Version (Angelini et al., 1999).	Frequency of DCD among Brazilian children is estimated to 4.3% among 7 and 8 year olds. Within the DCD group, 41.2% showed signs of ADHD based on SNAP-IV completed by teachers. Predominance of girls in the DCD group 8 year old group (62.7%). Recommendations to validate the MABC with Brazilian children and to do more validation studies of the AMCD.	BSF

Application of sensory processing concepts to the diagnostic criteria of attention-deficit/hyperactivity disorder in children (Cheney, L. M.)	2008	USA	N/A	N/A	sensory processing	Dissertation. The dissertation aims to explore the utility of the application of sensory processing concepts to a dimensional approach to classification of AD/HD in children in the fifth edition of the DSM. The objectives are: (1) to explore the history of the conceptualization of AD/HD; (2) to clarify the current conceptualization of AD/HD as defined by the diagnostic and statistical manual of mental disorders (DSM-IV-TR), (3) to clarify the theory, definition, and process behind Ayre's sensory integration (SI) model and Winnifred Dunn's sensory processing model and to explore the relationship between sensory processing and AD/HD as defined by the literature; (4) to explore the utility of the application of concepts related to sensory processing in regards to the diagnostic criteria of AD/HD in children.	N/A	The dissertation aims to explore the utility of the application of sensory processing concepts to a dimensional approach to classification of AD/HD in children in the fifth edition of the DSM.	BSF
Consider sensory processing disorders in the explosive child: case report and review (Cheng, M., Boggett-Carsjens, J.)	2005	Canada	Children and youth. Case report of 9 year old boy. **ELEMENTARY**	Tertiary care clinic	sensory processing	Case history of 9 year old boy with past dx of bipolar, ADHD, ODD and non-verbal learning disability. Described as an explosive child due to sound and tactile triggers. Discussion on sensory processing disorder is discussed in the paper.	Sensory Profile (Dunn, 1999)	Referral to occupational therapy to assist with sensory processing difficulties.	BSF
A comparison of patterns of sensory processing in children with and without developmental disabilities (Cheung, P. P., Siu, A. M.)	2009	China	N=1840 children without disabilities; 72 children with ASD (2.7 - 11.6 years old) and 114 children with ADHD (4.8-12 years old) **MIXED**	school setting	sensory processing	Case-control. Study compared patterns of sensory processing among children with ASD, ADHD and children without disabilities.	Chinese Sensory Profile (CSP) (Dunn, 1999, Tseng et al., 2000)	Descriptive analyses of the data set. MANCOVA to identify differences of sensory processing between ASD & ADHD groups and gender. GLM and discriminant analyses showed that the CSP effectively differentiated between children w/ and w/o dev. disabilities but failed to identify major differences between ASD and ADHD. Multivariate tests show significant differences between groups. No overall gender differences between groups. Study supports the use of the CSP as a screening tool for sensory processing.	BSF

The suitability of the Sensory Profile for diagnosing sensory modulation dysfunctions in Chinese children (Chow, S. M.)	2005	Hong Kong	N=584 parents of typically developing children between the ages of 3 to 10 years old **ELEMENTARY (parents)**	school setting	sensory processing	Cross-sectional. The headteachers from a list of randomly selected schools were contacted for permission to distribute the questionnaires to parents. Completed consent forms and questionnaires were returned via the school.	Chinese Sensory Profile (CSP) (Dunn, 1999, Tseng et al., 2000)	The percentages of children who never or seldom displayed 125 types of behavior were documented and compared with the US data published previously. While none of the 125 items of the Sensory Profile measured dysfunctions at the –2SD level, 32% of the items did at the –1SD level. When compared to the performance of children in the US, v2 analyses revealed differences in 64.8% of the items.	BSF
Occupational therapy for children with attention deficit hyperactivity disorder: A survey on the level of involvement and training needs of therapists (Chu, S)	2003	UK	pediatric occupational therapists, N=282	Multiple settings (e.g. community child health services, acute hospital settings, etc.)	OT knowledge, attitudes, beliefs	Cross-sectional. National survey on the level of involvement of pediatric occupational therapists in services for children with ADHD.	N/A	63.8% of therapists reported they saw children with ADHD as part of overall caseload due to associated problems (e.g. sensory, perceptual motor, functional performance areas). 20.7 % of therapists' report levels of knowledge of ADHD at basic and poor levels.	E (service provision)
Occupational therapy for children with attention deficit hyperactivity disorder (ADHD), part 1: A delineation model of practice (Chu, S., Reynolds, F.)	2007	UK	N/A	multiple settings	service delivery	Grey literature. Theoretical model proposed based on literature review, clinical experience and consensus study. Describes a delineation model of practice based on OT theoretical concepts.	N/A	Description of family centred approach, multidimensional evaluation of children with ADHD and developing multifaceted interventions of children with ADHD.	E (service provision/ model of practice)
Occupational therapy for children with attention deficit hyperactivity disorder (ADHD), Part 2: A multicentre evaluation of an assessment and treatment package (Chu, S., Reynolds, F.)	2007	UK	N=20 pediatric occupational therapists took part in the package. They provided data for 20 children with ADHD; ranging from 5.2 -10.8 years of age,	Multicentre	service delivery	Pre-post-test with occupational therapists. 20 OTS participated in an evaluation and assessment package, which lasted 3 months with 12 weekly contacts with the child, parents and teachers.	ADHD rating scales - pre and post interventions (both the home and school versions were completed). Measures of the Processes of Care (MPOC) completed by parents and teachers re: their perceptions about the package. Sensory Profile data was collected on the 20 selected children.	17 children showed in an improvement in scores following treatment. Most parents reported gains in ADHD management as per MPOC scores (descriptive statistics were used). Limitations due to small sample size; low generalizability.	E (service provision)

Driving characteristics of teens with attention deficit hyperactivity and autism spectrum disorder (Classen, S., Monahan, M., Wang, Y.)	2013	USA	N=22 teens (9 w/ ADHD, 7 w/ ASD, 6 with ASD-ADHD; mean age= 15.05). Healthy controls(HC) N=22 (mean age: 14.32) **HIGH SCHOOL**	Participants recruited via school districts, physician offices, flyers in public places. Clinical tests took place at simulation laboratory at the University of Florida	Driving	Cross-sectional study. Two group prospective study. The participants' parents completed a demographic questionnaire, medical history and list of medications. The participants completed a clinical battery of tests, an orientation to the simulator, 7-min acclimation drive, and 20-min main drive.	Tests : Useful field of View (UFOV) (Ball & Owsley, 1993), Optec 2500 Visual Analyzer, VMI (Beery, 2010), Comprehensive Trail Making Test (Reynolds, 2002), Symbol Digit Modalities Test (Smerbeck et al., 2011), BOT-2 Short Form (Bruininks, 2005),	Compared with HC teens, the teens with ADHD–ASD performed more poorly on right-eye visual acuity, selective attention, visual–motor integration, cognition, and motor performance and made more errors on the driving simulator pertaining to visual scanning, speed regulation, lane maintenance, adjustment to stimuli, and total number of driving errors. Teens with ADHD–ASD, compared with HC teens, may have more pre-driving deficits and as such require the skills of a certified driving rehabilitation specialist to assess readiness to drive.	A/P
Including the family perspective in sensory integration outcomes research (Cohn, E. S., Cermak, S. A)	1998	USA	N/A	N/A	sensory processing, family involvement	Grey literature. Discussion on the education of sensory integration therapy. Link to children with ADHD as they often present with sensory integrative dysfunction.	Outcome measures recommended: Child Behavior Checklist (Achenbach, 1991), Conners Rating Scales (Conners, 1997), Home Situations Questionnaire - Revised (DuPaul & Barkley, 1992),. Other measures on family system: Parenting Stress Index (PSI, Abidin, 1991), Parenting Sense of Competence (PSOC, Gibaud-Wallston, 1978), etc.	Presentation of a conceptual framework based on sensory integration and intervening at various levels; inclusion of the family.	E
A model for play-based intervention for children with ADHD (Cordier, R., Bundy, A., Hocking, C., Einfeld, S)	2009	Australia	N=112 children with ADHD paired with playmates (N=112) who were typically developing. The control group consisted of typically developing children paired with typically developing children (n=126). Ages: 5 to 11 years old. **ELEMENTARY**	N/A	play skills	Grey literature. A model was proposed to depict the interaction between ADHD characteristics (according to the literature) and factors that promote play.	N/A. Results available in another publication. Purpose of the paper is to present the model and present principles based on preliminary findings.	N/A	A/P
Empathy in the play of children with attention deficit hyperactivity disorder (Cordier, R.,	2010	New Zealand	Participants were children (aged 5 to 11 years) diagnosed as having ADHD (N = 112) and typically	Recruited from district health boards.	play skills	Cross-sectional. (Case-control comparison). Group 1 consisted of children with ADHD who were paired with typically developing playmates	Test of Playfulness (Bundy, 2004), Conners	Children with ADHD were less playful than their controls based on overall ToP scores. None of the ToP items that relate directly to ADHD primary	A/P

Bundy, A., Hocking, C., Einfeld, S.)			developing peers (N = 126) who were matched based on age, ethnicity, and gender. **ELEMENTARY**			(one child with ADHD and one typically developing child in each observation) and group 2 consisted of typically developing children who were paired with a playmate who was also typically developing (two typically developing children in each observation). All playmate pairs were familiar with one another. Play sessions were videotaped and assessed by an experienced rater using the ToP.	Parent Rating Scale - Revised	symptoms were significantly different between ADHD group and typical group. Conclusion was made that children with ADHD are developmentally inappropriate with respect to "decentring" and to show empathy.	
Playing with a child with ADHD: a focus on the playmates (Cordier, R. Bundy, A., Hocking, C., Einfeld, S.)	2010	New Zealand	Group 1 consisted of N=112 children with ADHD paired with 112 typically developing children. Group 2 were 63 pairs (N=126) typically developing children who played together. **ELEMENTARY**	Playroom in a clinical setting	play skills	As above. Cross-sectional. Pairs of children took part in 20 minutes of free play. observed videotaped the session. A single rater who was blind to the study purpose rated all the children using the Test of Playfulness.	Test of Playfulness (Bundy, 2004)	overall finding that play behaviour of playmates closely resembled to that of the children with ADHD.	A/P
Interactive Metronome training in children with attention deficit and developmental coordination disorders (Cosper, S. M., Lee, G. P., Peters, S. B., Bishop, E.)	2009	USA	N=12 who had been diagnosed with attention deficit hyperactivity disorder, in conjunction with either developmental coordination disorder (n=10) or pervasive developmental disorder (n=2). Total N=12. Age range: 6.5 - 13.5 years old. **ELEMENTARY**	Rehabilitation center for outpatient treatment	motor skills, DCD, sensory processing?	Pretest-post-test design. The children underwent 15 1-h sessions of Interactive Metronome training over a 15-week period. Each child was assessed before and after the treatment using measures of attention, coordination, and motor control to determine the efficacy of training on these cognitive and behavioral realms.	Bruininks-Oseretsky Test of Motor Proficiency - Short Form, Gordon Diagnostic System's (GDS) continuous performance test.	Children w/ mixed attentional and motor coordination disorders made significant improvements in complex visual choice reaction time. No Signiant improvements on measures of sustained attention.	BSF

Broadening the occupational therapy toolkit: An executive functioning lens for occupational therapy with children and youth (Cramm, H., Krupa, T., Missiuna, C., Lysaght, R. M., Parker, K. C. H.) [	2013	Canada	N=13 occupational therapists (who have worked with children, adolescents, or both in settings here EF issues would be common)	professional networks, conferences and OT agencies (for sampling)	OT knowledge, attitudes, beliefs, executive functioning	Qualitative content analysis of interviews with occupational therapists. Open-ended questions were used. All participants were questioned about the same areas to promote dependability of the findings. A coding scheme to categorize the data was used. Inductive content analysis performed (immersion in data, line by line derivations, iterative coding, converting notes into labels), Rigor was ensured through review and revision of tentative labels along with ongoing dialogue and review among authors.	N/A	Three themes were identified and developed: the to need to see children EF in children and youth, barriers to seeing executive functioning, learning to see through the EF lens. EF should be considered during the clinical reasoning. OTs who have integrated into their practice have acquired knowledge/skills through inter-professional collaboration and PD opportunities. OTs have a perceived and actual lack of preparation to adequately address EF needs among youth.	E (attitudes of health care professionals)
Mothering a child with hidden impairments (Cronin, A. F.)	2004	USA	N= 22 mothers of children with ADHD, n= 22 mothers of children with cystic fibrosis	Specialty clinics	family involvement, parenting	Qualitative analysis of interviews with mothers of children with ADHD or cystic fibrosis. Data collection consisted of 1 or 2 interviews with informants (lasted 1-2 hours). Theoretical perspective: concepts of roles, habits, and routines from occupational science. The researcher kept field notes, included comments and recorded general impressions.	N/A	Transcripts were analyzed for emergent themes. Mothers of children with ADHD reported little family support, high perception of child-related demands, and less confidence in their success in mothering their children. They felt "on alert" and did not feel they had "normal" routines. A recurrent source of exhaustion and frustration described by mothers of children with ADHD was their relationship with the children's schools and with the health care system.	E
Evidence review to investigate the support for subtypes of children with difficulty processing and integrating sensory information (Davies, P. L., Tucker, R.)	2010	USA	N/A	N/A	sensory processing	Review. 57 articles were included in a systematic literature review; only 4 articles provided direct evidence for subtypes. Authors classified studies as class 1 - where multivariate statistical approaches are used to examine relationship between more then two variables (associated with SPD) or as class 2 - univariate methods of statistical analysis are used. Class 2 - the articles were grouped by diagnostic population studied. *(Only ADHD group will be emphasized.)*	N/A	(10 articles were included - re: children with ADHD) Children with ADHD present with sensory modulation such as sensory seeking, reactivity, sensitivity; increased variability in timing of motor responses. A theme to conduct comprehensive assessment of sensory-based functions (praxis, sensory modulation, sensory discrimination). More consistency in the types of tools used recommended.	BSF

Motor skills in Australian children with attention deficit hyperactivity disorder (Doyle, S., Wallen, M., Whitmont, S.)	1995	Australia	N=38 children with attention deficit hyperactivity disorder between the ages of 7 to 12 years **ELEMENTARY**	outpatient hospital setting	motor skills, handwriting	Cross-sectional. This study investigates the prevalence and nature of motor difficulties in ADHD using standardized measures in a primary school aged sample of Australian children. Children were assessed in the OT department prior to further multidisciplinary assessment/treatment in the ADD clinic. Of those children usually medicated, half were removed from medication for at least 15 hours prior to assessment and the remainder were assessed on their usual medication regime.	Parents' motor skill rating, Bruininks-Oseretsky Test of Motor Proficiency (BOTMP) (Bruniniks, 1978); Quick Neurological Screening Test (QNST) (Mutti, Sterling, & Spalding, 1978).	One third of the children were judged by their parents to be uncoordinated on ratings of both gross and fine motor skills - 58% fell in the categories of "poor" and "very poor" . On the BOTMP, only 5% and 8% fell in the "below average" range in the Short form and fine motor composites. On the QNST, 84% of the sample fell in the normal range. Another outcome, is that children in this sample present with relatively poor handwriting skills on parent reports and generally better gross than fine motor performance. Children taking medication showed slightly better performance on the BOTMP Short Form. There are clear implications of the ability-performance hypothesis for motor skill remediation in the ADHD population. Discrepancy between parent and teacher concerns of motor performance as assessed in the clinical situation will alert the therapist of the possibility that the ADHD signs of inattention an impulsiveness are the basis of these perceived motor difficulties.	BSF
Factors associated with participation of children with and without ADHD in household tasks (Dunn, L., Coster, W. J., Cohn, E. S., Orsmond, G. I.)	2009	USA	N= 22 parents of children with ADHD and N=22 parents of children without ADHD (of children aged 9 to 11 years old or grades 3 to 5) **ELEMENTARY**	Regarding participation in the home environment	Activities of daily living, participation	Cross-sectional. Case control. Questionnaires completed. Relational (?) study to examine factors associated with participation in household tasks among children with ADHD. Parents completed the survey packet.	Children Helping Out: Responsibilities, Expectations, and Supports (CHORES) (Dunn, 2004); Conners Parent Rating Scale Revised Short Form (Conners 1997); Family Time and Routines Scale (FTRS) (McCubbin et al., 1987); Parent Stress Index (Abidin, 1995); Parenting Sense of Competence (Johnston & Mash, 1989)	Child's age, the presence of an older sibling, and the importance of family routines were significant predictors of the number of household tasks performed by children. Diagnosis of ADHD, the presence of an older sibling, and parental stress were significant predictors of the amount of assistance the children required to do the household tasks.	A/P

Household task participation of children with and without attentional problems (Dunn, L., Coster, W. J., Orsmond, G. I., Cohn, E. S.)	2009	USA	(as above) **ELEMENTARY**	as above	activities of daily living, participation	Cross-sectional. Matched group design and a sample of convenience to compare task participation by school-aged children with and without ADHD.	Children Helping Out: Responsibilities, Expectations, and Supports (CHORES) (Dunn, 2004); Conners Parent Rating Scale Revised Short Form (Conners 1997);	Children with ADHD did not differ significantly from the comparison group in their frequency of participating in household tasks. Children with ADHD, however, required significantly more assistance with the tasks than did the comparison group. The results have implications for family occupations and children's occupational development.	A/P
Participation of children with and without ADHD in household tasks (Dunn, M. L.)	2005	USA	N=45 parents, 22 who had a child with ADHD and 23 whose child had no disabilities participated in this study. Children were in grades from 3 to 5. **ELEMENTARY**	community groups	Activities of daily living, participation	**Dissertation.** Three studies were designed for this dissertation. One involved the validation of a measure of children's participation in household tasks. The second study examined the patterns of participation for school-aged children with and without ADHD. The aim of the third study was to examiner predictors of participation in household tasks. Parents who agreed to participate were sent the survey key with the CHORES and returned it to principal investigator.	Children Helping Out: Responsibilities, Expectations and Supports (CHORES)	Results were not significant, however children with ADHD required significantly more assistance to participate in household tasks. In the third study, grade, presence of an older sibling, and the importance of family routines to the parent predicted children's performance scores. Presence of ADHD, presence of an older sibling, and parental personal stress predicted children's assistance scores. Parents of children with ADHD are likely to use more support strategies to engage their children. Use of occupation-based interventions to promote participation in home routines for families who have children with ADHD may benefit both the family and the child. Exploration of accommodations and adaptations for children may include organizing a responsive schedule (e.g., allowing children extra time to get started in the morning), reframing household tasks by adding	A/P

Patterns of sensory processing in children with attention deficit hyperactivity disorder (Dunn, W. & Bennett, D)	2002	USA	Parents of N=70 children 3 to 15 years old with a primary diagnosis of ADHD and parents of children without disabilities matched by age and gender completed the Sensory Profile **ELEMENTARY (parents)**	community ADHD clinic	sensory processing	cross-sectional. Parents of 70 children with ADHD matched to parents of 70 children without (matched by age and gender) (the latter group came from the national standardization sample). Parents of children with ADHD completed the SP in clinic while waiting for their appt. Parents of children without disabilities received the questionnaires in the mail and returned them to the researchers.	Sensory Profile	Researchers completed a MANOVA. Results show children with ADHD and children without disabilities were significantly different on all 14 sections. Post hoc univariate analyses revealed statistically significant differences (i.e., $p < .05$) between the children without disabilities and the children with ADHD on 118 of the 125 items. (In every case, the children with ADHD displayed the behavior more frequently than children without disabilities.) The findings from this study provide evidence that the Sensory Profile may be a useful tool for confirming central features of the diagnosis of ADHD. There is growing evidence that sensory processing differences occur in children with ADHD.	BSF
The relationship between sensory processing difficulties and leisure activity preference of children with different types of ADHD (Engel-Yeger, B., Ziv-On, D.)	2011	Israel	Participants were 58 boys aged 6–10 years: 29 boys with ADHD: 15 with hyperactive-impulsive type and 14 characterized as inattentive. The controls were 29 typical peers. **ELEMENTARY**	clinic	sensory processing, leisure participation	Cross-sectional. Children participated before receiving any type of therapeutic/medical intervention. Parents completed the SSP and children completed the PAC (questionnaire) in the presence of a data collector.	The Short Sensory Profile (McIntosh et al., 1999); Preference for Activities of Children (PAC) (King et al., 2004)	Children with both ADHD types showed significantly lower preference to participate in leisure activities than the controls. Their lower preference correlated with SPD. The findings suggest that children with different ADHD types may share common SPD, which may negatively impact their activity preference.	A/P
The Sensory Profile: A discriminant analysis of children with and without disabilities (Ermer, J, Dunn, W)	1998	USA	Data for three groups of children: PDD (n= 38, 3 to 13 years old), ADHD (n=61, 3 to 15 years old), and children without disabilities (n=1075, 3 to 10 years old) **MIXED**	clinic	sensory processing	Cross-sectional. To identify factors on the SP that best discriminate among children with autism/PDD, children with ADHD, and children without disabilities. Parents completed the forms during scheduled clinic visits.	The Sensory Profile (Dunn & Westman, 1995)	Analysis yielded two discriminate functions; one that differentiated children with disabilities from children without disabilities, and another that differentiated two groups of children with disabilities from each other.	BSF
Stability balls and students with attention and hyperactivity concerns: Implications for on-task and in-seat behavior (Fedewa, A. L., Erwin, H. E.)	2011	USA	N=8 in 4th and 5th grade **ELEMENTARY**	elementary school setting (classroom)	behaviour management, sensory processing, motor skills	Single-case design. The students were observed 3x/week over a period of 12 weeks using a single-subject A-B time-series design. Teachers completed the ADHDT scale to identify students with a high probability of ADHD. Momentary Time Sampling was used to collect observational data (code students behaviour every 30s).	Attention-Deficit/Hyperactivity Test (Gilliam, 1995); Teacher Social Validity Scale (Fedewa, 2011?)	Results of the stability ball intervention revealed increased levels of attention, decreased levels of hyperactivity, and increased time on task and in seat or on ball. Findings from the social validity questionnaire demonstrated that teachers preferred the stability balls over chairs.	E (products/tech for education)

Theraplay for children with attention deficit hyperactivity disorder (Fourie, A. J., van Vuuren, S., Venter, A., Nel, M.)	2007	South Africa	20 children with combined-type ADHD between the ages of 5 and 8 years old - 10 children in the control group and 10 in the experimental group **ELEMENTARY**	clinic (?)	behaviour management, cognitive skills, visual perceptual	Experimental study - randomized trial This study investigated whether Theraplay influenced the functioning of children diagnosed with attention deficit hyperactivity disorder (ADHD) in different settings namely known situation (at home and with parents), individual performance (perceptually) and in group situations (classroom behaviour). The children were randomized into an experimental group and control group. The experimental group received 10 weekly therapy sessions of Theraplay.	Conners' Rating Scales (Parent and Teacher Rating Scales) (Conners, 1997); Rivermead Behaviour Memory Test (RBMT-C) (Wilson et al., 1991); Developmental Test of Visual Perceptual Skills -2 (DTVP-2) (Hammill et al., 1995).	Experimental group improved significantly in comparison to the control group in 12 out of 14 CPRS-RL categories. They also improved significantly with respect to the oppositional behaviour scale. The experimental group's emotional behaviour improved significantly after Theraplay. The experimental group also improved significantly in spatial arrangements and combined visual motor integration skills.	A/P
Parents reported oral sensory sensitivity processing and food preference in ADHD (Ghanizadeh, A.)	2013	Iran	n = 189 children with ADHD (3.4 to 15 years old) **MIXED**	clinic	sensory processing (oral)	Cross-sectional. Parents completed the questionnaire in clinic.	Oral Over- and Under responsivity Behaviors Inventory (OOUBI)	The parents of children with ADHD and ODD symptoms are more likely to report OR to oral sensations in their children. In other words, these results suggest that children with ADHD and higher oppositional behaviour are more likely to adhere to the same foods.	BSF
Effect of a social skills training group on everyday activities of children with attention-deficit-hyperactivity disorder (Gol, D., Jarus, T.)	2005	Israel	N=27 children with ADHD (2 females, 25 males; age range 5 to 8y, mean 6y 6mo, SD 10mo), and 24 children without ADHD (8 females, 16 males; age range 5 to 8y, mean 6y 11mo, SD 10mo) 14 children out of those with ADHD used medication daily **ELEMENTARY**	Child and Family Developmental Center	social skills	Experimental study – case-control (?) Nine out of the 27 children with ADHD were *randomly selected* to attend group treatment which focused on social skills training, through meaningful occupations (e.g. art, games, cooking). A parallel parents' group was conducted by a social worker and psychologist. Children were evaluated at the beginning of group treatment and after 10 sessions and again after the last meeting. Ten children without ADHD were *randomly selected* and were evaluated after 10 weeks, in parallel to the second evaluation of the children with ADHD who participated in the OT skills group.	Assessment of Motor and Process Skills (AMPS)	Children with ADHD initially scored significantly lower in process and motor skills areas. Following the group sessions, children with ADHD significantly improved from the first to the second evaluation and no longer differed from the children without ADHD after treatment ($p<0.008$). The results emphasize the need for a focus upon occupation in assessment and treatment of children with ADHD.	A/P

OTs in the trees: adventure programs for adolescents (Goodman, L & Shapiro, M. E.)	2000	USA	adolescents (case example of adolescent with ADHD in article) **HIGH SCHOOL**	clinical/school --> outdoor program	social skills, motor skills, sensory processing	Grey literature. Article about adventure programming for children with psychiatric problems, learning disabilities or substance abuse disorders. The authors describe the performance components in adventure programs such as vestibular stimulation, midline stability, bilateral coordination, balance, locomotion, ocular control, and proprioception. Adventure programs share the fundamental belief that persons can learn and grow physically, mentally, and emotionally through challenging physical activities.	N/A	N/A	A/P
A possible correlation between vestibular stimulation and auditory comprehension in children with attention-deficit/hyperactivity disorder (Haghshenas, S., Hosseini, M. S., Aminjan, A. S.)	2014	Iran	N=, aged 10 to 12 years with attention-deficit/hyperactivity disorder (ADHD), were selected to study the effect of vestibular stimulation on auditory perception and sensitivity **ELEMENTARY**	psychiatric center	sensory processing (vestibular, auditory)	Experimental - randomized trial (study states children were randomly divided) The participants were divided into 2 groups, and matched by age. They were *randomly divided* to control or intervention groups. The children in the intervention group obtained vestibular stimulation therapy for 2x/week, for 10 weeks. Children in the control group received a variety of other clinical exercises (e.g. memory games, proprioceptive activities, solving mazes, etc.).	Integrated Visual and Auditory Continuous Performance Test (IVA CPT)	No significant difference was found between the groups that received clinical exercises vs. vestibular stimulation. The mean differences between the pre- and post-test in the intervention group (in the presence of vestibular stimulation) were significantly higher than in the control group ($p < .05$).	BSF
Effectiveness of Cognitive-Functional (Cog-Fun) intervention with children with attention deficit hyperactivity disorder: A pilot study (Hahn-Markowitz, J., Manor, I., Maeir, A.)	2011	Israel	n = 17, 7-8 year old children with a diagnosis of ADHD **ELEMENTARY**	community clinic	cognitive skills	Before-after/pre-post test. Uncontrolled, one-group, pre-intervention–post-intervention pilot investigation to explore the effects of the Cog–Fun program on children with ADHD. The program involved ten 1-hr weekly sessions and transfer work facilitated by the parents at home. Each child–parent dyad chose one occupational goal to work toward at home, at school, or in the schoolyard. Measures administered at 3 months follow-up.	The Behavioral Rating Inventory of Executive Function (BRIEF; Gioia, Isquith, Guy,& Kenworthy, 2000a); Tower of London (Drexel University); Canadian Occupational Performance Measure (Law et al., 2005)	We found significant improvements with medium to large effects on outcome measures after intervention, and most effects were maintained at follow-up.	BSF

Evaluation of clumsiness in children (Hamilton, S.S.)	2002	USA	school age children **ELEMENTARY**	N/A	motor skills, DCD	Grey literature. Discussion about the mild motor problems among school-age children and associated deficits such as attention-deficit hyperactivity disorder. Referral to occupational therapy is discussed in this paper.	N/A	N/A	BSF
Using the Sensory Processing Measure (SPM) in multiple practice areas (Henry, D. A., Ecker, C. E., Glennon, T. J., Herzberg, D.)	2009	USA	school age children **ELEMENTARY**	clinical and school setting	sensory processing	Grey literature. Special interest article (in "OT Practice") discussing the utility of the SPM in various practice areas, such as school-based or clinic-based. Several case examples are provided. Also discusses the psychometric strength of the SPM (internal consistency, test-retest reliability and discriminant validity.	Sensory Processing Measure (Parham et al., 2007)	N/A	BSF
Proprioception and participation at school: Are weighted vests effective? Appraising the evidence, part 1. (Honaker, D.)	2005	USA	school age children **ELEMENTARY**	school	sensory processing	Grey literature: news article is about the effectiveness of weighted vests and how to carry out an appraisal of the evidence on this intervention. A case example of a kindergarten student with ADHD is also described. An appraisal of the evidence suggests that the 3 studies identified had low external validity and small sample sizes, and the intervention was at least effective for some or most of the participants.	N/A	N/A	BSF
Proprioception and participation at school: Are weighted vests effective? Appraising the evidence, part 2. (Honaker, D.)	2005	USA	school age children **ELEMENTARY**	school	sensory processing	Grey literature: See above. Article describing how a school-based occupational therapist uses the available evidence to make a clinical decision about using a weighted vest for a K student with ADHD.	N/A	N/A	E (tools for educa tion)
Characteristics of the sensory-motor, verbal and cognitive abilities of preschool boys with attention deficit/hyperactivity disorder combined type	2006	Japan	N=46 Japanese boys with ADHD-combined type (ADHD-C) whose ages ranged from 45 to 72 months **PRE-SCHOOL**	Rehabilitation center	sensory processing, motor skills, cognitive skills	Cross-sectional. Children were assessed with the JMAP and were compared with 46 Japanese boys matched for age and gender in the normative samples that served as the standardizations for the JMAP (in control group, matched for age and gender).	Japanese Miller Assessment for Preschoolers; Tanaka-Binte Intelligence Scale (IQ)	The ADHD-C group had significantly lower scores than the normative sample group in equilibrium, postural control, fine motor of hand and tongue, motor praxis, articulation, memory related to the comprehension of long sentences, and visual construction. Because fundamental	BSF

(Iwanaga, R., Ozawa, H., Kawasaki, C., Tsuchida, R.)								sensory-motor abilities were notably lower in the ADHD-C group than in the normative sample group, it is suggested that preschool boys with ADHD-C should be examined and treated for sensory-motor disabilities.	
Visual perception of ADHD children with sensory processing disorder (Jung, H., Woo, Y. J., Kang, J. W., Choi, Y. W., Kim, K. M.)	2014	Korea	N= 38, ages 6-8 years old, with a diagnosis of ADHD **ELEMENTARY**	Hospital setting - outpatient	sensory processing, visual perceptual	Cross-sectional. Children were identified having a SPD using the SSP. They were then clustered into two groups (w/ SPD (n= 20) and without (n= 18)). Participants were asked to complete the K-DTVP-2 and parents completed the SSP. The children were clustered into two groups, based on the scores of the SSP (w/ SPD or not).	Short Sensory Profile (SSP) (McIntosh et al., 1999); Korean Developmental Test of Visual Perception - 2; Kiddie-Schedule for Affective Disorders and Schizophrenia-Present and Lifetime Version-Korean Version (Kaufman et al., 1997).	The ADHD children with SPD performed inferiorly to ADHD children without SPD in the on 3 quotients of K-DTVP-2. The general visual perception of K-DTVP-2 score was related to Movement Sensitivity section (r=0.368*) and Low Energy/Weak section of SSP (r=0.369*).	BSF
Prediction of methylphenidate (Ritalin) responsiveness through sensory integrative testing (Kimball, J. G.)	1986	Canada/ USA	N=17 boys; 9 good and 8 poor responders to Ritalin **MIXED**	Hospital outpatient (Toronto hospital)	medication effects, sensory processing	Cross-sectional. All subjects were tested in an off-drug state. Examiner was blind to which group the child belonged to. The tests administered were the SCSIT and SCPNT.	Southern California Sensory Integration Test (SCSIT) tactile tests; Vestibular tests: (a)Southern California Post rotary Nystagmus Test (SCPNT); (b) Bruininks-Oseretsky Test of Motor Proficiency Subtest 2: Standing Balance (24); (c) SCSIT: Standing Balance Eyes Open; and (d) SCSIT Standing Balance Eyes Closed. Clinical observations: (a) prone extension position; (b) flexion in supine; (c) symmetrical tonic neck reflex; (d) asymmetrical tonic neck reflex; (e) equilibrium reactions; (f) gravitational insecurity; (g) muscle tone; (h) co-contraction; and (i) reaction to the SCPNT.	Inspection of the correlations reveals that drug response is significantly correlated with SCPNT (.05), equilibrium reactions (.01), Double Tactile Stimuli (.01), and reaction to the SCPNT (.01). Results showed that children who were poor responders to Ritalin showed prolonged scores on and an adverse reaction to the Southern California Postrotary Nystagmus Test and had poorer equilibrium reactions and lower double tactile stimuli scores than the children judged good responders to Ritalin.	BSF

Should children with ADHD be routinely screened for motor coordination problems? The role of the paediatric occupational therapist (Kirby, A., Salmon, G., Edwards, L.)	2007	UK	N = 69; 5 to 16 years (mean age 10.9 years), with a gender ratio of 3.3:1 male: female. Fifty-two of the 69 (75.4%) children who participated in the study were taking prescribed medication for ADHD. **MIXED**	ADHD clinic	motor skills	Cross-sectional. The parents of 88 children due to attend ADHD clinics (either for initial assessment or for medication monitoring) were sent a M-ABC-Checklist Movement with their appointment letter and an information sheet about the study, with the request that the questionnaire was completed and returned at the time of the clinic appointment.	Movement Assessment Battery for Children Checklist (M-ABC Checklist, Henderson and Sugden 1992)	The results showed that 19% of the children with ADHD were defined as having a 'movement problem', with a further 16% defined as 'at risk'. This paper discusses the results of the study and the implications for paediatric occupational therapy.	BSF
Research Brief. (Koenig & Kinnealy, 2005)	2005	USA	children with ADHD, ages 4 to 8 years and have never received SI therapy before **ELEMENTARY**	N/A	sensory, behaviour	Grey literature: A summary of a research study looking at comparative outcomes of OT using SI in children with ADHD who receive direct intervention versus a wait-list control condition. This assumes that ADHD has sensory and neurological underpinnings. Thus, does OT influence changing the behavioural manifestations of ADHD. All study participants are pre- and post-tested after 40 1-hour treatment sessions within 4 to 6 months after placed in a wait-list condition.	Sensory Profile, SIPT, Behavioural Style Questionnaire, Conners Parent Rating Scales - Revised, Quick Neurological Screening Test	N/A	BSF
Theoretical and clinical perspectives on the Interactive Metronome: a view from occupational therapy practice (Koomar, J., Burpee, J. D., DeJean, V., Frick, S., Kawar, M. J., Fischer, D. M.)	2001	USA	**ELEMENTARY**		sensory processing (praxis, coordination)	Review/case study. Discussion on the use of the Interactive Metronome. Authors discuss the theory and its clinical utility. Discuss how the IM can help develop timing and rhythmicity. The authors also report a case example. Discussion on extending clinical applications of the IM is also highlighted.	N/A	N/A	BSF
Occupational Therapy in Attention Deficit Hyperactive Disorder (Kurani, D.)	2007	India	N/A	not indicated	sensory processing, cognitive skills, perceptual motor skills	Grey literature: summary on ADHD and possible underlying causes to sensory integrative dysfunction and cognitive perceptuomotor dysfunction. Discussion on various types of interventions (sensory integration, behavioural approaches) to promote play and participation.	N/A	N/A	BSF

Sensory over-responsivity and anxiety in typically developing children and children with autism and attention deficit hyperactivity disorder: Cause or coexistence? (Lane, S. J., Reynolds, S., Dumenci, L.)	2012	USA	Convenience sampling provided participants ages 6–10 year in one of three groups: ASD (N= 23), ADHD (N=38), or TYP (N= 70). **ELEMENTARY**	Lab	sensory processing, emotional regulation (anxiety)	Case-control. Path analysis was used to examiner the sensory over-responsivity model. Following telephone screening, assessment measures were mailed , a child information form, and consent form to parents. Children were introduced to a SPASE lab where the electrodes were applied and salivary samples were obtained.	Sensory Profile (Dunn, 1999); Sensory Over responsiveness Inventory (Schoen et al., 2008); Revised Children's Manifest Anxiety Scale (Reynolds & Richmond, 2005); Electrodermal Response Measures; Salivary Cortisol	The magnitude of physiological responses to sensory challenge was a mediator variable between predictors (baseline arousal and attention) and outcomes (anxiety and physiological recovery). Behavioral SOR was correlated with anxiety but not with physiological variables.	BSF
Sensory over-responsivity and ADHD: Differentiating Using electrodermal responses, cortisol, and anxiety (Lane, S. J., Reynolds, S., Thacker, L.)	2010	USA	N=38 children with ADHD, 6-12 y. o., n= 46, control group **ELEMENTARY**	Lab	sensory processing	Case-control. Children's cortisol sample was taken and electrodes were applied. The children received the Sensory Challenge Protocol (presentation of 6 different sensory stimuli - touch, vision, smell, movement, sound). Each stimulus was presented 8 times with a variable of 10- to 15-seconds interval between stimuli.	Sensory Over responsiveness Inventory (Schoen et al., 2008); Revised Children's Manifest Anxiety Scale (Reynolds & Richmond, 2005); Electrodermal Response Measures; Salivary Cortisol	Results substantiated links between SOR and anxiety, in both TYP and ADHD children. Results suggests that ADHD should be considered in conjunction with anxiety and sensory responsivity; both may be related to bottom-up processing differences, and deficits in prefrontal cortex/hippocampal synaptic gating.	BSF
A study on fine motor skills of Iranian children with attention deficit/hyper activity disorder aged from 6 to 11 years (Lavasani, N. M., Stagnitti, K.)	2011	Iran/ Australia	N= 26 with ADHD, N= 29 controls; males; aged 6 to 10 years old **ELEMENTARY**	school setting	fine motor skills	Case-control. Children were assessed in their schools. IQ was tested and they all performed the 9 fine motor tasks.	Raven Intelligence Test (Raven, 1958); Purdue Pegboard (Lafayette Instrument Company, 2002), fine motor assessment developed in Iran	For the fine motor results, the children with ADHD performed significantly lower than the control group in cutting, placing the dots with no direction in 6 seconds, threading beads, drawing lines, finger movements and in Purdue Pegboard. There was a significant difference ($t = 2.706$, $df = 53$, $p = 0.009$) in cutting using scissors between the children with ADHD ($M = 9.58$, $SD = 5.25$) and typical children ($M = 13.45$, $SD = 5.34$).	BSF

The effects of yoga on attention of preschool-aged children with attention problems (Lawson, L. M.)	2012	USA	N=3 preschool aged children with attention problems (not formally diagnosed with ADHD). **PRE-SCHOOL**	school setting	sensory processing, motor skills	Single subject AB study design. Researchers examined the effect of participation in YogaRi on attention during small group activities. Two of the students were in the intervention classroom and one student was in the control classroom. During intervention, children followed a ten minute yoga video tape four days a week for a period of five weeks. Children's time on task was observed during fine motor activities once per week during a two week baseline period and for 1x/week during 5 weeks of intervention.	length of time child visually attends to the task while simultaneously engaging in fine motor activities	Results indicated that children participating in the yoga increased during the intervention phase (11% for student 1, and 24% for student 2). Time on task remained relatively stable for student 3 (control) - increased by 2.5%.	A/P
Kinematic performance of fine motor control in attention-deficit/hyperactivity disorder: the effects of comorbid developmental coordination disorder and core symptoms (Lee, I. C., Chen, Y. J., Tsai, C. L.)	2013	Taiwan	N= 15 children with ADHD; n = 8 children with ADHD + DCD; n = 38 typically developing children; ages 6-11 year old **ELEMENTARY**	Lab (?)	fine motor skills, DCD	Cross-sectional. To determine if fine motor fluency exists between 3 groups of children: children with ADHD, children with ADHD + DCD, and typically developing control group. Children who obtained scores <15th percentile were assigned to the ADHD+DCD group. Testing was conducted in two sessions. The pre-screening tests were conducted during the first session, and the Integrated Visual and Auditory (IVA)+Plus and redesigned fine motor movement tests (tracking and pursuit task) were administered during the second session.	Peabody Picture Vocabulary Test-Revised (PPVT-R); Beery– Buktenica Development Test of Visual-Motor Integration Fourth Edition (VMI); Movement Assessment Battery for Children (MABC)	No significant difference was found when comparing the performance of the Children with ADHD and the typically developing group. Significant differences existed between children in whom ADHD is comorbid with DCD and typically developing children.	BSF

Parent-child interaction of mothers with depression and their children with ADHD (Lee, P. C., Lin, K. C., Robson, D., Yang, H. J., Chen, V. C., Niew, W. I.)	2012	Taiwan	N= 39 dyads of boy with their mothers (fourth to sixth grader); 10 boys with ADHD + mothers with depression; 13 boys with ADHD + mothers without depressions; 16 boys without ADHD + mothers without depression **ELEMENTARY**	not indicated	family involvement	Observational study - cross-sectional. The Specific Affect Coding System, 20-code version was used to code interactional affect, including positive engagement, negative engagement, negative disengagement, and neural affect. During one observation session, lasting approximately 30–60 min, each dyad sat together in a comfortable research room. Mothers and boys first participated in a neutral condition for at least 10 min, followed by a conflict-solving condition for at least 10 min. The two conditions were conducted in a fixed order, with the neutral condition first, followed by the conflict-solving condition, because the emotionally arousing nature of the conflict-solving condition might have influenced mothers' and boys' behavior and affect during the neutral condition. Each session was videotaped.	Issues Checklist (Robin & Foster, 1989); Specific Affect Coding System (Gottman et al., 1996);	There were no statistically significant group-by-context interaction effects or group effects on all affective variables between the group of children with ADHD and mothers without depression and the group of children without ADHD and mothers without depression. Children with ADHD whose mothers were depressed were less positive in their parent–child interaction compared with children in the other groups. Maternal depression may play an important role in the affective presentation of dyads of children with ADHD and mothers with depression.	E
A meta-analysis of behavioral parent training for children with attention deficit hyperactivity disorder (Lee, P. C., Niew, W. I., Yang, H. J., Chen, V. C., Lin, K. C.)	2012	Taiwan	Children with ADHD and their mothers **MIXED**	N/A	family involvement	Meta-analysis. Examined the effect of behavioral parent training on child and parental outcomes for children with ADHD. Electronic databases were searched (Medline, Psych INFO, Pubmed, CINAHL, Cochrane Clinical Trials and ERIC) for possible studies. Key words used to identify articles were behavioral parent training, parent training, parent group, behavior problem, attention deficit, hyperactivity, hyperactive, and ADHD.	(see results) Outcomes of child behavior, parent behavior and parental perception of parenting	Forty studies were included and generated an overall moderate effect size at post-treatment and a small effect size at follow-up. The majority of outcome categories were associated with a moderate effect size at post-treatment that decreased to a small effect size at follow-up. Parenting competence was the only outcome that had a large effect, which decreased to moderate at follow-up.	E

Passport to learning: A cognitive intervention for children with organizational difficulties (Leew, J.)	2001	Canada	For school age children - can be applicable to children with LD, DCD, and ADHD **ELEMENTARY**	school setting? Therapeutic setting?	cognitive skills, organization	Grey literature. A small group program is described that targets children's cognitive deficiencies and emphasizes a strategy-based, problem-solving approach to intervention. The program uses mediational techniques, cognitive strategies (e.g. mind mapping, questioning) and is based on a problem solving framework. Parents are also involved in the program.	N/A	N/A	BSF
Playfulness in children with attention deficit hyperactivity disorder (Leipold, E. E., Bundy, A. C.)	2000	USA	N= 50 childre, 25 with ADHD- 17 boys, 8 girls ; 5 to 14 y.ears old **MIXED**	home, playground (observations made in natural play settings)	play skills	Observational, cross-sectional. The purpose of this study was to (a) compare Test of Playfulness (ToP) (Bundy, 1997a) scores of children with and without ADHD, and (b) examine unexpected responses in the data that might suggest a different hierarchy of items when the ToP is applied to children with ADHD.	Test of Playfuleness (ToP) (Bundy 1997)	The mean ToP score of children with ADHD was significantly lower than that of children without ADHD (t =-3.49; P= .001). The three most problematic areas were internal control, intrinsic motivation, and framing. While data from 92% of the children with ADHD conformed to the hierarchy of items established by Rasch analysis, 3 items (mischief, teasing/joking, and clowning) yielded unexpectedly high scores for a high percentage of the children suggesting that these items may be relatively easier for children with ADHD.	A/P
Disorganization as related to discoordination and attention deficit (Lifshitz, N., Josman, N., Tirosh, E.)	2014	Israel	Four groups of boys between the age of 7 and 12 years— (1) Disorganization and coordination disorder (N = 30); (2) Coordination disorder (N =33); (3) Disorganization (N=28); and (4) Control (N=29) **ELEMENTARY**	lab, home and school (for parent and teacher questionnaires)	organization, DCD	Cross-sectional. Parents completed the demographic and health questionnaires. The teachers completed the QASOAT and the Conners. The MABC was administered to each child.	Questionnaire for Assessing the Students Organizational Abilities for the Teacher (QASOAT); Conners' Teacher's Rating Scale (Conners, 1997); The Movement Assessment Battery For Children (Henderson & Sugden, 1992)	The present study confirmed not only a significant relationship between attention deficit and coordination disorder but a high comorbidity when an organizational deficit was manifested.	BSF

Objective measurement of weekly physical activity and sensory modulation problems in children with attention deficit hyperactivity disorder (Lin, C. Y., Yang, A. L., Su, C. T.)	2013	Taiwan	N=20 with ADHD (mean age 8.64 ± 2.57 years), and 20 matched typically developing boys (mean age 9.10 ± 1.79 years) participated in our study **ELEMENTARY**	natural setting	physical activity, sensory processing	Cross-sectional. Aim to objectively measure and compare the physical activity (PA) in children with ADHD for 7 days in a natural setting and examine the association between PA and sensory modulation problems. Children with ADHD were recruited from a local clinic. Children without ADHD were recruited from a local elementary school. One parent completed the questionnaires at the beginning of the study. Then the child was asked to wear the ActiGraph for one week and parents were asked to complete a daily log. At the end of the week, parents returned the Actigraph along with the log.	ActiGraph GT1M (to detect physical activity); Conners' Parent Rating Scale-Revised: Short Version; Sensory Profile -Chinese version (Tseng, 2002); Sensory Challenge Protocol (Mangeot et al., 2001, McIntosh et al., 1999, Miller et al., 1999).	The average PA was higher in the ADHD group than the control group, particularly in unstructured settings vs. structured settings. The electrodermal responses does not differentiate sensory modulation ability between children with ADHD and typical developing children. Group differences in sensory modulation were found using the SP. Children with ADHD showed more sensory modulation problems than children typically developing children.	BSF
Effects of weighted vests on attention, impulse control, and on-task behavior in children with attention deficit hyperactivity disorder Lin, H. Y., Lee, P., Chang, W. D., Hong, F. Y.)	2014	Taiwan	N=110 children with ADHD (not on medication) (mean age = 8.6 (1.7)) **ELEMENTARY**	clinic / therapy room	sensory processing, attention, impulse control	Randomized, two-period crossover design. All participants visited the therapy room twice and completed the Conners' Continuous Performance Test - II (CPT-II). All participants in the study were randomly assigned to one of two groups: Group A or Group B. Group A participants completed the CPT task under weighted vest condition and then 4 weeks later completed the CPT under the unweighted vest condition. Group B completed the tasks in the reverse order. The weight of the vest was adjusted to 10% of the child's weight. Observational data was also collected.	Conners' Continuous Performance Test (Conners, 2004); behavioral coding	In the weighted vest condition, the participants did show significant improvement in all three attentional variables of the CPT task, including the inattention, speed of processing and responding, consistency of executive management, and three of four on-task behaviours. No significant improvements in impulse control and automatic vocalizations were found.	E
Balance in children with attention deficit hyperactivity disorder-combined type (Mao, H. Y., Kuo, L. C., Yang, A. L., Su, C. T.)	2014	Israel	n = 20 children with ADHD (mean age: 9 years 3 months; 18 boys, 2 girls) ; n = 20 matched typical controls (mean age: 9 years 2 months; 18 boys, 2 girls) **ELEMENTARY**	Lab	motor skills (balance)	Cross-sectional. Static and dynamic sitting balance ability in children with ADHD-C compared to their matched controls. Children were instructed to sit on the mechanical horse; trial lasted 10 seconds. The children were then administered the balance subtests of the BOTMP and MABC.	Movement Assessment Battery for Children Checklist (M-ABC Checklist, Henderson and Sugden 1992);t Bruininks Oseretsky Test of Motor Proficiency (BOTMP) (Bruininks, 1978); mechanical horseback	Children with ADHD-C had less-consistent patterns of movement, more deviation of movement area, and less-effective balance strategies during mechanical horseback riding. In addition, their performance on the balance subtests of the MABC and BOTMP were not as well as those of the controls.	BSF

							riding test recorded using a motion capture system		
Sensory modulation dysfunction in children with attention-deficit-hyperactivity disorder (Mangeot, S. D, Miller, L. J, McIntosh, D. N., McGrath-Clarke, J., Simon, J., Hagerman, R. J., Goldson, E.)	2001	USA	N=26 children with ADHD (mean age 8.3 years, 18 males, 8 females), and N=30 typically developing children (mean age 8.2 years, 21 males, 9 females) were tested using a laboratory procedure that gauges responses to repeated sensory stimulation by measuring electrodermal reactivity (EDR). **ELEMENTARY**	Lab; children recruited by clinics specializing in ADHD	sensory processing	Case-control. Control group was recruited by posters at Children's hospital. Children with ADHD were referred by local clinics. Children taking medication were advised to stop 24-48 before physiological testing. Children participated in the Sensory Challenge Protocol - The protocol gauges an individual's physiological reactivity to repeated sensory stimulation by measuring EDRs.	Physiological measures (Sensory Challenge Protocol). Parent report measures: Short Sensory Profile, the Leiter International Performance Scale–Revised, Parent Rating subscales, and the Child Behavior Checklist (CBCL).	Compared to the typical sample, the children with ADHD displayed greater abnormalities in sensory modulation on both physiological and parent-report measures. The children with ADHD also displayed more variability in responses. The difference in EDRs appears driven by an atypically large reaction to the initial presentation of the stimulus. Findings suggest sensory problems may be underdiagnosed in this population.	BSF
A randomized controlled pilot study of the effectiveness of occupational therapy for children with sensory modulation disorder (Miller, L.J. , Coll, J. R., Schoen, S. A.)	2007	USA	N=24 children with SMD (mean age across groups 6.09 - 6.88). Children had to be between the ages of 3-11.6 years old **ELEMENTARY** *study included children with SMD and ADHD (62.5% of sample had evidence of ADHD symptoms)	outpatient occupational therapy at a children's hospital	sensory processing, cognitive skills, behaviour skills, social/ emotional	Experimental - randomized controlled trial (RCT). Research question: Does OT-SI better ameliorate attention, cognitive/social. Or behavioral problems than n Alternate Placebo treatment or a passive placebo? The children were randomly assigned to one of 3 treatment conditions: OT-SI, Activity Protocol and No Treatment. Children were evaluated with SIPT + interview with parents to identify presence of SMD. OT-SI was administered twice a week for 10 weeks. Activity protocol included a variety of engaging table-top activities; no coaching to parents. No treatment was a 10-week waitlist. Pre-test and post-test measures were taken.	Leiter-R: Parent Rating Scale; Short Sensory Profile; Vineland Adaptive Behavior Scales (socialization subtest); Child Behavior Checklist; Goal attainment scaling; Electrodermal reactivity (using the Sensory Challenge Protocol).	Children in the OT-SI group made gains that were significantly greater than the children in other two groups on the GAS. They also increased significantly more than the groups on attention on cognitive/social composite of the Leiter-R. Children in OT-SI group showed greater reduction in EDR amplitude. Small sample size and lack of statistical power. Look into manualized treatment protocols in OT.	BSF

Attention deficit hyperactivity disorder and sensory modulation disorder: A comparison of behavior and physiology (Miller, L. J., Nielsen, D. M., Schoen, S. A.)	2012	USA	N=176 children were included in the study. N=70 children with SMD, N=37 children with ADHD, N=12 children with SMD & ADHD, and N=57 typically developing children	child development center at the hospital	sensory processing	Cross-sectional: Hypothesize that the physiological reactions to sensory stimuli differs between children with ADHD and those with SMD. Children who were medicated were taken off their medication the night before physiological testing. During physiological testing, a data analyst blind to group membership checked the electrodermal records	Short Sensory Profile; SNAP-IV, Leiter international performance scale-revised, parent rating scales; Child Behavior Checklist (CBCL); physiological measures (measured by electrodermal response during the Sensory Challenge).	(Check paper for stats used - Chi-square, ANOVA, etc.) Children with SMD significantly differed from children with ADHD on measures of sensation, emotion and attention as well as physiological reactivity to a variety of sensory stimuli. Based on parental reports, children referred for SMD had more sensory problems, more somatic complaints, and were more likely to be withdrawn or anxious/depressed. Dual diagnoses had more sensory-related behaviours than ADHD and more attentional difficulties than SMD. Sensory problems were also found in children with ADHD.	BSF
Lessons learned: A pilot study on occupational therapy effectiveness for children with sensory modulation disorder (Miller, L. J., Schoen, S. A., James, K., Schaaf, R. C.)	2007	USA	N= 30, ages 3.9 -11 years old; children who met the global criteria for one subtype of SPD, sensory modulation disorder. **ELEMENTARY**	clinical/lab setting	sensory processing	Single group pretest–post-test pilot outcome study designed to inform a future RCT. The interventions OT - SI, was administered twice a week, for 10 weeks. The treatment sessions were videotaped and reviewed by the therapists. Pretest and post-test measures were collected (see outcome variables and outcome measures -->) and effect sizes were calculated.	Short Sensory Profile (McIntosh, Miller, Shyu, & Dunn, 1999); ADD–H Comprehensive Teacher's Rating Scale (ACTeRS) (Ullmann, Sleator, & Sprague, 1991); three subtests of the Leiter International Performance Scale–Revised: Parent Rating Scale (Roid & Miller, 1997); Multi-Dimensional Anxiety Scale for Children (MASC; March, 1997); Vineland Adaptive Behavior Scale (Stinnett, Havey, & Oehler-Stinnett, 1994; Wodrich & Barry, 1991); The Child Behavior Checklist (CBCL; Achenbach, 1991); electrodermal reactivity (EDR); ontextually relevant measure of change, goal attainment scaling (GAS; Kiresuk, Smith, & Cardillo, 1994)	Measures that were nonsignificant or did not show changes in the hypothesized direction included Barkley's Behavior Rating Scale (Barkley & Murphy, 1998), the SNAP–IV (MTA Cooperative Group, 1999), the MASC (March, 1997), three subtests of the Vineland (Stinnett et al., 1994), subtests of the CBCL (Achenbach, 1991), subtests of the Leiter–R (Roid & Miller, 1997) except Attention, some EDR variables, and videotaped changes in natural settings based on the current paradigm.	BSF

An analysis of score patterns of children with attention disorders on the Sensory Integration and Praxis Tests (Mulligan, S.)	1996	USA	norm groups used: 4 years to There were n=309 children with ADHD and n=5371 who did not have ADHD	retrospective - use of databases	sensory processing	Retrospective study (observational). SIPT data were provided from existing data banks from WPS. For the NOADHD group, cases were matched on the variables of gender, norm groups, and learning disability. The purpose was see how do children with and without ADHD perform on the SIPT; what % of children with and without ADHD fall into each of the 6 SIPT profiles, and do children with ADHD score differently on the SIPT than children who don't have ADHD.	Sensory Integration and Praxis Tests (SIPT)	Subjects in both groups were likened to the Low-Average Bilateral Integration and Sequencing profile most often, followed by the Low-Average Sensory Integration and Praxis profile and the Visuo-dyspraxia and Somato-dyspraxia profile. A MANOVA was done to determine differences in groups - subjects in the ADHD group scored differently than subjects in the NOADHD group. Discriminant analysis was used to evaluate whether individual tests could differentiate children with ADHD vs. No-ADHD. Space Visualization was weighted most heavily. Subjects with ADHD appear to have more sensory integrative than non-ADHD students, particularly with balance and most areas of praxis. Further examination and understanding of the types of vestibular processing difficulties and motor planning abilities of children and adults with attention disorders may provide some guidance with respect to treatment as weJl as increase understanding of the clinical presentation of persons with ADHD.	BSF
Classroom strategies used by teachers of students with attention deficit hyperactivity disorder (Mulligan, S.)	2001	USA	N=151 elementary and high school teachers **MIXED**	school setting	service delivery, school-based intervention	Cross-sectional. This study surveyed general education teachers in northern New England to determine the classroom strategies teachers commonly use and perceive as being effective for improving the performance of children with ADHD. 625 teacher surveys were sent out in 13 school districts in northern New England. Districts were chosen via a random sampling method. 168 surveys - (27%) were returned.	survey compiled based on literature review	The strategies receiving the highest frequency and effectiveness ratings were enforcing routine and structure, frequent contact, preferential seating, use of motor breaks, and teaching self-monitoring of behaviors. The strategies receiving the lowest effectiveness ratings were peer tutoring, timeout, and giving assistance during transitions. Qualitative analysis of teacher responses to open-ended questions provided recommendations for improving the education of children with ADHD, including: increasing special education support in the classroom, smaller class sizes, frequent parent-teacher collaboration, and more hands-on learning experiences.	E

Use of weighted vests in pediatric occupational therapy practice (Olson, L. J., Moulton, H. J.)	2004	USA	N=340 pediatric occupational therapists	OT's who work in pediatrics, in school-based settings	sensory processing, behaviour management	Cross-sectional. Questionnaire was mailed to 514 pediatric OT's who belonged to the School-Based Systems Special Interest Section. Response rate was 68%. The survey included 43 items which covered therapist opinions, procedures, behavioral observations and knowledge about weighted vests, including demographic information.	survey compiled based on literature review and clinical experience. The five sections addressed therapist opinions, procedures, behavioral observations, knowledge, and demographic information.	Respondents who use weighted vests were more likely to have advanced degrees or certifications and more years of experience as pediatric therapists. They reported using weighted vests with preschool and young elementary school-aged children with the diagnoses of autism or attention deficit disorder. Staying on task, staying in seat and attention span were the most common behaviors that therapists reported improving when weighted vests were used.	E
Occupational therapists' reported experiences using weighted vests with children with specific developmental disorders (Olson, L. J., Moulton, H. J.)	2004	USA	N=51 pediatric occupational therapists (from different geographic areas from the listerv at the 1999 AOTA Annual Conference)	OT's who work in pediatrics, in school-based settings	sensory processing, behaviour management, school-based intervention	Cross-sectional, telephone survey. Purpose to identify specific practice patterns of a convenience sample of paediatric occupational therapists and the behavioural changes that they observe when they use weighted vests with children with developmental disorders. The interviews were audiotaped with permission; took approx. 30 minutes to complete.	21-item telephone survey consisting of dichotomous, rank ordered, Likert scale, and open-ended items was designed as a follow-up to a prior mail survey (Olson and Moulton, 2004)	Although the interviewees observed some different behavioural changes in children with various developmental disorders when these children used weighted vests, their practice patterns in using the vests were similar across disabilities. The most common behavioural changes noted were increased attention and staying on task. Therapists using weighted vests with children with both sensory integration dysfunction and ADHD also frequently reported changes in children's balance and stability.	E
Perspectives. Creating competency for Cameron (Orloff, S., N., S)	2006	USA	adolescence **HIGH SCHOOL**	clinic-based and school setting	handwriting	Grey literature. News/column - case study. OT discussion on a 14-year old boy with ADHD who presented with handwriting difficulties. OT discusses treatment and programs used (Handwriting on the Wall, Write Incredibly Now™). Discussion on how to develop perspectives among teachers and parents with respect to students with ADHD.	N/A	Cooperative collaboration between the school team and special education services steadily increased success for this student.	A/P
Middle school is a challenge with ADHD (Orloff, S. N. S.)	2006	USA	middle school children with ADHD **HIGH SCHOOL**	School setting	organization, handwriting	Grey literature. Commentary/news column. OT replies to a parent's concern regarding her child with ADHD going to middle school.	N/A	N/A	A/P

Effect of robotic-assisted three-dimensional repetitive motion to improve hand motor function and control in children with handwriting deficits: A nonrandomized phase 2 device trial (Palsbo, S. E., Hood-Szivek, P.)	2012	USA	N = 18 children with CP, ASD, ADHD, ADD, or other disorders (grades K- 5) ***Only 2 participants with ADHD (out of 18) **ELEMENTARY**	school setting (participants recruited from schools).	assistive technology (robotics), handwriting	Pretest-post-test; single group design. They explored the efficacy of robotic technology in improving handwriting in children with impaired motor skills. Haptic software and hardware was developed. A typical session included a 10-min review of the letters and numbers covered in the previous sessions, 10 min with robot-assisted glyph formation under the supervision of the interveners (who would adjust speed or letter size during the session and provide verbal feedback), and 10 min on the workbook lesson. Sessions were conducted 3–5 times per wk for 4–6 wk, for a total of 15–20 sessions per child.	Motor Co-ordination subtest of the Beery–Buktenica Developmental Test of Visual–Motor Integration (VMI; Beery, Buktenica, & Beery, 1989); random number and uppercase letter order subtests of the Test of Handwriting Skills–Revised (THS–R; Milone, 2007); Print Tool (Olsen & Knapton, 2006); copy subtest of the Evaluation Tool of Children's Handwriting (ETCH; Amundson, 1995); VMI (as a potential confounding variable).	Fine motor control improved for the children with learning disabilities and those ages 9 or older but not for those with CP or under age 9. All children with ASD or ADHD referred for slow writing speed were able to increase speed while maintaining legibility.	BSF
Effects of psycho-educational training and stimulant medication on visual perceptual skills in children with attention deficit hyperactivity disorder (Papavasiliou, A. S., Nikaina, I., Rizou, I., Alexandrou, S.)	2007	Greece	N=16 children, 7–11 years old, with ADHD - attending regular school **ELEMENTARY**	school setting Therapeutic setting (?)	medication effects, visual perceptual skills	Pre-post, single group. The children were involved in occupational therapy and special education geared towards attention training (5hrs/week). Six months later methylphenidate 1 mg/kg/day was prescribed. It was not taken by eight children because of family choice. The TVPS was given twice, upon diagnosis, and 8 months post-intervention. The groups were compared by a repeated measures analysis of variance (ANOVA) with medication as a between groups factor and test-retest scores as within factor. The test was given twice; first, upon diagnosis and prior to any intervention and subsequently, eight months after occupational therapy and special education were initiated. In the medicated group the test was carried out one hour after methylphenidate administration.	Test of Visual Perceptual Skills - Revised (Gardner, 1996)	All children demonstrated increases in total scores in the second measurement. Medicated children scored higher but ANOVA showed a nonsignificant F for the two groups, medicated and un-medicated (F = 0.0031, p = 0.9563), indicating a no differential effect of the two levels of treatment. It revealed a significant F for the pre- and post-treatment total TVPS scores (F = 30.91, p ■ 0.0001) indicating a significant difference between pre- and post-treatment tests. The interaction between pre-post treatment and level of treatment (medicated–un-medicated) was nonsignificant (F = 2.20, p = 0.1604).	BSF

Somatosensory functioning in children with attention deficit hyperactivity disorder (Parush, S., Sohmer, H., Steinberg, A.,Kaitz, M.)	1997	Israel	N=49 children with ADHD; N=49 typical controls (ages 5 to 11 years old) **ELEMENTARY**	Lab setting	sensory processing	Cross-sectional. Parents were contacted by phone and explained the study. Parents and teachers both completed the Conner's questionnaires and mailed them back. Children who met the criteria for ADHD were called for testing in the lab. All testing was carried to children with ADHD and to controls. All testing was done in a quiet room. The assessor was blind to the child's group allocation.	Touch Inventory for Preschoolers (Ti[; Royeen, 1987); Sensory Integration and Praxis Tests (SIPT; Ayres, 1989); somatosensory evoked potentials	Results show that a large percentage of the children with ADHD were tactile defensive. The children with ADHD showed a larger-than-normal amplitudes of late but not early components of SEP.	BSF
Somatosensory function in boys with ADHD and tactile defensiveness (Parush, S., Sohmer, H., Steinberg, A., Kaitz, M.)	2007	Israel	N=67 boys (with ADHD; with or without tactile defensiveness (TD)). Matched with N=60 typically developing children; 5 to 11 years old **ELEMENTARY**	Lab setting?	sensory processing	Cross-sectional. All children were tested in a quiet room. The experimenters were blind to whether or not the child had ADHD. While the child was being tested, the parents completed the TIP questionnaire.	Touch Inventory for Preschoolers (TIP) (to determine TD); Sensory Reactivity Score (Kaitz & Parush,1991); Sensory Integration and Praxis Test, measurements of the Somatosensory Evoked Potential (SEP) and ratings of the children's affective responses during tactile stimulation	Both ADHD groups differed from the control group on most study measures. No significant differences were found between the two ADHD subgroups on threshold and perceptual tests scores, except for Finger Identification. However, the TD+ group demonstrated significantly higher central SEP amplitudes than did the TD– group. Together, the results support claims that TD is related to central processing of somatosensory information, but not to anomalous tactile perception, except for Finger Identification.	BSF
Play preference of children with ADHD and typically developing children in Brazil: A pilot study (Pfeifer, L. I., Terra, L. N., dos Santos, J. L. F., Stagnitti, K. E., Panuncio-Pinto, M. P.)	2011	Brazil	N=16 children with ADHD matched with 16 children without ADHD (7 -12 years old); families of low socioeconomic status **ELEMENTARY**	university hospital and primary school setting	play skills	Cross-sectional: The aim of this paper was to report research findings on children with ADHD and typically developing children in relation to preference of play partners, play places, toys and type of play. The children with ADHD were assessed in a private room at the hospital, where the children without ADHD were assessed in a private room in a primary school. The researcher asked the children the questions from the questionnaire and recorded their answers.	Children's Play Behaviour questionnaire (Pfeifer, 2006)	No significant difference between groups in relation to preference. There were significant differences between groups in in choice of places to play. Children with ADHD preferred to play in school and typically developing children preferred to play on the street. There were significant differences in relation to toys and type of play engaged in with children with ADHD preferring educational materials and typically developing children preferring electronic games.	A/P

Effectiveness of disc 'O' sit cushions on attention to task in second-grade students with attention difficulties (Pfeiffer, B., Henry, A., Miller, S., Witherell, S.)	2008	USA	N=31 2nd grade students were assigned to a treatment group and 32 were assigned to the control group. Children with attention difficulties **ELEMENTARY**	school setting	sensory processing, behaviour management, school-based intervention	RCT. Pre-post. This study investigated the effectiveness of a type of dynamic seating system, the Disc 'O' Sit cushion (Gymnic, Osoppo, Italy), for improving attention to task among second-grade students with attention difficulties. Treatment group participants used the Disco-sit cushion throughout the school day for a 2 week period. Teachers completed the BRIEF	Behaviour Rating Inventory of Executive Function - for Children version and Preschool Version (Gioia et al., 2003)	An analysis of variance identified a statistically significant difference in the attention to task before and after the intervention for the treatment group. The results of the study provide preliminary evidence for the use of the Disc 'O' Sit cushion as an occupational therapy intervention to improve attention in the school setting.	E
Handwriting performance in children with attention deficit hyperactivity disorder (ADHD) (Racine, M. B., Majnemer, A., Shevell, M. Snider, L.)	2008	Canada	children with ADHD **ELEMENTARY**	N/A	handwriting	Literature review.	N/A	Existing evidence would suggest that children with ADHD have impaired handwriting performance, characterized by illegible written material and/or inappropriate speed of execution compared to children without ADHD.	A/P
Diagnostic validity of sensory over-responsivity: a review of the literature and case reports (Reynolds, S., Lane, S. J.)	2008	USA	multiple populations described, including children with ADHD. **MIXED**	N/A	sensory processing	Literature review. Case reports.	N/A However there is mention on different modes of measurement of sensory over-responsivity.	Summary of the case reports suggests a link between tactile stimulation and over-responsivity. Across all threes cases reports, motor incoordination was observed. Case studies provide preliminary support for the existence of SOR.	BSF
Sensory over-responsivity and anxiety in children with ADHD (Reynolds, S., Lane, S. J.)	2009	USA	N = 24 children with ADHD and N=24 without ADHD (children with ADHD were divided into 2 groups; those with SOR and those without) ages: 6 to 10 years old **ELEMENTARY**	university/hospital	sensory processing, emotional regulation (anxiety)	Cross-sectional. Parents were screened by phone to determine eligibility. Parents were then mailed the SenSOR and the RCMAS and they returned to the research laboratory.	Sensory Over-Responsivity Scale (Miller, 2004); Revised Children's Manifest Anxiety Scale (RCMAS) (Reynolds & Richmond, 2005)	Results show significant differences across all three groups re: anxiety scores. Children with ADHD-SOR had significantly higher levels of total anxiety and physiological anxiety. O.T.s must be cognizant of the likelihood that children with ADHD and SOR are at risk for comorbid anxiety disorders. OTs may play a role in helping children develop techniques for relaxation and or for communicating effectively.	BSF

Handwriting performance of children with attention deficit hyperactive disorders: a pilot study (Rosenblum, S., Epsztein, L., Josman, N.)	2008	Israel	N = 12 children with ADHD and N= 12 children without ADHD, aged 8 - 10 years old **ELEMENTARY**	schools or in clinic	handwriting	Case-control. To compare the handwriting characteristics of children with ADHD while on and off medication and compared to controls. Children with ADHD were evaluated on two separate occasions. Prior to the first session, children with ADHD were taken off medication for 24 hours. One month after the first session, the second session was conducted with the children with ADHD taking their medication.	ComPET – Computerized Penmanship Evaluation Tool (Rosenblum, Parush,&Weiss, 2003); paragraph copying task; Hebrew Handwriting Evaluation Tool (Erez & Parush, 1999)	Results provide evidence for poorer performance of children with ADHD in comparison to children without ADHD on most handwriting process and product measures. Children with ADHD demonstrated significantly more total time including in-air time spent in handwriting performance when off medication	A/P
Reliability and validity of Dunn's Sensory Profile among Thai children living in large metropolitan areas (Satiansukpong, N.)	2002	Thailand/ USA	N=60 caregivers of Thai children with no disabilities, 30 caregivers of Thai children with Autism or PDD, 30 caregivers of Thai children with ADHD. Children were between the ages of 4.11 and 9.11 years old **ELEMENTARY**	school setting, hospital or occupational therapy clinic	sensory processing	Dissertation. The aim of the study was to determine to what extent is the Thai version of the Sensory Profile reliable and valid for screening sensory processing abilities of Thai children. Research aims also included exploring the internal consistency and the test-retest reliability.	Thai version of the Sensory Profile	Children with autism/PDD had a tendency to get a lower score. The test-retest reliability for a one-week period is 0.96 (Pearson) and 0.97 (ICC). The correlation between each section and total score ranged from .51 to .89. membership. The TSP section scores delineated 90% of the NOR and DIS, 91.7% of the children with AU/PDD and ADHD, 89% of NOR, children with AU/PDD, and ADHD, correctly.	BSF
Classroom seating for children with attention deficit hyperactivity disorder: therapy balls versus chairs (Schilling, D. L., Washington, K., Billingsley, F. F., Deitz, J.)	2003	USA	N=3 students in the 4th grade with ADHD **ELEMENTARY**	classroom setting	school-based intervention, motor skills, behaviour management	Single subject a-B-A-B interrupted time series. The study was conducted in a 4th grade inclusive classroom during daily language arts. During phases 1 and 3, the 3 participants and all other class members sat on chairs (in- seat on chair); during phases 2 and 4, everyone sat on therapy balls (in-seat on ball). Dependent variables were in-seat behavior and legible word productivity.	Outcomes were in-seat behaviour and word legibility	Results demonstrated increases in in-seat behavior and legible word productivity for the students with ADHD when seated on therapy balls. Social validity findings indicated that generally the teacher and students preferred therapy balls.	E

The construction of family occupations: A study of families with children who have attention deficit/hyperactivity disorder (Segal, R.)	1998	USA	N=17 families including children between the ages of 6-11 years old with ADHD **ELEMENTARY**	occupational and physical therapy clinic	family involvement	A qualitative study of daily experiences and adaptations of 17 families with children who have attention-deficit/hyperactivity disorder is described in this paper. Data collection consisted of two interviews with the families. Each interview lasted approx. 2-3hrs. The second interview took place 1 to 2 weeks after the first one. All interviews were audio-taped and transcribed. For the analyses, the researcher attempted to understand the experiences of the families.	qualitative analysis of interview transcripts	Families with children who have ADHD identified morning routines and homework as difficult parts of the day for their families and described how they coped with these difficult situations. All of them developed strategies to enable their children's occupational competence.	E
Adaptive strategies of mothers with children with attention deficit hyperactivity disorder: Enfolding and unfolding occupations (Segal, R.)	2000	USA	N=17 families including children between the ages of 6-11 years old with ADHD - they were recruited from a national support group for children with ADHD and their families **ELEMENTARY**	occupational and physical therapy clinic	family involvement	Qualitative. In-depth interviews were conducted with 17 families with children with ADHD. Parents were asked to describe their family's daily schedule, routines, and how occupations were performed. Data were analyzed using the grounded theory approach. Data was collected with one to four interviews per family.	Qualitative analysis of interview transcripts; Data were coded into meaningful conceptual units (e.g., categories, themes), then each category was examined for conditions, context, strategies, and consequences (as perceived by the parents).	Mothers used three adaptive strategies: enfolding occupations, temporal unfolding of occupations, and unfolding occupations by inclusion. Enfolding occupations means performing more than one occupation at a time. Unfolding occupations means taking chunks of activities or occupations out of previously established sequences of enfolded occupations to be performed at a different time (temporal unfolding) or by a different person (unfolding by inclusion). The child's special needs and the availability of financial and human resources influenced the selection of adaptive strategy. Using these adaptive strategies enabled the mothers to care for their children. However, using enfolding or temporal unfolding meant that mothers had less time for other occupations.	E

The extraordinary construction of ordinary experience: scheduling daily life in families with children with attention deficit hyperactivity disorder (Segal, R., Frank, G.)	1998	USA	N=17 families with children with ADHD were interviewed (in LA, California) **ELEMENTARY**	occupational and physical therapy clinic	activities of daily living, family involvement	Qualitative. The study examines the adaptation of families raising children with ADHD in terms of the extraordinary work they perform to construct daily schedules they perform within the ordinary pattern of time use. Data collections consisted of one to four interviews per family. All interviews were audiotaped and transcribed by a professional transcriber.	Qualitative analysis of interview transcripts	Parents' scheduling consideration included their children's ability to concentrate, the children's other physiological or emotional needs, and parental work schedules. There was a cultural relevance of the afternoon schedule described as well as its importance for designing occupational therapy interventions.	E
The activity setting of homework: An analysis of three cases and implications for occupational therapy (Segal, R., Hinojosa, J.)	2006	USA	N=3 cases - families, one of which were parents of children with ADHD **ELEMENTARY**	home setting	instrumental activities of daily living -> homework	This is a qualitative study of parental self-reports of the strategies they use to foster their children's successful engagement in homework. Three cases were examined using the activity setting concept from the ecocultural theory of family accommodation.	Qualitative analysis: inductive analysis, triangulation	Homework completion is regarded as a valued end-goal. Valued activities must also fit in the family routine. Discussion on how interventions are designed focusing on children's skill development and performance rather than on other processes or situations that influence a child's performance. When planning home treatment programs therapists may explore parental values and priorities, investing time for parental training, discussing parental interactions with their children.	A/P
Homework strategies for children with attention deficit hyperactivity disorder: how can practitioners help students and parents with one of the most basic occupations of school? (Segal, R., Hinojosa, J., Addonizio, C., Borisoff, D., Inderwies, L., Lee, J.)	2005	USA	school age children with ADHD **ELEMENTARY**	school setting	instrumental activities of daily living -> homework	Grey literature. Article describes the strategies used by mothers to encourage their children's engagement in homework. This article was based on findings from a larger study by the authors. Some of the strategies include to create a conducive environment, set up a routine, use of cues and to make homework manageable. OTs can use their skills in activity analysis, adaptation, and modification to help parents address each of these components.	N/A	Several strategies are discussed. Examples include creating a conducive environment, setting up a routine, making homework manageable and use of cues and feedback while the child completes homework.	A/P

Effect of the Interactice Metronome ® training on children with ADHD (Shaffer, R. J., Jacokes, L. E., Cassily, J. F., Greenspan, S. I., Tuchman, R. F., Stemmer, P. J., Jr.)	2001	USA	N=56 boys who were 6 to 12 years old with a diagnosis of ADHD **ELEMENTARY**	Clinic (?)	sensory processing, motor skills	<u>Experimental pretest-post-test design</u> The participants were *randomly assigned* to one of three matched groups. A group of 19 participants receiving 15 hr of Interactive Metronome training exercises were compared with a group receiving no intervention and a group receiving training on selected computer video games. Test administrators were blind to which group each child belonged to. The program-generated rhythmicity accuracy scores (Interactive Metronome scores), displayed in milliseconds on the screen, indicated to administrators how close in time the participant's responses were to the reference beat as they occurred. After each exercise, the participants were shown their scores. This feedback appeared to motivate them to do better.	Test of Variables of Attention (TOVA) (Greenburg & Dupuy, 1993); Conners' Ratong Scales - Revised (both parent and teacher forms) (Conners, 1990); Wechsler Intelligence Test for Children -Third Edition (Wechsler, 1992); Achenbach Child Behaviour Checklist (Achenbach & Edelbrock, 1991); The Sensory Profile (Dunn & Westmann, 1995); Bruininks -Oserestky of Motot Efficiency (Bruininks, 1978); Wide Range Achievement Test (WRAT 3); Language Processing Test (Wilkinson, 1993).	A significant pattern of improvement across 53 of 58 variables favoring the Interactive Metronome treatment was found. Additionally, several significant differences were found among the treatment groups and between pre-treatment and posttreatment factors on performance in areas of attention, motor control, language processing, reading, and parental reports of improvements in regulation of aggressive behavior.	BSF

Handwriting performance and underlying factors in children with Attention Deficit Hyperactivity Disorder (Shen, I. H., Lee, T. Y., Chen, C. L.)	2012	Taiwan	N=21 children with ADHD (8.59 +/- 1.25 years old), N= 21 matched controls (8.5 +/- 1.08 years) **ELEMENTARY**	clinical setting	handwriting	Case-control study. All children completed the Chinese version of the Test of Nonverbal Intelligence (C-TONI, 3rd ed.). A score of 80 or above on the C-TONI was required. Children who scored less than 15th percentile rank on the M-ABC-2 were excluded. The children were administered the Basic Reading and Writing Comprehensive Test (BRWCT), the M-ABC-2, and the DTVP-2. Participants also copied 50 Chinese characters on a digitizing tablet with a wireless inking pen. The Tseng Handwriting Problem Checklist for children's writing sample was performed by an occupational therapist that was blinded to group allocation. All participants conducted the experiment in a private room individually.	Chinese version of the Test of Nonverbal Intelligence, 3rd edition (C-TONI, 3rd ed.) (Brown, Sherbenou, & Johnsen, 1997); Tseng Handwriting Problem Checklist (THPC; Tseng, 1993a); Basic Reading and Writing Comprehensive Test (BRWCT) (Hung, Chang, Chen, Chen, & Lee, 2003); a digitizer (WACOM UD-1218E) with a wireless inking pen and the OASIS software (De Jong, Hulstijn, Kosterman, & Smits-Engelsman, 1996); Movement Assessment Battery for Children, 2nd edition (M-ABC-2; Henderson et al., 2007); DTVP-2 (Developmental Test of Visual Perception second edition; Hammill, Pearson, & Voress, 1993)	The ADHD group showed poorer handwriting performance than the comparison group on THPC. The ADHD group scored significantly lower in construction, sequencing, behavior, accuracy, motor, and directionality factors. With respect to motor performance, the ADHD group scored lower significantly than the comparison group in aiming and catching component standard scores. The ADHD group spent more on-paper time to copy 50 Chinese characters and exhibited more writing time during the writing process. The ADHD group scored significantly lower on tasks demanding upper limb and eye–hand coordination and visual-motor integration compared with controls. Furthermore, motor skill and visual-motor integration were positively correlated with the legibility. Motor skill was negatively correlated with writing time, in-air time, and in-air trajectory.	A/P
Participation in leisure activities among boys with attention deficit hyperactivity disorder (Shimoni, M., Engel-Yeger, B.,Tirosh, E.)	2010	Israel	N=25 boys aged 8–11 years with ADHD and N=25 age-matched typical boys. **ELEMENTARY**	clinic	play skills, leisure participation	Case-control. The purpose of the present study was, therefore, to examine participation patterns in outside formal school activities among boys with ADHD compared to typical boys.	Demographic questionnaire, Children's Assessment of Participation and Enjoyment (CAPE) (King et al., 2004)	The findings indicate that boys with ADHD reported significant lower intensity rates of participation in most activity domains. Furthermore, boys with ADHD also reported higher diversity scores and lower enjoyment in 'formal' activities. Yet, no significant differences were found with regard to activity place and partners.	A/P

Gender differences in quality of schoolwork task performance among typically developing students and students at risk of or with mild disabilities (Sperens, M., Munkholm, M., Fisher, A. G.)	2012	Sweden	N=2510 students (typically developing = 412 girls, 422 boys; at risk = 147 girls, 379 boys; mild = 242 girls, 901 boys), 4–10 years of age. Mild disabilities included ADHD, DCD, LD, and SI **ELEMENTARY**	participants came from the international School AMPS database and came from 7 world regions, majority from North America and Nordic regions.	IADL - school work performance	Case-control: The purpose of this study was to examine whether there is a gender difference in quality of schoolwork task performance among students at risk of or with mild disabilities, and to compare any identified differences to those that might exist among their typically developing peers. The results on the School AMPS database were used to run 4 regression analyses.	School Version of the Assessment of Motor and Process Skills (School AMPS) (to measure school performance)	Regression analyses revealed no significant gender or age-by gender interaction effects for any of the three groups (typically developing, at risk, mild). Conclusion - there are no gender differences among any of the three groups of participants in the study.	A/P
OT can help parents and teachers deal with ADHD: understanding the "whoops" children (Stancliff, B. L.)	1998	USA	N/A	N/A	organizational skills, sensory processing, service delivery	Grey literature. This article describes the nature of ADHD and its behavioural manifestations among children in school. Several OTs give their input about the OT perspective on explaining certain behaviours associated with ADHD, such as sensory processing concerns. OTs may view these concerns from a systems point of view (i.e. motor control, sensory control, cognitive and social). The articles also highlights case examples of children with ADHD and what aspects of their lives are affected. Mention of the *How does your engine run program?* Emphasis on analyzing all aspects and adapting the environment and the task.	N/A	N/A	E (service delivery)
Relationship between motor proficiency, attention, impulse, and activity in children with ADHD (Tseng, M. H., Henderson, A., Chow, S. M., Yao, G.)	2004	Taiwan	N=42 school-aged children with ADHD (36 males, 6 females; mean age 8 years 2 months, SD 1 year 2 months; range 6 years to 11 years), and N=42 age- and sex-matched children without ADHD (mean age 8 years 3 months, SD 1 year 1 month; range 6 years to 11 years) **ELEMENTARY**	clinical/ research lab	motor skills, attention level	Case-control. The aim of this study was to investigate the relationship between motor performance, attention deficit, impulsiveness, and hyperactivity in children with attention-deficit – hyperactivity disorder (ADHD). Children were referred by psychiatrists and psychologists. They stopped taking their medication prior to testing. all children were tested individually in a quiet room.	Bruininks-Oseretsky Test of Motor Performance (Bruininks, 1978); Activity Level Rating Scale for Parents (Hsu et al., 1982); Activity Level Rating Scale for Teachers (Hsu et al., 1982), Gordon Diagnostic System (Gordon, 1991),	Analysis by t-test revealed a significant difference between children with and without ADHD in fine and gross motor skills, impulse control, and attention. Stepwise regression indicated that attention, impulse control, and parent ratings of activity level were the three best predictors of gross motor skills for children with ADHD, accounting for 55.9% of the variance. Attention and impulse control were the two best predictors of fine motor skills.	BSF

The use of a weighted vest to increase on-task behavior in children with attention difficulties (VandenBerg, N. L)	2001	USA	N=4 students with ADHD, ages 5.9 to 6.10 years; 2 boys and 2 girls **ELEMENTARY**	school setting	sensory processing	This was a quasi-experimental, single system (single subject) AB design. The participants' wore weighted vests that were fitted and calibrated to 5% of their body weight. The baseline phase spanned for 6 different days over a 15-day period. The children were observed at different assigned times as per their schedule. Intervention phase followed in which observations were completed within 15 days. The vest remained in for an activity, lasting 20-30 minutes.	Behavioural data and qualitative information (from teachers) was collected.	On-task behavior increased by 18% to 25% in all 4 students while wearing the weighted vest. Additionally, 3 of the 4 students frequently asked to wear the vest other than during the observation times.	E (tools for educa tion)
Recognizing problems in movement coordination (Wann, J.)	2008	UK	**MIXED**	N/A	motor skills (DCD)	Grey literature - Commentary: Discussion on the specific subgroup of children with motor difficulties that are not accounted for by poor IQ or problems with attention and that have a significant impact on daily living skills.	N/A	N/A	BSF
Behavioral and physiologic response measures of occupational task performance: A preliminary comparison between typical children and children with attention disorder (White, B. P., Mulligan, S. E.)	2005	USA	N=12 children with a diagnosis of ADHD and N=21 typically developing children (control group); aged between 5-13 years old **ELEMENTARY**	children assessed in homes or in university setting (mimicked a kitchen setting)	behaviour management, functional performance	Case-control. To compare performance on the Assessment of Motor and Process Skills (AMPS), a measure of functional task performance and physiological responses (salivary cortisol levels) during AMPS administration, between typically developing children and children diagnosed with attention deficit hyperactivity disorder (ADHD). Salivary cortisol level was also measured to determine the extent of the relationship between stress response and functional performance.	Assessment of Motor and Process Skills (AMPS); salivary cortisol levels	On the ADL Process measure and the ADL motor ability of the AMPS, statistically significant differences were found between the children with ADHD and the typical children, with the ADHD group performing more poorly than the typical group. Overall, the cortisol levels of the ADHD group were higher than the typically developing children. This investigation suggests that the AMPS may be an appropriate tool to use with this population.	BSF

A play-based intervention for children with ADHD: A pilot study (Wilkes, S., Cordier, R., Bundy, A., Docking, K., Munro, N.)	2011	Australia	Participants included children (aged 5–11 years) diagnosed with ADHD, age-matched typically developing playmates (N=14/ group) and parents of children with ADHD **ELEMENTARY**	playroom (in a clinical setting?)	play skills	Pre-post study. The intervention involved seven weekly video-recorded free-play sessions; video feed-forward / feedback and therapist- and peer-modelling were used to promote social play. The play pairs were known to each other. The sessions were 40 minutes long and ran for 7 weekly sessions. The sessions took place in a playroom with a primary and secondary therapist. The primary therapist worked with the children to provide weekly feedback and to model/promote cooperative play and the secondary therapist worked with the parents.	The Test of Playfulness (Bundy, 2004) ; Child Behaviour Checklist (Achenbach & Rescorla, 2001); Conners' Parent Rating Scale- 3 (Conners, 2008)	Results demonstrate a large effect in improving the social play of children with ADHD. The hypothesis that the mean overall ToP post-test score of children with ADHD will be significantly higher than the mean overall pre-test scores was supported. A t-test for dependent samples revealed significance ($t > 8.10$; $P < 0.01$). The hypothesis that the mean post-test scores of children with ADHD will be significantly higher than their pre- test scores on ToP items that reflect interpersonal empathy were partially supported.	A/P
Eighteen-month follow-up of a play-based intervention to improve the social play skills of children with attention deficit hyperactivity disorder (Wilkes-Gillan, S., Bundy, A., Cordier, R., Lincoln, M.)	2014	Australia	N=5 with ADHD who had participated in a play-based intervention. Parents of children with ADHD also participated (mean age = 8.9 years old) **ELEMENTARY**	playroom	play skills	Pre-post (follow-up study). Children and their playmates attended an 18-month follow-up play session and parents participated in semi-structured interviews over the course of a week. The Test of Playfulness was used to measure children's play outcomes in the context of social play with a peer, pre–post and 18-months following the intervention. All sessions were video recorded to allow for scoring of the children's social play skills.	Test of Palyfulness (Bundy, 2004) ; Conners Comprehensive Behavior Rating Scales (CCBRS) (Conners, 2008)	Children maintained their gains at the 18 month follow-up. Wilcoxon signed rank tests for related samples revealed that there was no significant difference in children's social play skills between the mean overall 18-month follow-up measure scores and mean overall post-test measure scores ($Z = 0.14$; $P = 0.89$ and $d = \checkmark 0.4$).	A/P
Evaluation of a pilot parent-delivered play-based intervention for children with attention deficit hyperactivity disorder (Wilkes-Gillan, S., Bundy, A., Cordier, R., Lincoln, M.)	2014	Australia	N=5 five children with ADHD who had participated in a play-based intervention. Parents of children with ADHD also participated. Ages 6 - 11 years old. **ELEMENTARY**	playroom in clinical setting (?)	play skills, family involvement	One group, pre-post test. This study evaluated a parent-delivered intervention aiming to address the social difficulties of children with attention deficit hyperactivity disorder (ADHD). The intervention was evaluated from three perspectives: effectiveness, feasibility, and appropriateness.	Test of Playfulness	Children's social play outcomes improved significantly from pretest to 1-mo follow-up. Results from the preliminary cost analysis indicated that the parent-delivered intervention was less costly. The pilot parent delivered intervention demonstrated preliminary effectiveness in improving the social play skills of children with ADHD.	A/P

Differential diagnosis of sensory modulation disorder (SMD) and attention deficit hyperactivity disorder (ADHD): Participation, sensation, and attention (Yochman, A., Alon-Beery, O., Sribman, A., Parush, S.)	2013	Israel	N=19 children with ADHD without SMD; 19 children with SMD without ADHD (dx by both pediatric neurologists and OTs); aged 6-8 and matched by age and gender **ELEMENTARY**	developmental center	sensory processing	Cross-sectional. This study is the first to compare the profiles of these populations regarding both "body functions" (attention and sensation) and "participation," using measures applicable for clinical use. Each child was individually evaluated on a broad battery of evaluations by an occupational therapist. The examiner was blind to group placement.	The Fabric Prickilness Test (FPT; Garnsworthy et al., 1988; Cervero et al., 1994); Pinprick Pain (Smith and Nephew Rolyan; Menomonee Falls, WI); Evaluation of Sensory Processing (ESP; Parham and Johnson-Ecker, 2002); The test of everyday attention (TEA-Ch; Manly et al., 1999); The Participation in childhood occupations questionnaire (PICO-Q; Bar-Shalita et al., 2009)	On the pinprick pain test, children with SMD reported higher scores as a response to punctate pain compared to children with ADHD. On the fabric prickliness test, children with SMD reported higher scores compared to children with ADHD and on the measures of pain "after-sensation." On the ESP, the scores of the SMD group were significantly lower than the scores of the ADHD group on taste and smell, tactile and motion/vestibular subtests. No significant group differences on any of the TEA-Ch subtests were found.	BSF
Co-occurrence of developmental delays among preschool children with attention-deficit-hyperactivity disorder (Yochman, A., Ornoy, A., Parush, S.)	2006	Israel	N=49 pre-school children with ADHD (range 3 years 10 months - 6 years) and N=48 typically developing children **PRE-SCHOOL**	kindergarten children were contacted; lab setting	motor skills, sensory processing, cognitive skills, communication skills, pre-school children	Cross-sectional. Aim of the study was to provide a comprehensive profile of the sensory, motor, language and intellectual functioning of pre-school children with ADHD. 49 children with ADHD took part in the study and 48 typically developing children were matched by age, sex, and years of maternal education. Each child was individually evaluated by experienced professionals (psychologist, occupational therapist, and speech therapist) on the battery of tests. The examiners were blind to group placement.	Preschool Behavior Questionnaire (PBQ; Behar 1977, Prior et al. 1983); Wechsler Preschool and Primary Scale of Intelligence, Miller Assessment for Preschoolers (MAP; Miller 1988), Beery-Buktenica Developmental Test of Visual-Motor Integration (VMI; Beery 1997), The Sensory Profile (Dunn, 1999), Reynell Developmental Language Scale (Reynell andHuntley 1987)	The results showed that the scores of the ADHD group were significantly lower than the comparison group on all measures. In addition, 23 (47%) of the children with ADHD had clinically significant co-occurring deficits in two or more areas. These findings suggest that preschool children with ADHD have multiple developmental deficits over and above the core symptoms of ADHD and emphasize the importance of evaluating the sensorimotor functioning of preschool children with ADHD symptoms.	BSF

Perceptuomotor functioning in preschool children with symptoms of attention deficit hyperactivity disorder (Yochman, A., Ornoy, A., Parush, S.)	2006	Israel	N=49 pre-school children with ADHD (range 3 years 10 mths - 6 years) and N=48 typically developing children **PRE-SCHOOL**	kindergarten children were contacted; lab setting	motor skills, perceptual skill, cognitive skills, visual motor skills, oral motor skills, pre-school children	Cross-sectional. The purpose of this study was to compare the fine motor, gross motor, visuo-motor, and oral-motor functioning. Letters outlining the details of the study were circulated to kindergarten parents. 774 parents gave their consent to participate. Mothers and teachers completed the PBQ. 78 children were identified as having ADHD. Out of these children, 49 were eventually evaluated. 48 children without ADHD were matched to the research group as per age, gender and years of maternal education. Children were evaluated by an experienced OT on the MAP and the Beery-VMI test. The assessor was blind to group placement.	Preschool Behavior Questionnaire (PBQ; Behar 1977, Prior et al. 1983); Miller Assessment for Preschoolers (MAP; Miller 1988), Beery-Buktenica Developmental Test of Visual-Motor Integration (VMI; Beery 1997),	Results of the multivariate analyses yielded a significant group effect. The scores of the ADHD group were significantly lower than those of the control group on all measures. The results show that in comparison to their typically developing peers, non-referred preschool children with symptoms of ADHD performed significantly worse in fine-motor, gross-motor, visuo-motor, and oral-motor functioning. Our findings of deficits in multiple motor domains are of particular importance given the lack of studies and inconsistent findings of previous research on motor functioning among preschool children with ADHD	BSF
Responses of preschool children with and without ADHD to sensory events in daily life (Yochman, A., Parush, S., Ornoy, A.)	2004	Israel	N=48 mothers of children with ADHD and N=46 mothers of children without ADHD **PRE-SCHOOL**	not indicated	sensory processing	Cross-sectional. Matched group comparison design to identify possible differences in sensory processing between children with and without ADHD. Participants recruited from regular kindergarten. The control group was matched to the research group based on age, gender, and parental socioeconomic level. Consenting mothers and teachers completed the PBQ. Following this, the children were identified as having ADHD and were then further evaluated by a developmental pediatrician to verify the diagnosis of ADHD and by a psychologist for WPPSI testing. 48 mothers were then asked to complete	Preschool Behavior Questionnaire (Behar & Stringfield, 1974); Sensory Profile (Dunn, 1999), Wechsler Preschool and Primary Scale of Intelligence (Wechsler, 1967).	Children with ADHD have significantly lower scores on most of the sections and factors in the SP, suggesting they have different patterns of sensory processing and modulation. One should consider this area of functioning in the routine evaluation and treatment of children who are suspected of having ADHD. More research is necessary before we can arrive at more definitive conclusions regarding differences between age groups, with regard to sensory processing.	BSF

The role of the occupational therapist in attention deficit hyperactivity disorder: a case study... including commentary by Simpson K, Mandich A, and Rodger S (Young, R. L.)	2007	Scotland/ UK	**ELEMENTARY** school children	community based	service delivery	Case study (about author's experience). Discussion on the role of occupational therapy with students, including the assessment, screening, interview and intervention process. Article states how OT can intervene: behaviour modification, the use of the Alert Program, a 'tool box' of strategies, use of a problem-solving approach, and discussion about sensory integration.	Strengths and Difficulties Questionnaire, Short Sensory Profile (Dunn, 1999),	Article has given insight to the work and involvement of the OT role, including the role of the OT in a school district.	E

Appendix B: Data Tracking Table for Papers on Assessments/Outcome Measures

Title & Author	Year	Country	Type of measure	Target population	Description - subtests/items	Psychometric properties (if available)	ICF-CY construct
Development and initial validation of the Performance Skills Questionnaire (PSQ) (Bart, O. Rosenberg, L. Ratzon, N. Z., Jarus, T.)	2010	Israel	Parent questionnaire	Pre-school and school-age children ranging from 4-6 years old. (mixed)	The PSQ is a performance skills questionnaire containing 34 items in three domains: motor skills (10 items), process skills (14 items), and communication skills (10 items). Each item is scored on a Likert scale from 1 to 6, where a higher score indicates better performance skills. Parents are asked to rate how each item describes their child (describes my child a lot–does not describe my child at all). Three measures, one for each domain, can be yielded from the PSQ, as well as one total score.	Internal consistency = Cronbach's alpha of the whole sample for motor, process and communication skills were .89, .92, and . 84. Test-retest reliability = ICC for mean scores ranged from .92 to .96; agreement % ratings across 3 domains ranged from 57.5% to 95%. Construct validity = oblique rotation with 3-factor solution explained 46.52% of the variance. Divergent and convergent validity = all correlations were statistically significant (compared to VMI, Children Participation Questionnaire).	A/P
Strategy application test: Discriminate validity studies (Birnboim, S.)	2004	Israel	Paper-pencil task to test the ability apply and maintain a working strategy for efficient execution of tasks.	Applicable to various clinical populations, including adults and children. (mixed)	Paper-pencil task consisting of three tasks: naming pictures, simple arithmetic, and copying simple designs. Each task is 6 pages long. Goal is get a maximum score.	Children with ADHD performed significantly lower than the age-matched controls.	A/P (education)
The Dynamic Occupational Therapy Cognitive Assessment for Children (DOTCA-Ch): A new instrument for assessing learning potential (Katz, Noomi, Golstand, Sarina, Bar-Iian, Ruthie Traub, Parush, Shula)	2007	Israel	A dynamic criterion-referenced assessment of cognitive abilities and learning potential for children with cognitive and learning difficulties	Children 6 to 12 years old (elementary)	The DOTCA-Ch battery consists of 22 subtests in 5 cognitive domains: Orientation, Spatial Perception, Praxis, Visuo-motor Construction, and Thinking Operations. This is a dynamic assessment such that a child's initial correct response is not take as the final outcome measure of his or her performance. The examiner uses a systematic approach to modify the task through prompts or other forms of mediation.	MANOVA analyses determined four age groups that best fit the outcome data: 6–6.11, 7–8.11, 9–10.11, and 11–12 years. Criterion cut-off scores of 25% for at-risk and under 10% for deficient performance were obtained for each age group. Dynamic percentage scores were determined. Significant high interrater reliability (.87 to .99) and moderate to high internal consistency reliability (.61 to .77) were found. Construct validity was supported by comparing children with traumatic brain injury and learning disabilities to typically developing children, and ecological validity of children with attention deficit hyperactivity disorder by comparing performance on the DOTCA–Ch to the School Function Assessment.	BSF A/P

An evaluation of the clinical use of the assessment of motor and process skills with children (Payne, S., Howell, C.)	2005	UK	AMPS is a top-down, standardised assessment of functional ability that, unlike many standardised tests traditionally used by paediatric occupational therapists, has been developed for use by occupational therapists (Fisher 2003). Being grounded in occupational therapy theory, it represents the unique perspective that occupational therapists have on the assessment of functional ability.	for children from 3 years of age (Tested on 33 children between 3 to 15 years old with a median age of 9 years old). With a variety of diagnoses (including ADHD)	AMPS is a top-down, standardised assessment of functional ability that, unlike many standardised tests traditionally used by paediatric occupational therapists, has been developed for use by occupational therapists (Fisher 2003). This assessment allows therapists simultaneously to observe and evaluate a person's ability to perform activities of daily living (domestic and personal) and the quality of his or her motor and process skills. Motor skills are the observed actions that people use to move themselves or objects during the tasks performed, and include walking, reaching, manipulating and lifting. Process skills are how people sensibly organise themselves, their tools and their actions over time, and reflect how effective they are at overcoming or compensating for any problems that they	*need to check evidence for validity and reliability studies. Clinical utility is discussed.	BSF A/P
Using the Spanish Child Occupational Self-Assessment (COSA) with children with ADHD (Romero Ayuso, D. M., Kramer, J.)	2009	Spain/USA	The Child Occupational Self-Assessment (COSA) (Keller, Kafkes, Basu, Federico & Kielhofner, 2005) is a self-report assessment based on the MOHO that assesses children's sense of competence for doing a range of everyday activities and the relative importance of those activities.	For children between the ages of 7 to 11 years old	Was designed to be used in a variety of different contexts - including schools, community clinic, and hospitals. Children read 24 statements that describe doing activities at home, school and with others, and then determine how competent they feel doing the activity and how important the activity is to them.	Study determined the COSA has good psychometric properties, when translated and used with Spanish children. ICC = 0.911 and 0.922 (competence and values scale). Competence items were correlated with at least three or more other competence items. The COSA can help OTs better understand the a child's perception of their competence and value for a range of everyday activities.	A/P
Daily functioning profile of children with attention deficit hyperactive disorder: A pilot study using an ecological (Rosenblum, S., Frisch, C., Deutsh-Castel, T., Josman, N.)	2014	Israel	Do-Eat is a performance based questionnaire. Children are asked to perform three tasks: make a sandwich, prepare chocolate milk and fill in a certificate. These tasks are the scored according to performance and sensorimotor skill.	children aged 5-8 years old	This study aimed to compare the performance characteristics of children with ADHD to those of controls based on the Do-Eat assessment tool, and to establish the tool's validity.	significant moderate correlations were found between the Do-Eat sensorimotor scores, the ChAS-P and the BRIEF scores in the ADHD group. Significant correlations were found between performance on the Do-Eat and the ChAS-P questionnaire scores, verifying the tool's ecological validity	A/P
SOS: A Screening Instrument to Identify Children with Handwriting Impairments (Van Waelvelde, H., Hellinckx, T., Peersman, W., Smits-Engelsman, B. C. M.)	2012	Belgium	The SOS test (Systematic Screening for Handwriting Difficulties) has been developed for this purpose. Child copies a sample of writing within 5 min. Handwriting quality is evaluated using six criteria and writing speed is measured. The Dutch SOS test was administered to 860 Flemish children (7–12 years).	children between the ages of 7-12 years old (recruited from mainstream schools and special education schools). A total of 629 students were recruited.	Writing speed was measured by counting the number of letters produced in exactly 5min. To evaluate the quality of the handwriting, the first five lines were used to evaluate six well-described criteria: (1) fluency in letter formation: abrupt directional changes in the writing trace, (2) fluency in connections between letters, (3) letter height, (4) regularity of letter height, (5) space between words, and (6) straightness or regularity of the sentence.	Inter- and intra-rater reliability was excellent. Test–retest reliability was moderate (0.69, 0.66).A correlation coefficient of 0.70 between SOS and "Concise Assessment Methods of Children Handwriting" test (Dutch version) confirmed convergent validity.	A/P

Appendix C: Introduction e-mail to participate in survey (English and French versions)

Dear occupational therapy colleagues,

We invite you to participate in a research project titled **"Involvement of Occupational Therapists with Children with Attention Disorders - A Survey."** The aim of this project is to investigate the extent to which occupational therapists are involved with children with attention disorders, with respect to assessment and intervention practices.

You are eligible to participate if:

- You are an occupational therapist and member of your provincial order
- You work with children/youth between the ages of 3 to 17 years old, presenting with a diagnosed attention disorder (e.g. ADHD) or undiagnosed attention difficulties (which may or may not exist as a comorbid condition with a primary diagnosis)
- You have at least one year of work experience

Participation consists of completing an online survey which takes approximately **10 to 15 minutes to complete.**

If you are interested in taking part, please click on the link below. If you would like more information, please contact Lina Ianni at the coordinates below.

We thank you for your interest and cooperation!

Lina Ianni, erg.
McGill University
Lina.ianni@mail.mcgill.ca

Chers collègues ergothérapeutes,

Nous vous invitons à participer à un projet de recherche intitulé **« Implication des ergothérapeutes auprès d'enfants et de jeunes ayant des troubles de l'attention - un sondage »**

Le but de ce projet est de trouver dans quelle mesure les ergothérapeutes sont engagés envers les enfants souffrant de troubles de l'attention, en matière de pratiques d'évaluation et d'intervention.

Vous êtes éligible à participer si:

- Vous êtes un ergothérapeute et membre de votre association provinciale

- Vous travaillez avec les enfants / jeunes entre les âges de 3 à 17 ans, atteints d'un trouble de l'attention diagnostiqué (par exemple TDAH) ou d'une difficulté d'attention non diagnostiquée (qui peut ou ne peut pas exister comme une comorbidité avec un diagnostic primaire)
- Vous avez au moins un an d'expérience de travail

La participation consiste à remplir un sondage en ligne qui prend environ **10 à 15 minutes à compléter**.

Si vous êtes intéressés à participer, veuillez cliquer sur le lien ci-dessous. Si vous souhaitez plus d'informations, veuillez communiquer avec Lina Ianni aux coordonnées ci-dessous.

Nous vous remercions de votre intérêt et de votre coopération!

Lina Ianni, erg.
McGill University
Lina.ianni@mail.mcgill.ca

Appendix D: National Survey – English Version

Involvement of Occupational Therapists with Children/Youth with Attention Disorders – A Survey

CONSENT TO PARTICIPATE IN RESEARCH

Dear occupational therapy colleagues, you are invited to participate in a research survey project led by Dr. Laurie Snider and Lina Ianni from McGill University on occupational therapy (OT) for children with attention disorders.

Attention deficit hyperactivity disorder (ADHD) is a very common neurobehavioral childhood disorder. The literature shows there is a need for a holistic approach to address the functional limitations and participation restrictions associated with the complex profile of a child with an attention disorder. Occupational therapists (OTs) are in an emerging position to advance this understanding of attention disorders among children.

STUDY OBJECTIVES

The objectives of this research study are:

- To investigate the extent to which occupational therapists are involved with children with attention disorders, with respect to assessment and intervention practices
- To inquire about your opinions regarding clinical decision making
- To inquire about your level of professional development related children with attention disorders

PROCEDURES

We would like to request your consent to participate in this study, which consists of completing this online survey. The survey is comprised of 5 sections:

Section 1 - Demographic and Employment Information
Section 2 - OT involvement with children/youth with attention disorders
Section 3 - OT Assessment practices with children/youth with attention disorders
Section 4 - OT Intervention practices with children/youth with attention disorders
Section 5 - Professional development and clinical decision making

The survey should take approximately 10-15 minutes to complete. The majority of questions consist of multiple choice and checkbox formats.

CONFIDENTIALITY

All data is stored in a password protected electronic platform. The results of the survey will be used for scholarly purposes only and may be shared with McGill University representatives. The results of the research study, which will be presented in aggregate form, may be published, but your identity cannot be revealed.

PARTICIPATION AND WITHDRAWAL

Your participation in this research is completely voluntary. You may refuse to participate or may discontinue your participation at any time without explanation. If you decide not to participate, or if you discontinue your participation, you will suffer no penalty. You may exercise the option of removing your data from the study.

- ○ I understand the above and agree to participate in this study.

***For your participation, your name can be entered in a draw to win a prize - the *Paediatric Activity Card Sort (PACS)*! (Mandich, Polatajko, Miller & Baum, 2004)**
This assessment tool focuses on measuring occupation in the paediatric population. To be entered to win, please leave your name and e-mail address below. Thank you!

SECTION I: DEMOGRAPHIC AND EMPLOYMENT INFORMATION

1. Age group:
   - ☐ 20 to 29
   - ☐ 30 to 39
   - ☐ 40 to 49
   - ☐ 50 to 59
   - ☐ 60 to 69
   - ☐ > 70 years old

2. Gender:
   - ☐ Male
   - ☐ Female

3. Province where you currently work:
   - ☐ Alberta
   - ☐ British Colombia
   - ☐ Manitoba
   - ☐ New Brunswick
   - ☐ Newfoundland
   - ☐ Nova Scotia
   - ☐ Ontario
   - ☐ Prince Edward Island
   - ☐ Quebec
   - ☐ Saskatchewan
   - ☐ Territory: Northwest Territories
   - ☐ Territory: Nunavut
   - ☐ Territory: Yukon

4. Entry-level qualification for occupational therapy:
   - ☐ Diploma
   - ☐ Bachelor's
   - ☐ Entry level Master's
   - ☐ Other (please specify): _____

5. Year of graduation from occupational therapy program: _____

6. Highest degree attained:
   - ☐ Bachelor's
   - ☐ Graduate certificate
   - ☐ Entry level Master's
   - ☐ Applied or Research Master's
   - ☐ Doctorate (PhD)
   - ☐ Other (please specify): _____

7. Years practicing as an occupational therapist:_____

8. Years working as a pediatric occupational therapist: _____

9. Employment status:
   - ☐ Not currently employed

- ☐ Part-time (<10 hours per week)
- ☐ Part-time (11 to 20 hours per week)
- ☐ Part-time (21 to 30 hours per week)
- ☐ Full-time (>31 hrs per week)

10. Paediatric population you work with: (Check all that apply)
    - ☐ Infants and pre-school age (<4 years old)
    - ☐ School-age (5 to 12 years old)
    - ☐ Middle and high school age (13 to 17 years old)
    - ☐ Young adult (18 years and older)

11. Number of clients you provide services for in a typical day (including direct and indirect/consultative services):
    - ☐ 2 or less
    - ☐ 3 to 5
    - ☐ 6 to 9
    - ☐ 10 or more
    - ☐ I do not see clients

12. Setting in which you provide your services: (Select all that apply.)
    - ☐ General hospital – acute care
    - ☐ Children's hospital
    - ☐ Rehabilitation center
    - ☐ Community agency
    - ☐ Primary health care
    - ☐ Home care agency
    - ☐ School setting
    - ☐ Private practice or clinic
    - ☐ Research center
    - ☐ Other (please specify): _____

13. Primary work role: (Please select all that apply.)
    - ☐ Clinician
    - ☐ Manager
    - ☐ Consultant
    - ☐ Case manager
    - ☐ Researcher
    - ☐ Other (please specify): _____

14. How many occupational therapists are there at your workplace? _____

15. Do you work part as an interdisciplinary team?

    - ☐ Yes
    - ☐ No

16. If yes, is this team considered a specialized team?(*A specialized team is one that focuses on assessment and treatment of one condition.)*
    - ☐ Yes
    - ☐ No

SECTION II: OCCUPATIONAL THERAPY INVOLVEMENT WITH CHILDREN/YOUTH WITH ATTENTION DISORDERS

17. Do you work with children with attention problems?
    - ☐ Yes
    - ☐ No

18. Approximately, what proportion of your caseload consists of children and/or youth with attention disorders?
    - ☐ Less than 10%
    - ☐ 11-25%
    - ☐ 26-50%
    - ☐ 51-75%
    - ☐ 76-100%

19. Who typically refers children and/or youth with attention disorders to occupational therapy in your facility? (Please check all that apply.)
    - ☐ Parents
    - ☐ Interdisciplinary team
    - ☐ Other paramedical professionals (e.g. speech-language pathologists, psychologists)
    - ☐ Physicians
    - ☐ Teachers
    - ☐ Don't know

20. What types of services do you provide?
    - ☐ Assessment/evaluation
    - ☐ Treatment
    - ☐ School-based consultation
      *(For this item, consultation is defined as an approach to service provision in which the consultant, a specialist, assists another person in a problem-soliving process with regards to the client)**
    - ☐ Home-based interventions, including assessment, treatment, or consultation
      *(For this item, consultation is defined as an approach to service provision in which the consultant, a specialist, assists another person in a problem-soliving process with regards to the client)**

      ** Erchul & Martens, 2002, Kampwith, 2006*

SECTION III: ASSESSMENT PRACTICES WITH CHILDREN/YOUTH WITH ATTENTION DISORDERS

21. Do you use an occupational therapy frame of reference, model, or theory to guide your assessment and intervention approach (e.g. the Canadian Model of Occupational Performance, Model of Human Occupation, Motor Learning, etc.)
    - ☐ Yes
    - ☐ No

22. If yes, please select all that apply:
    - ☐ Behaviourism
    - ☐ Biomechanical Frame of Reference
    - ☐ Canadian Model of Occupational Performance and Engagement (CMOP-E)
    - ☐ Cognitive Theory
    - ☐ Cognitive-behavioural Frame of Reference
    - ☐ Cognitive Orientation to Occupational Performance (CO-OP)
    - ☐ Ecology of Human Performance
    - ☐ Kawa Model
    - ☐ Model of Human Occupation (MOHO)
    - ☐ Motor Learning
    - ☐ Neurodevelopmental Theory
    - ☐ Occupational Performance Process Model (OPPM)
    - ☐ Person Environment Occupation Model (PEOM)
    - ☐ Psychodynamic Frame of Reference
    - ☐ Rehabilitative Frame of Reference
    - ☐ Response to Intervention (RTI) Model
    - ☐ Sensory Integration
    - ☐ Other; please specify: _____

23. In your work setting, what is the purpose of the assessment of children with attention disorders? (Select all that apply.)
    - ☐ To support or rule out a diagnosis (e.g. as part of an interdisciplinary team)
    - ☐ To develop and prepare a treatment or intervention plan
    - ☐ To rule out a co-exiting or comorbid disorder
    - ☐ For consultative purposes
    - ☐ Research
    - ☐ Other; please specify: _____

24. Which skills or areas do you typically evaluate in an occupational therapy assessment with children with attention disorders? (Please select all that apply.)

    I typically assess/evaluate:
    - ☐ Fine motor skills
    - ☐ Gross motor skills
    - ☐ Sensory processing and perceptual skills
    - ☐ Visual and/or ocular-motor skills (e.g. low vision)
    - ☐ Cognitive skills
    - ☐ Emotional regulation and/or behaviour skills

- ☐ Adaptive functioning and/or activities of daily living
- ☐ School-functioning skills (e.g. handwriting, organizational skills)
- ☐ Leisure participation (i.e. play skills)
- ☐ Communication and social skills
- ☐ Social environment (e.g parenting)
- ☐ Physical environment (e.g. classroom setup)

25. Among the following assessments and outcome measures, please select those that you use the most with children with attention disorders. If the measures or assessments you use are not listed, please specify them in the space provided.

Global developmental assessments

- ☐ Batelle Developmental Inventory, 2nd Edition (BDI-2)
- ☐ Miller Assessment for Preschoolers (MAP)
- ☐ Peabody Developmental Motor Scales – second edition (PDMS-2)
- ☐ Other – please specify: _____

Motor skills assessments

- ☐ Assessment of Motor and Process Skills (AMPS)
- ☐ Bruininks-Oseretsky Test of Motor Proficiency (BOTMP and 2nd edition – BOT-2)
- ☐ Gross Motor Function Measure (GMFM-88 or GMFM-66)
- ☐ Movement Assessment Battery for Children and revised version (MABC or MABC-2) (including checklist)
- ☐ Other – please specify: _____

Emotional or behaviour skills assessments

- ☐ Adaptive Behaviour Assessment System, 2nd Edition (ABAS-II)
- ☐ Behaviour Assessment System for Children, 2nd Edition (BASC-2)
- ☐ Behaviour Rating Inventory of Executive Function (BRIEF)
- ☐ Child Behaviour Rating Scale (CBCL)
- ☐ Conners Teacher Rating Scale, Revised (CTRS-R) and Conners Parent Rating Scale, Revised (CPRS-R)
- ☐ Functional Emotional Assessment Scale (FEAS)
- ☐ Other – please specify: _____

Occupational performance assessments

- ☐ Canadian Occupational Performance Measure (COPM)
- ☐ Child Occupation Self-Assessment (COSA)
- ☐ Other – please specify: _____

Activities of daily living (ADLs) and participation assessments

- ☐ Children Helping Out: Responsibilities, Expectations and Supports (CHORES)
- ☐ Children's Global Assessment Scale (CGAS)
- ☐ Functional Independence Measure for Children (WeeFIM)
- ☐ Children's Assessment of Participation and Enjoyment/Preferencs for Activities of Children (CAPE/PAC)
- ☐ Participation and Environment Measure for Children and Youth (PEM-CY)
- ☐ Pediatric Activity Card Sort (PACS)
- ☐ Perceived Efficacy and Goal Setting System (PEGS)
- ☐ Pediatric Evaluation of Disability Inventory (PEDI)
- ☐ Vineland Adaptive Behaviour Scale, 2nd Edition (VABS-II)
- ☐ Other – please specify: _____

Sensory assessments

- ☐ Sensory Integration and Practice Tests (SIPT)
- ☐ Sensory Processing Measure (SPM)
- ☐ Sensory Profile (including School Companion, Short Sensory Profile, and Sensory Profile for Adolescents)
- ☐ Other – please specify: _____

Visual motor and visual perceptual tests

- ☐ Motor-free Perception Test, 3rd Edition (MVPT-3)
- ☐ Test of Visual Perceptual Skills (TVPS)
- ☐ Beery-Buktenica Developmental Test of Visual Motor Integration (5th or 6th editions) (Beery-VMI)
- ☐ Other – please specify: _____

Cognitive assessments

- ☐ Test of Everyday Attention in Children (TEAC-Ch)
- ☐ Other – please specify: _____

School functioning

- ☐ Evaluation Tool of Children's Handwriting (ETCH)
- ☐ The Print Tool (Handwriting Without Tears™)
- ☐ School Assessment of Motor and Process Skills (School AMPS)
- ☐ School Function Assessment (SFA)
- ☐ Other – please specify: _____

Social and communication skills

- ☐ Social Skills Rating System (SSRS)

☐ Other – please specify: _____

Miscellaneous

☐ Informal assessment (observations, interviews, “in-house” questionnaires)
☐ Other – please specify: _____

SECTION IV: INTERVENTION PRACTICES WITH CHILDREN WITH ATTENTION DISORDERS

26. Among children with attention disorders, your interventions focus on:

(Please check all that apply.)

I typically intervene for:

- ☐ Fine motor skill development
- ☐ Gross motor skill development
- ☐ Sensory processing and perceptual skills
- ☐ Visual and/or ocular-motor skills (e.g. low vision)
- ☐ Cognitive skills
- ☐ Emotional regulation and/or behaviour skills
- ☐ Adaptive functioning and/or activities of daily living
- ☐ School-functioning skills (e.g. handwriting, organizational skills)
- ☐ Leisure participation (i.e. play skills)
- ☐ Communication and social skills
- ☐ Accommodations in the social environment (e.g assisting parenting skills)
- ☐ Accommodations in the physical environment (e.g. classroom setup, assistive technology)
- ☐ I provide consultation with parents/caregivers, educators and/or school personnel

27. How long, on average, do your occupational therapy interventions usually last per session?
    - ☐ Less than 30 minutes
    - ☐ 31-45 minutes
    - ☐ 46 minutes to an hour
    - ☐ More than 1 hour

28. Typically, how frequent are these occupational therapy sessions?
    - ☐ One-time consultation only
    - ☐ 2-3 sessions a year
    - ☐ 1/month
    - ☐ 2-3 sessions a month
    - ☐ 1/week
    - ☐ 2- 3 sessions a week
    - ☐ I do not have OT sessions with children/clients

29. Typically, what is the approximate duration of treatment?
    - ☐ One-time consultation only
    - ☐ One week
    - ☐ 2-3 weeks
    - ☐ One month
    - ☐ 1-3 months
    - ☐ 3-5 months
    - ☐ 5 months or more

30. During my therapy or intervention sessions, I typically work with children (please select all that apply):
    - ☐ Individually

- ☐ In small groups of 2-5 children
- ☐ In groups of 6 or more children
- ☐ I provide classroom interventions (e.g. activities or strategies applied for a classroom of students)
- ☐ I work as a consultant with parents/caregivers and/or teachers

SECTION V: PROFESSIONAL DEVELOPMENT

31. In the last year, have you attended continuing professional development activities related to intervention with children with attention disorders?
    - ☐ Yes
    - ☐ No

32. How many continuing professional development activities related to interventions for children with attention disorders have you attended in the past 5 years?
    - ☐ 1
    - ☐ 2-3
    - ☐ 4 or more

33. The following are statements regarding clinical decision making with children/youth with attention disorders. Please select the response that best applies.

    a. I use scientific resources (e.g. research findings, professional journals) to make clinical decisions regarding children/youth with attention disorders.

Never	Rarely	Sometimes	Often	Always
1	2	3	4	5

    b. I base my clinical decisions on knowledge I gained from previous education (i.e. professional occupational therapy education).

Strongly Disagree			Strongly Agree
1	2	3	4

    c. I consult with my occupational therapy colleagues to help me make clinical decisions.

Never	Rarely	Sometimes	Often	Always
1	2	3	4	5

    d. I use search engines (e.g. Google, Bing, Yahoo, etc.) as sources of information to make clinical decisions about my clients.

Never	Rarely	Sometimes	Often	Always
1	2	3	4	5

    e. My professional experience is the most important source of information guiding the decisions I make about my clients with attention disorders.

Strongly Disagree			Strongly Agree
1	2	3	4

    f. I use knowledge and/or resources from continuing professional development courses to help me make clinical decisions. (e.g. workshops, conferences, research days, etc.)

Never	Rarely	Sometimes	Often	Always
1	2	3	4	5

g. My clients' wishes is the most important factor in guiding the decisions I make about their care.

Strongly Disagree			Strongly Agree
1	2	3	4

34. The following statements and questions are about accessibility and availability of clinical resources or information in your facility. Please note the following questions pertain to working with a clinical population of children or adolescents with attention disorders.

a. At my facility, I am expected to practice in an evidence-based manner.
(Evidence-based practice is defined as applying the best available research results or evidence when making decisions about health care.)

Strongly Disagree			Strongly Agree
1	2	3	4

b. Are continuing professional development activities offered at your facility during working hours?
- ☐ Yes
- ☐ No

c. Does your employer pay for continuing professional development activities?
- ☐ Yes
- ☐ No

d. Does your employer provide you with protected time to focus on your own professional development (e.g. attending a workshop or conference) ?
- ☐ Yes
- ☐ No

e. Does your employer provide you with protected time to search for and read research literature?
- ☐ Yes
- ☐ No

f. Do you have access to current research through professional journals (electronic or paper) and/or online databases at your workplace?
- ☐ Yes
- ☐ No

g. Does your employer provide you with dedicated time to participate in research activites (e.g. conferences, research days)?

☐ Yes
☐ No

h. Do you have a mentor in your workplace?
☐ Yes
☐ No

i. I seek out my mentor when I encounter a challenging clinical situation.

Strongly Disagree			Strongly Agree
1	2	3	4

j. My mentor provides me with feedback on my clinical practice to inform my clinical decisions.

Strongly Disagree			Strongly Agree
1	2	3	4

k. Are you a mentor in your workplace?
☐ Yes
☐ No

35. What would you like to know more about occupational therapy with children/youth with attention disorders? (e.g. assessments, interventions, knowledge and theory, programs, etc.)
Please specify.

Appendix E: National Survey – French Version

Implication des ergothérapeutes auprès d'enfants et de jeunes ayant des troubles de l'attention - un sondage

CONSENTEMENT

Chers collègues ergothérapeutes, nous vous invitons à participer à un projet d'enquête de recherche dirigé par la Dre Laurie Snider et Lina Ianni, de l'Université McGill, sur l'ergothérapie chez les enfants souffrant de troubles de l'attention.

Le trouble du déficit de l'attention avec hyperactivité (TDAH) est un trouble neurocomportemental de l'enfance très répandu. La documentation scientifique sur le sujet indique le besoin de prôner une approche holistique pour comprendre les limites fonctionnelles et les restrictions de participation associées au profil complexe de l'enfant atteint d'un trouble de l'attention. Les ergothérapeutes se trouvent dans une position privilégiée pour faire progresser la compréhension du déficit de l'attention chez les enfants.

LES BUTS DE L'ÉTUDE

Les buts de cette étude sont les suivants:

- De déterminer dans quelle mesure les ergothérapeutes sont engagés en matière d'évaluation et d'intervention avec les enfants ayant des troubles de l'attention;
- D'explorer vos opinions sur la prise de décision clinique;
- De décrire votre niveau de perfectionnement professionnel au sujet des enfants avec des troubles de l'attention.

PROCÉDURES

Votre consentement est requis pour participer à cette étude. Votre participation consistera à répondre au présent sondage en ligne qui comprend 5 sections:
Section 1 – Données démographiques et les renseignements professionnels;
Section 2 – L'engagement des ergothérapeutes envers les enfants/les jeunes atteints de troubles de l'attention;
Section 3 – Les pratiques d'évaluation par les ergothérapeutes des enfants/des jeunes avec des troubles de l'attention;
Section 4 – Les pratiques d'intervention des ergothérapeutes envers les enfants/les jeunes avec des troubles de l'attention;

Section 5 – Perfectionnement professionel et prise de décision clinique.

Cela devrait vous prendre environ de 10 à 15 minutes pour répondre au sondage. La plupart des questions sont à choix multiples et requièrent simplement de choisir une option.

CONFIDENTIALITÉ

Toutes les données sont enregistrées sur une plateforme électronique protégée par un mot de passe. Les résultats du sondage ne seront utilisés qu'à des fins académiques, mais pourraient être partagées avec des représentants de l'Université McGill pour assurer la conduite éthique de l'étude. Les résultats de l'étude pourraient être publiés, mais seulement sous forme résumée de telle sorte que votre identité ne soit jamais révélée.

PARTICIPATION ET DÉSISTEMENT

Votre participation à cette recherche est entièrement libre et volontaire. Vous pouvez refuser d'y participer ou cesser votre participation en tout temps sans aucune explication. Si vous décidez de ne pas participer, ou si vous vous retirez du projet, vous pourrez demander que vos données soient retirées de l'étude.

- ○ Je comprends ce qui précède et accepte de participer à cette étude de recherche.

***Pour vous remercier de votre participation à cette étude, nous vous offrons la chance de ganer un prix: le *Pediatric Activity Card Sort (PACS)*! (Mandich, Polatajko, Miller & Baum, 2004)**

Cet outil d'évaluation permet de documenter la perception qu'ont les enfants de leur performance occupationnelle. Pour être admissible, veuillez laisser votre nom et votre adresse électronique ci-dessous. Merci!

SECTION 1 : DONNÉES DÉMOGRAPHIQUES ET RENSEIGNEMENTS PROFESSIONNELS

1. Veuillez indiquer votre groupe d'âge

- 20 à 29 ans
- 30 à 39 ans
- 40 à 49 ans
- 50 à 59 ans
- 60 à 69 ans
- > 70 ans

2. Genre

- Masculin
- Féminin

3. Province où vous travaillez actuellement

- Alberta
- Colombie-Britannique
- Manitoba
- Nouveau-Brunswick
- Terre-Neuve
- Nouvelle-Écosse
- Ontario
- Île-du-Prince-Édouard
- Québec
- Saskatchewan
- Territoire: Territoires du Nord-Ouest
- Territoire: Nunavut
- Territoire: Yukon

4. Qualification d'entrée en ergothérapie
- Diplôme
- Baccalauréat
- Maîtrise

Autre (veuillez préciser):

5. Année de diplomation du programme d'ergothérapie:

6. Plus haut niveau de scolarité complété?
- Baccalauréat
- Certificat d'études supérieures
- Maîtrise (sans thèse)
- Maîtrise en science appliquée ou de type recherche (avec thèse)
- Doctorat (Ph.D)

Autre (veuillez préciser):

7. Nombre d'années de pratique à titre d'ergothérapeute:_____

8. Nombre d'années de pratique à titre d'ergothérapeute pédiatrique:_____

9. Statut d'emploi:
- Actuellement sans emploi
- Temps partiel (< 10 heures par semaine)
- Temps partiel (11 à 20 heures par semaine)
- Temps partiel (21 à 30 heures par semaine)
- Temps plein (> 31 heures par semaine)

10. Clientèle pédiatrique avec laquelle vous travaillez:
Veuillez cocher toutes les réponses applicables
- Nourrissons et enfants d'âge préscolaire (< 4 ans)
- Enfants d'âge scolaire (de 5 à 12 ans)
- Adolescents (13 à 17 ans)
- Jeunes adultes (18 ans et plus)

11. Nombre de clients auxquels vous fournissez des services au cours d'une journée typique (y compris les services directs et indirects/consultatifs):
- 2 ou moins
- 3 à 5
- 6 à 9
- 10 ou plus
- Je ne vois pas de clients

12. Milieu dans lequel vous offrez vos services:
Veuillez cocher toutes les réponses applicables.
- ☐ Hôpital général – soins aigus
- ☐ Hôpital pour enfants
- ☐ Centre de réadaptation
- ☐ Organisation communautaire
- ☐ Soins de santé primaires
- ☐ Agence de soins à domicile
- ☐ Milieu scolaire
- ☐ Pratique privée (travailleur autonome) ou clinique privée
- ☐ Centre de recherche

Autre (veuillez préciser):

13. Rôle professionnel principal:

Veuillez cocher toutes les réponses applicables.

- ☐ Clinicien
- ☐ Gestionnaire
- ☐ Expert-conseil
- ☐ Gestionnaire de cas
- ☐ Chercheur

Autre – veuillez préciser :

_____

14. Combien d'ergothérapeutes y a-t-il dans votre milieu de travail?_____

15. Travaillez-vous au sein d'une équipe interdisciplinaire?

- Oui
- Non

16. Si oui, est-ce que cette équipe est spécialisée?
* Une équipe spécialisée met l'accent sur l'évaluation et le traitement d'une condition en particulier.

- Oui
- Non

SECTION II : L'IMPLICATION DES ERGOTHÉRAPEUTES AUPRÈS DES ENFANTS/JEUNES AVEC DES TROUBLES DE L'ATTENTION

17. Travaillez-vous avec des enfants ou des jeunes ayant des troubles de l'attention?

- Oui
- Non

18. Environ quelle proportion de votre clientèle est composée d'enfants ou de jeunes avec des troubles de l'attention?

- Moins de 10 %
- 11 à 25 %
- 26 à 50 %
- 51 à 75 %
- 76 à 100 %

19. Qui réfère généralement les enfants ou les jeunes atteints de troubles de l'attention en ergothérapie dans votre établissement ?
Veuillez cocher toutes les réponses applicables.

- ☐ Parents
- ☐ Équipe interdisciplinaire
- ☐ Autres professionnels paramédicaux (orthophonistes, psychologues, etc.)
- ☐ Médecins
- ☐ Enseignants
- ☐ Ne sais pas

20. Quels types de services fournissez-vous?
Veuillez cocher toutes les réponses applicables.

***Dans ce cas, le terme consultation est défini comme une approche de prestation de service où le consultant, un spécialiste, assiste une autre personne dans un processus de résolution de problème à l'égard du client. (Erchul & Martens, 2002; Kampwith, 2006)*

- ☐ Évaluation
- ☐ Traitement
- ☐ Consultation en milieu scolaire
- ☐ Interventions à domicile (comprend l'évaluation, le traitement ou la consultation)

SECTION III : LES PRATIQUES D'ÉVALUATION DES ERGOTHÉRAPEUTES AUPRÈS DES ENFANTS/JEUNES AVEC DES TROUBLES DE L'ATTENTION

21. Utilisez-vous un cadre de référence, un modèle de pratique ou une théorie en ergothérapie pour guider votre évaluation et votre approche d'intervention (p. ex. le Modèle canadien du rendement occupationnel, le Modèle de l'occupation humaine, l'apprentissage moteur, etc.)

- Oui
- Non

22. Si oui au no. 21, veuillez sélectionner toutes les réponses applicables :

- ☐ Béhaviorisme
- ☐ Cadre de référence biomécanique
- ☐ Modèle canadien du rendement et de l'engagement occupationnel (MCRO-E)
- ☐ Théorie cognitive
- ☐ Schème de référence cognitivo-comportemental
- ☐ Cognitive Orientation to Occupational Performance (CO-OP)
- ☐ Modèle de l'écologie de la performance humaine
- ☐ Modèle de Kawa
- ☐ Modèle de l'occupation humaine (MOH)
- ☐ Apprentissage moteur
- ☐ Théorie neurodéveloppementale
- ☐ Modèle du processus d'intervention soutenant le rendement occupationnel (MPRO)
- ☐ Modèle personne-environnement-occupation (PEO)
- ☐ Schème de référence psychodynamique
- ☐ Schème de référence de la réhabilitation
- ☐ Modèle de réponse à l'intervention (RAI)
- ☐ Intégration sensorielle

Autre ; veuillez préciser

23. Dans votre milieu de travail, quel est le but de l'évaluation des enfants atteints de troubles de l'attention ?
Veuillez sélectionnez toutes les réponses applicables.

- ☐ Soutenir ou exclure un diagnostic (p. ex. dans le cadre d'une équipe interdisciplinaire)
- ☐ Développer et préparer un traitement ou un plan d'intervention
- ☐ Exclure un trouble coexistant ou une comorbidité
- ☐ À des fins de consultation
- ☐ Recherche

Autre; veuillez préciser :

24. Quelles compétences ou types de compétences évaluez-vous généralement lors d'une évaluation ergothérapique auprès d'enfants avec des troubles de l'attention ?
Veuillez sélectionner toutes les réponses applicables.

- ☐ Motricité fine
- ☐ Motricité globale
- ☐ Traitement sensoriel et habiletés perceptuelles
- ☐ Habiletés visuo et/ou oculo-motrices (p. ex. basse vision)

- ☐ Habiletés cognitives
- ☐ Habiletés de régulation émotionnelle et/ou comportementale
- ☐ Fonctionnement adaptatif et/ou des activités de la vie quotidienne
- ☐ Fonctionnement exécutif et fonctionnement scolaire (p. ex. écriture, compétences organisationnelles, etc.)
- ☐ Participation aux loisirs (c.-à-d. les compétences au jeu)
- ☐ Habiletés sociales et communicationnelles
- ☐ Environnement social (p. ex. éducation parentale)
- ☐ Environnement physique (p. ex. configuration de la salle de classe)

Autre, veuillez préciser:

25. Parmi les évaluations et les mesures de résultats suivantes, veuillez sélectionner celles que vous utilisez le plus auprès d'enfants/jeunes avec des troubles de l'attention.
Si les mesures ou les évaluations que vous utilisez ne figurent pas dans cette liste, veuillez sélectionner "Autre" et les indiquer dans l'espace prévu à cet effet.

Évaluations du développement global
- ☐ Inventaire du développement de Batelle, 2e édition (IDB-2)
- ☐ Miller Assessment for Preschoolers (MAP)
- ☐ Échelle de développement moteur de Peabody – deuxième édition (PDMS-2)

Autre – veuillez préciser :

Évaluations des habiletés motrices
- ☐ Assessment of Motor and Process Skills (AMPS)
- ☐ Test de développement moteur de Bruininks-Oseretsky (BOTMP et 2e édition-BOT-2)
- ☐ Évaluation motrice fonctionnelle globale (GMFM-88 ou GMFM-66)
- ☐ Batterie d'évaluation du mouvement chez l'enfant ou sa version révisée (M-ABC ou M-ABC-2) (y compris la liste de contrôle)

Autre – veuillez préciser:

Évaluations des habiletés comportementales ou de régulation émotionnelle
- ☐ Système d'évaluation du comportement adaptatif, 2e édition (ABAS-II)
- ☐ Système d'évaluation du comportement de l'enfant, 2e édition (BASC-2 CDN-F)
- ☐ Inventaire d'évaluation comportementale des fonctions exécutives (BRIEF)
- ☐ Échelle d'évaluation du comportement de l'enfant (CBCL)
- ☐ Échelle de Conners pour enseignants, révisée (CTRS-R) et l'Échelle de Conners pour parents, révisée (SPRS-R)
- ☐ Échelle d'évaluation émotionnelle fonctionnelle (FEAS)
- ☐ Échelle de comportement adaptatif Vineland, 2e édition (VABS-II)

Autre – veuillez préciser:

Évaluations du rendement occupationnel
- ☐ Mesure canadienne du rendement occupationnel (MCRO)

☐ Child Occupation Self-Assessment (COSA)

Autre- veuillez préciser :

25. [SUITE] Parmi les évaluations et les mesures de résultats suivantes, veuillez sélectionner celles que vous utilisez le plus auprès d'enfants/jeunes avec des troubles de l'attention.
Si les mesures ou les évaluations que vous utilisez ne figurent pas dans cette liste, veuillez sélectionner "Autre" et les indiquer dans l'espace prévu à cet effet.
Activités de la vie quotidienne (AVQ) et évaluations de la participation

- ☐ Children Helping Out : Responsabilities, Expectations and Support
- ☐ Échelle d'évaluation globale pour enfants (CGAS)
- ☐ Mesure de l'indépendance fonctionnelle pour l'enfant (M.I.F.-MÔMES)
- ☐ Children's Assessment of Participation and Enjoyment/Preference for Activities of Children (Cap/CCP)
- ☐ Participation and Environment Mesure for Children and Youth (PEM-CY)
- ☐ Pediatric Activity Card Sort (PACS)
- ☐ Perceived Efficacy and Goal Setting System (PEGS)
- ☐ Pediatric Evaluation of Disability Inventory (PEDI)

Autre – veuillez préciser :

Évaluations sensorielles

- ☐ Sensory integration and Praxis Tests (SIPT)
- ☐ Mesure du traitement sensoriel (SPM)
- ☐ Profil sensoriel (y compris le compagnon scolaire, le profil sensoriel court et le profil sensoriel pour adolescents)

Autre – veuillez préciser:

Évaluations visuo-motrices et visuo-perceptuelles

- ☐ Motor-free Perception Test, 3e édition (MVPT-3) ou autres éditions
- ☐ Test des habiletés visuelles-perceptuelles (TVPS)
- ☐ Beery-Buktenica Developmental Test of Visual Motor Integration (5e ou 6e édition) (Beery-VMI)

☐ Autre – veuille préciser:

Évaluations cognitives

- ☐ Test d'évaluation de l'attention quotidienne chez l'enfant (TEAC-Ch)
- ☐ Dynamic Occupational Therapy Cognitive Assessment for Children (DOTCA-Ch)

☐ Autre – veuillez préciser:

Évaluations du rendement scolaire et des habiletés scolaires

- ☐ Evaluation Tool of Children's Handwriting (ETCH)
- ☐ The Print Tool (Handwriting Without TearsTM)
- ☐ Évaluation fonctionnelle des habiletés motrices et opératoires (AMPS)
- ☐ School Function Assessment (SFA)
- ☐ Autre - veuillez préciser

Divers

- ☐ Évaluation informelle (observations, entrevues, questionnaires « maison »)
- ☐ Autre – veuillez préciser :

SECTION IV: LES PRATIQUES D'INTERVENTION DES ERGOTHÉRAPEUTES AUPRÈS DES ENFANTS/JEUNES AVEC DES TROUBLES DE L'ATTENTION

26. Chez les enfants atteints de troubles de l'attention, vos interventions sont axées sur :
Veuillez cocher toutes les réponses applicables.

- ☐ Développement de la motricité fine
- ☐ Développement de la motricité globale
- ☐ Traitement sensoriel et habiletés perceptuelles
- ☐ Habiletés visuo et/ou oculo-motrices (p. ex. une basse vision)
- ☐ Habiletés cognitives
- ☐ Habiletés de régulation émotionnelle et/ou comportementale
- ☐ Fonctionnement adaptatif et/ou activités de la vie quotidienne
- ☐ Habiletés quant au fonctionnement exécutif ou au fonctionnement scolaire (p. ex. écriture, compétences organisationnelles)
- ☐ Participation aux loisirs (c.-à-d. les compétences au jeu)
- ☐ Habiletés sociales et communicationnelles
- ☐ Adaptations à l'environnement social (p. ex. habiletés parentales)
- ☐ Adaptations à l'environnement physique (configuration de la salle de classe, technologies d'assistance)
- ☐ J'accorde des consultations aux parents/tuteurs, enseignants et/ou au personnel scolaire

Autre - veuillez préciser:

27. En moyenne, quelle est la durée d'une de vos sessions d'intervention d'ergothérapie?

- Moins de 30 minutes
- 31 à 45 minutes
- 46 minutes à une heure
- Plus de 1 heure

Autre - veuillez préciser:

28. Quelle est la fréquence habituelle de ces séances d'ergothérapie?

- Consultation ponctuelle uniquement
- 2-3 séances par année
- 1/mois
- 2-3 séances par mois
- 1/semaine
- 2-3 séances par semaine
- Je n'offre pas de séances d'ergothérapie pour enfants/clients

29. Normalement, quelle est la durée totale approximative d'un traitement?

- Consultation ponctuelle uniquement
- Une semaine
- 2-3 semaines
- Un mois
- 1 à 3 mois
- 3 à 5 mois

- 5 mois ou plus

30. Au cours de mes séances d'intervention ou de thérapie, je travaille généralement avec les enfants:
Veuillez sélectionner toutes les réponses applicables.

- ☐ Individuellement
- ☐ En petits groupes de 2 à 5 enfants
- ☐ En groupes de 6 enfants ou plus
- ☐ J'offre des interventions en classe (p. ex. des activités ou des stratégies applicables à une classe d'étudiants)
- ☐ Je travaille comme consultant auprès de parents/tuteurs ou d'enseignants
- ☐ Autre – veuillez préciser:

SECTION V: PERFECTIONNEMENT PROFESSIONNEL ET PRISE DE DÉCISION CLINIQUE

31. Au cours de la dernière année, avez-vous assisté à des activités de formation continue liées à des pratiques d'intervention auprès d'enfants avec des troubles de l'attention?

- Oui
- Non

32. À combien d'activités de formation continue liées à des pratiques d'intervention auprès d'enfants avec des troubles de l'attention avez-vous assisté au cours des cinq dernières années?

- Aucune
- 1
- 2-3
- 4 ou plus

33. Voici des déclarations concernant des décisions cliniques prises à l'égard d'enfants/adolescents ayant des troubles de l'attention. Veuillez sélectionner la réponse qui s'applique le mieux.

a. J'utilise des ressources scientifiques (p. ex. résultats de recherche, revues scientifiques) pour prendre des décisions cliniques concernant les enfants et les jeunes avec des troubles de l'attention

- Jamais
- Rarement
- Parfois
- Souvent
- Toujours

b. Je fonde mes décisions cliniques sur les connaissances que j'ai acquises de lors de ma formation générale (p. ex. formation professionnelle en ergothérapie).

- Fortement en désaccord
- Pas d'accord
- D'accord
- Fortement d'accord

c. Je consulte mes collègues ergothérapeutes pour m'aider à prendre des décisions cliniques.

- Jamais
- Rarement
- Parfois
- Souvent
- Toujours

d. J'utilise des moteurs de recherche (p. ex. Google, Bing, Yahoo) comme sources d'information pour prendre des décisions cliniques à l'égard de mes clients.

- Jamais
- Rarement
- Parfois

- Souvent
- Toujours

e. Mon expérience professionnelle est la principale source d'informations guidant mes décisions à l'égard de mes clients ayant des troubles de l'attention.
- Fortement en désaccord
- Pas d'accord
- D'accord
- Fortement d'accord

f. J'utilise les connaissances et ressources acquises lors de mes cours de formation continue pour m'aider à prendre des décisions cliniques. (p. ex., ateliers, conférences, jours de recherche)
- Jamais
- Rarement
- Parfois
- Souvent
- Toujours

g. Les désirs de mes clients sont le facteur principal guidant mes décisions à l'égard des soins offerts.
- Fortement en désaccord
- Pas d'accord
- D'accord
- Fortement d'accord

34. Les déclarations et les questions qui suivent concernent l'accessibilité et la disponibilité de ressources cliniques ou d'information dans votre établissement.
Veuillez noter que les questions suivantes se rapportent au travail auprès d'une population clinique d'enfants ou d'adolescents souffrant de troubles de l'attention.
a. Dans mon établissement, on s'attend à ce que j'aie une pratique factuelle.
(La pratique factuelle est définie comme l'application des meilleurs résultats de recherche ou faits démontrés disponibles lors de la prise de décisions sur les soins de santé).
- Fortement en désaccord
- Pas d'accord
- D'accord
- Fortement d'accord

b. Offre-t-on des activités de formation continue dans votre établissement pendant les heures de travail?
- Oui
- Non

c. Est-ce que votre employeur débourse les frais des activités de formation continue?
- Oui
- Non

d. Votre employeur vous fournit-il une période de temps privilégiée vous permettant de vous concentrer sur votre propre perfectionnement professionnel (p. ex., assister à un atelier ou une conférence)?

- Oui
- Non

e. Votre employeur vous fournit-il une période de temps privilégiée pour chercher et lire de la littérature scientifique?

- Oui
- Non

f. Avez-vous accès aux recherches en cours par le biais de revues scientifiques (versions électronique ou papier) et/ou de bases de données en ligne dans votre lieu de travail?

- Oui
- Non

g. Votre employeur vous fournit-il du temps spécialement dédié à la participation à des activités de recherche (p. ex. conférences, journées de recherche)?

- Oui
- Non

h. Avez-vous un mentor dans votre lieu de travail?
*Le mentorat est une relation interpersonnelle réciproque dans laquelle un collègue plus expérimenté (habituellement plus vieux) agit comme guide, modèle, enseignant et répondant d'un collègue moins expérimenté (habituellement plus jeune), d'un stagiaire ou d'un étudiant. Un mentor procure à son protégé des connaissances, des conseils, des avis, des défis et du support dans l'optique que le protégé devienne un membre à part entière d'une profession spécifique. (*W.B. Johnson On Being a Mentor: A Guide for Higher Education Faculty)

- Oui
- Non

34. [SUITE] Les déclarations et les questions qui suivent concernent l'accessibilité et la disponibilité de ressources cliniques ou d'information dans votre établissement.
Veuillez noter que les questions suivantes se rapportent au travail auprès d'une population clinique d'enfants ou d'adolescents ayant des troubles de l'attention.

i. Je recherche l'avis de mon mentor quand je fais face à une situation clinique difficile.

- Fortement en désaccord
- Pas d'accord
- D'accord
- Fortement d'accord

j. Mon mentor me fournit de la rétroaction sur ma pratique clinique afin d'éclairer mes décisions cliniques.

- Fortement en désaccord
- Pas d'accord
- D'accord

- Fortement d'accord

k. Êtes-vous un mentor dans votre milieu de travail?
- Oui
- Non

35. Sur quels sujets concernant ergothérapie auprès les enfants/jeunes ayant des troubles de l'attention voudriez-vous en savoir plus? (ex. évaluations, interventions, théorie et connaissances sur le sujet, des programmes, etc.).
Veuillez spécifier.

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