LEISURE PARTICIPATION OF CHILDREN AND ADOLESCENTS WITH ADHD: A SCOPING REVIEW

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Abstract

Attention deficit hyperactivity disorder (ADHD) may affect various aspects of a child or adolescent's life including their education, friendships, and leisure participation. Their lack of participation in active leisure may be due to a dearth of experiences related to poor fundamental movement skill performance and poor self-regulation. While some researchers have suggested that children with ADHD tend to pursue non-active leisure activities, other researchers have suggested that these children do, in fact, participate and enjoy active leisure pursuits. However, it is challenging to examine leisure participation when there is not one clear, nor cohesive, picture of how school-aged youth experience leisure. Hence, the purpose of this study was to determine the extent of research on the leisure participation of children and adolescents with ADHD and associated research methods by answering the following overarching research question: What is known about the leisure participation of children and adolescents with ADHD? This scoping review was conducted in alignment with the Arksey and O'Malley (2005) framework for scoping reviews. A search strategy was conducted by searching six electronic databases (PsycINFO, SportDiscus, Web of Science, Sports Medicine and Education Index, and MEDLINE), along with citation chasing and handsearching of key journals, to retrieve relevant studies related to the leisure activities of school-aged youth. Ultimately, 25 studies were selected and analyzed for this scoping review. A lack of formal definitions for leisure was found across most of the selected studies. A descriptive numerical summary and thematic analysis also revealed that school-aged youth with ADHD participated in non-active and active leisure activities by themselves and with others, at home, and in the community. However, participation in active leisure may be less frequent due to a variety of barriers such as a lack of community spaces and resources, lack of familial finances, lack of free time, and difficulty maintaining the social demands of group physical activities. Important factors for the participation in non-active and active leisure pursuits of the youth with ADHD were the creation and maintenance of friendships and parental involvement. The results of quality assessments, conducted for each of the selected studies, revealed the need for better designed research studies on this topic to highlight the first-hand experiences and needs of the children and adolescents with ADHD. This study adds to the breadth of knowledge of ADHD and leisure by providing a better understanding of the leisure pursuits of these youth. Leisure and physical activity professionals should be able to use our study findings to develop and recommend leisure and physical activity programs that are tailored to the preferences and needs of school-aged youth with ADHD and their families.

Résumé

Le trouble déficitaire de l'attention avec hyperactivité (TDAH) peut affecter divers aspects de la vie d'un enfant ou d'un adolescent, notamment son éducation, ses relations amicales et sa participation aux loisirs. Leur manque de participation à des loisirs actifs peut être dû à une pénurie d'expériences liées à une mauvaise performance des mouvements fondamentaux et à une mauvaise autorégulation. Alors que certains chercheurs ont suggéré que les enfants atteints de TDAH ont tendance à s'adonner à des activités de loisirs non actives, d'autres chercheurs ont suggéré que ces enfants participent en fait à des activités de loisirs actives et les apprécient. Cependant, il est difficile d'examiner la participation aux loisirs lorsqu'il n'existe pas d'image claire et cohérente de la façon dont les jeunes d'âge scolaire vivent les loisirs. L'objectif de cette étude était donc de déterminer l'étendue de la recherche sur la participation aux loisirs des enfants et des adolescents atteints de TDAH et les méthodes de recherche associées, en répondant à la question de recherche primordiale suivante : que sait-on de la participation aux loisirs des enfants et des adolescents atteints de TDAH ? Cette étude exploratoire a été réalisée conformément au cadre d'Arksey et O'Malley (2005) pour les études exploratoires. Une stratégie de recherche a été mise en œuvre en interrogeant six bases de données électroniques (PsycINFO, SportDiscus, Web of Science, Sports Medicine and Education Index, et MEDLINE), ainsi que la recherche de citations et la recherche manuelle dans des revues clés, afin d'extraire les études pertinentes relatives aux activités de loisirs des jeunes d'âge scolaire. Au final, 25 études ont été sélectionnées et analysées dans le cadre de cette étude exploratoire. La plupart des études sélectionnées ont révélé l'absence de définitions formelles des loisirs. Une synthèse numérique descriptive et une analyse thématique ont également permis de constater que les jeunes TDAH d'âge scolaire participaient à des activités de loisirs actives et non actives, seuls et avec d'autres, à la maison et dans la communauté. Cependant, la participation à des loisirs actifs peut être moins fréquente en raison de divers obstacles tels que le manque d'espaces et de ressources communautaires, le manque de moyens financiers familiaux, le manque de temps libre et la difficulté à répondre aux exigences sociales des activités physiques de groupe. La création et le maintien d'amitiés et l'implication des parents sont des facteurs significatifs de la participation des jeunes atteints de TDAH à des activités de loisirs actives et non actives. Les résultats des évaluations de la qualité, menées pour chacune des études sélectionnées, ont révélé la nécessité d'études de recherche mieux conçues sur ce sujet afin de mettre en évidence les expériences et les besoins de première main des enfants et des adolescents atteints de TDAH. Cette étude enrichit les connaissances sur le TDAH et les loisirs en permettant de mieux comprendre les activités de loisirs de ces jeunes. Les professionnels des loisirs et de l'activité physique devraient pouvoir utiliser les résultats de notre étude pour développer et recommander des programmes de loisirs et d'activité physique adaptés aux préférences et aux besoins des jeunes d'âge scolaire atteints de TDAH et de leurs familles.

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Contribution of Authors

Patrinos, Christiana was the primary author of this thesis and the principal investigator in the data collection and analysis.

Dr. William Harvey served as thesis supervisor and Drs. Gordon Bloom and Shane Sweet served as thesis committee members.

Chapters 1 and 2 were written by Christiana Patrinos and an editorial review was provided by Dr. William Harvey.

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Chapters 4 through 6 were written by Christiana and editorial review was provided by Dr. William Harvey

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List of Abbreviations

ADLs = Activities of Daily Living

ADHD = Attention Deficit Hyperactivity Disorder

APA = Adapted Physical Activity

PA = Physical Activity

TR = Therapeutic Recreation

QATSDD = Quality Assessment for Studies with Diverse Designs

Chapter 1

Introduction

The purpose of this study was to determine the extent of research on the leisure participation of children and adolescents with ADHD and associated research methods. A brief overview of ADHD, leisure, and their interconnectedness are provided in this chapter. The study's purpose, significance, delimitations, and limitations as well as operational definitions are also provided in this chapter.

Attention Deficit Hyperactivity Disorder (ADHD)

Attention Deficit Hyperactivity Disorder (ADHD) is one of the most prevalent neurodevelopmental disorders of childhood. It is estimated that approximately 3 to 10% of school-aged youth worldwide experience some form of ADHD (McGough, 2014). The exact cause of ADHD is currently unknown. However, it has been strongly suggested by researchers that there may be genetic and hereditability links for individuals with the disorder (Faraone & Larsson, 2019; Grimm et al., 2020; Sharp et al., 2009). Other researchers have generated different neuropsychological models that each point to deficits in cognitive functioning (i.e., executive function and working memory) as potential causes of ADHD (Barkley, 1997; Durston et al., 2003; Sonuga-Barke, 2003. There are several health, social, and environmental risk factors that may also be implicated (American Psychiatric Association, [APA], 2013).

ADHD is characterized by three main symptoms which are inattention, impulsivity, and hyperactivity (McGough, 2014). There are three main diagnostic subtypes of ADHD. The first is the predominantly inattentive subtype which is characterized by a general lack of focus, poor concentration, and difficulty maintaining attention for long periods of time (APA, 2013). The second subtype is the hyperactive-impulsive subtype which is characterized by excessive and

inappropriate motor activity and acting without contemplating consequences (APA, 2013). The last and most common subtype amongst youth is the combined subtype. This subtype is diagnosed when a child or adolescent displays symptoms of inattention and hyperactivity and impulsivity (APA, 2013). ADHD may affect various aspects of a child's life including their learning and education, ability to build and maintain friendships, and leisure participation in recreational activities and sports (Engel-Yeger & Ziv-On, 2011).

Leisure

The simplest and most common definition of leisure is the engagement of an individual in an enjoyable activity during their free time away from obligations such as schooling, work, or household chores (Stebbins, 2018). Leisure includes activities that are freely chosen by an individual for the inherent enjoyment and pleasure experienced during participation in the activity (Stebbins, 2018). The definition of leisure as an action has enabled scholars to suggest the word leisure can also be used as a verb (R. Swedburg, personal communication, December 2005). When the term leisure is used as a verb, it embodies the concept of freedom because an individual has agency over their leisure decisions and goal achievement (Anderson & Heyne, 2012). For example, many practitioners in the fields of therapeutic recreation and leisure sciences may discuss leisure participation in terms of how an individual "leisures" rather than how an individual "participates" in leisure (Anderson & Heyne, 2012).

Non-active and active leisure are the two main categories of leisure. Non-active, or passive, leisure includes recreational activities that do not require physical exertion, although they may require mental exertion (Stebbins, 2018). Non-active leisure also includes an element of enjoyment and/or relaxation (Stebbins, 2018). Examples of non-active leisure include arts-based recreational activities such as painting, playing an instrument, reading, writing,

photography, and entertainment/digitally based recreation like watching television or videogaming (Bolic et al., 2018; Cho et al., 2018). Active leisure includes participation in recreational activities that involve an expenditure of energy and the utilization of gross and fine motor skills (Tinsley & Eldredge, 1995). Examples of active leisure include sports, children's playground games, and recreational activities like gardening, hiking, and swimming (Pfeifer et al., 2011; Holder et al., 2009; Tinsley & Eldredge, 1995). Leisure through the lens of ADHD will be discussed.

ADHD and Leisure

Fundamental movement skills (FMS) are foundational movements of the human body that are considered building blocks of physical activity (Platvoet et al., 2018). They usually consist of locomotor and object control skills (Platvoet et al., 2018). Locomotor skills are movements that allow an individual to move from one space to another (Ulrich, 2000). Examples of locomotor skills include walking, running, and jumping (Ulrich, 2000). Object control skills refer to the ability of an individual to manipulate objects or implements such as sticks, balls, and rackets (Ulrich, 2000). Examples of object control skills include throwing, catching, and dribbling (Ulrich, 2000). Locomotor and object control skills are key to participation in many leisure activities for all school-aged youth.

Children with ADHD may experience poor FMS performance which is related to difficulties with motor control (Barkley, 2006; Harvey et al., 2009). Poor FMS performance may lead these children to experience difficulties when participating in sports and physical activities during leisure (Harvey et al., 2009). Children with ADHD also experience difficulties in self-regulating behaviours and often exhibit poor interpersonal communication skills during interactions with peers (Barkley, 2006). Performance of poor social skills and difficulties in self-

regulating behaviour by these children may contribute to the experience of social exclusion during physical activity participation (Harvey et al., 2007). These negative experiences may also lead children with ADHD to avoid participation in sports and other forms of active leisure (Harvey et al., 2007; Poulsen & Ziviani, 2004).

The potential avoidance of active leisure by children with ADHD have led some researchers to believe that children with ADHD prefer non-active leisure pursuits (Bolic et al., 2018; Kostyrka-Allchorne et al., 2020; Pfeifer et al., 2011). For example, these researchers have suggested that children with ADHD prefer watching television and video gaming over sports and recreational activities like cycling and swimming (Bolic et al., 2018; Kostyrka-Allchorne et al., 2020; Pfeifer et al., 2011). In addition, this potential preference towards non-active leisure of children with ADHD may be because it is often performed alone and in quiet environments such as an individual's bedroom (Engel-Yeger & Ziv-On, 2011; Ismael, Lawson, & Cox, 2015). Participation in non-active leisure may, therefore, require less sensory processing and may make it more appealing to children with ADHD (Engel-Yeger & Ziv-On, 2011; Ismael, Lawson, & Cox, 2015).

There are other researchers, however, that have suggested that children with ADHD do participate in active leisure (Barfield & Driessnack, 2018; Harvey et al., 2014). They found that the children experienced enjoyment through their leisure participation regardless of difficulties that may occur during an activity (Barfield & Driessnack, 2018; Harvey et al., 2014). For example, these researchers found that children with ADHD participated in forms of active leisure such as hide and seek at the park with friends, playing traditional sports, and physical activities such as swimming or cycling (Barfield & Driessnack, 2018; Harvey et al., 2014). Other researchers have also found that youth with ADHD participated in physical activities for a

similar number of days within specific time periods as their neurotypical counterparts (Fogel et al., 2020; Shimoni et al., 2010). For example, Shimoni et al. (2010) found that boys with ADHD participated, on average, in physical and recreational activities as often as their peers without ADHD. Similarly, Fogel et al. (2020) found that there were no significant differences in the number of days that adolescents with ADHD participated in structured and unstructured physical activity compared to their neurotypical counterparts.

Hence, there is not a clear, nor cohesive, picture of the leisure experiences of children and adolescents with ADHD. Our understanding of the children's and adolescents' leisure is poor, given that leisure activities were not always clearly identified, with the inconsistent use of definitions for leisure. For example, leisure was categorized in some studies by researchers as activities of daily living (ADLs) which refer to daily tasks and/or skills needed to fulfill an individual's basic physical needs (Engel-Yeger & Ziv-On, 2011; Mlinac & Feng, 2016). Examples of ADLs include getting dressed independently, personal hygiene (e.g., bathing and brushing teeth), and eating without assistance (Mlinac & Feng, 2016). The inclusion of ADLs in the definition of leisure does not fit with the standard purpose of leisure. For example, ADLs do not allow for the same self-expression and fulfillment as leisure does (Tinsley & Eldredge, 1995).

Leisure has also been defined by some scholars as physical activities and sports played during recreation (Barfield & Driessnack, 2018; Harvey et al., 2014). Other scholars have perceived leisure as non-active pursuits such as entertainment-based activities and videogaming (Bolic et al., 2018; Kostyrka-Allchorne et al., 2020; Whalen et al., 2002). These competing perceptions of leisure have led researchers to make varying conclusions about how children and adolescents with ADHD leisure. More specifically, some researchers concluded that school-aged

youth with ADHD avoided active leisure (Bolic et al., 2018; Kostyrka-Allchorne et al., 2020; Pfeifer et al., 2011) while other researchers have concluded that the youth enjoyed participating in active leisure (Barfield & Driessnack, 2018; Harvey et al., 2014; Fogel et al., 2020; Shimoni et al., 2010).

This gap between non-active and active leisure activities may have been created due to these varying definitions and it may have further created misperceptions about how children and adolescents with ADHD leisure. For example, the inconsistent definitions of leisure and categorizations of leisure activities may have created challenges in examining the leisure participation patterns and motivations of children and adolescents with ADHD. Hence, it is necessary to determine the scope and quality of the literature that has been produced on the topic. It seems timely to evaluate the depth and quality of the gap within the existing body of literature by exploring the studies that have examined the leisure participation of children with ADHD.

A scoping review was conducted for the current study to determine the extent of research that has been done on the leisure participation of children and adolescents with ADHD and the types of research methods that have been used. This scoping review was also conducted to confirm the presence and evaluate the depth of this gap between non-active and active leisure activities. In addition, the inclusion of a quality assessment of methodological strength within this scoping review will provide critical information on the appropriateness of research methods of existing studies (i.e., Glegg et al., 2014). The results of the quality assessment, in turn, provide insights and recommendations to guide how future research should proceed in terms of research designs to be used (i.e., Glegg et al., 2014).

Purpose of Study

The purpose of this study was to determine the extent of research on the leisure participation of children and adolescents with ADHD and associated research methods. Hence, a scoping review was conducted to answer the following overarching research question: What is known about the leisure participation of children and adolescents with ADHD? The following sub-questions were posed to help answer the overarching research question: (1) How do the operational definitions of leisure relate or differ across studies about children and adolescents with ADHD? (2) What forms of non-active and active leisure do children and adolescents with ADHD participate in? (3) Where do children and adolescents with ADHD leisure? (4) Who do children and adolescents with ADHD leisure with? (5) What types of research methods have been used to examine the leisure participation of children and adolescents with ADHD? (6) What are the quality indicators of the leisure research performed to date for children and adolescents with ADHD?

Significance of Study

This study provides a breadth of knowledge by presenting an overall picture of how school-aged youth with ADHD leisure. This scoping review also provides the foundation for future research on the leisure participation of children and adolescents with ADHD that should be based on clear and formally accepted definitions of leisure. These consistent definitions may, in turn, lead to high quality research. Findings, related to well-conducted research, may lead to the development and use of stronger research methods in the future. The findings from this study may also provide the opportunity for future research to examine why these children and adolescents may choose certain forms of leisure activities over others.

In addition, the identification of current leisure participation patterns of school-aged youth with ADHD may provide valuable insights for current and future practitioners in the fields of adapted physical activity (APA) and therapeutic recreation (TR). The hope is that these practitioners will use the scoping review information when planning, conducting or recommending physical activity and leisure programs for children and adolescents with ADHD and their families. For example, leisure and physical activity practitioners are often the intermediaries between children with ADHD, their families, and successful access to participation in leisure activities and community recreation (Thompson & Emira, 2011). Hence, parents of children with ADHD often rely on the knowledge of and information disseminated by APA and TR field specialists when attempting to access leisure activities and community services for their children (Thompson & Emira, 2011). Therefore, the findings from this scoping review may also provide necessary insights for the parents and caregivers of children with ADHD who help to determine what leisure activities and services are available for their children. It is hoped that the field professionals and parents will work together to provide enhanced and personalized leisure programming because they may have a greater knowledge and understanding of how children and adolescents with ADHD leisure.

Delimitations

There were two delimitations for the current study. The first delimitation reflected the inclusion criteria that will be applied during the study selection process. For example, only peer-reviewed studies and dissertations about the leisure of children and adolescents with ADHD, 5-18 years, were selected. Next, the second delimitation was the inclusion of a quality assessment tool that allowed for the evaluation of methodological strength of the research methods used within the existing literature.

Limitations

There were two limitations for the current study. First, there was only one reviewer who completed steps two and three of the Arksey and O'Malley framework. While there was potential for bias during the selection of studies, an additional reviewer assessed the selected articles from steps two and three for relevancy. The additional reviewer was also involved in the data extraction and thematic analysis of steps four and five of the Arksey and O'Malley framework. Second, some studies could have used disability as an umbrella term and did not identify ADHD within the title or abstract which may have caused some studies to be missed during the selection process. Several key terms related to ADHD were incorporated in the search strategy for stage two of the Arksey and O'Malley framework to minimize the chance of missing relevant studies.

Operational Definitions

For the purpose of this study, the following operational definitions were used:

Attention Deficit Hyperactivity Disorder: A neurodevelopmental disorder characterized by symptoms of inattention and/or hyperactivity-impulsivity that directly affect an individual's daily functioning in social, academic, and occupational settings (APA, 2013).

Neurodevelopmental Disorder: A disorder caused by impaired development of the central nervous system resulting in abnormal brain function that may impact memory, cognition, and self-regulation of behaviours and emotions (Thapar et al., 2017). Examples include attention deficit hyperactivity disorder, autism spectrum disorder, and intellectual disability (APA, 2013).

Disability: The interaction between one's health condition (i.e., impairment) and contextual factors including their environmental and personal factors that may impact an individual's functioning and abilities in daily life (World Health Organization, [WHO] 2001).

Physical Activity: An activity that involves human movement of the body, an expenditure of physical energy, and an increase in heart rate (WHO, 2019).

Leisure: An activity that is freely chosen for the inherent enjoyment experienced during participation. Participation in a leisure activity occurs during one's free time away from daily obligations such as school and work (Stebbins, 2018).

Active Leisure: Recreational activities that involve the use of both gross and fine motor skills and an expenditure of physical energy (Tinsley & Eldredge, 1995).

Non-active Leisure: Recreational activities that are not active in nature but involve mental exertion and often include an element of enjoyment and/or relaxation (Stebbins, 2013).

Recreation: the activities that individuals engage in during their free time (Hurd & Anderson, 2010).

Chapter 2

Literature Review

The purpose of this study was to determine the extent of research on the leisure participation of children and adolescents with ADHD and associated research methods. This chapters consists of four sections. The first section provides a background of ADHD that includes etiology, diagnostic profile, age and sex differences. The second section provides an overview of how leisure has been traditionally defined and the major categories of leisure (i.e., active and non-active leisure) with examples including physical activity and sports. The third section discusses leisure in relation to ADHD. The final section provides a summary of scoping reviews with particular emphasis on the Arksey and O'Malley framework (2005) and a quality assessment of methodological strength, specifically the Quality Assessment Tool for Studies with Diverse Designs (QATSDD, Sirriyeh et al., 2012).

Attention Deficit Hyperactivity Disorder

Introduction

ADHD is the most prevalent neurodevelopmental disorder of childhood with global prevalence estimates spanning from 3 to 10% (McGough, 2014). The prevalence estimate of ADHD for school-aged children in the United States is about 8% (Hammerness, 2008). A national survey conducted in 2016 by the Centers for Disease Control and Prevention (CDC) estimated that a total of 6.1 million American children were diagnosed with ADHD and 5.7 million of those children were between the ages of 6 and 17 years (CDC, 2021). The prevalence of ADHD for Canadian children, between the ages of 5 and 18 years, is estimated around 5% or approximately 1.9 million children (Statistics Canada, 2015). In the province of Quebec, it is estimated that 7-8% of school-aged children have an ADHD diagnosis (Brassard et al., 2018).

Etiology

The exact cause of ADHD has yet to be identified even though it is a highly researched disorder within the area of youth mental health, particularly in school-aged children. What has been found, however, is a potential genetic linkage along with neuropsychological models that point to deficits in executive functioning within the frontal lobes of the brain (Hammerness, 2008). In addition, several environmental and social risk factors have also been examined for their influence on and potential causality of ADHD in school-aged youth.

Genetic links. Several researchers have found that there may be a strong genetic component to one of the causes of ADHD as discovered through linkage and association analyses. For example, the neurotransmitter dopamine along with the transporter protein (*DAT1*) and receptors D2 (*DRD2*), D4 (*DRD4*) and D5 (*DRD5*) have been thoroughly studied in both linkage and association analyses of ADHD (Sharp et al., 2009). Mutations in the dopamine transporter protein (DAT1) have been linked to impaired prefrontal-striatal circuits which can increase novelty seeking behaviour in both animals and humans (Sharp et al., 2009). In addition, the dopamine receptor D4 (*DRD4*) has also been found to have a strong association with novelty seeking and "behavioural inflexibility" which can be characteristics of ADHD (Sharp et al., 2009, p.592). Chromosome 16, which is involved in the development of the nervous system, has also been examined in relation to the cause of ADHD as it has been associated with other neurodevelopmental disorders such as autism spectrum disorder (Buttross, 2007). Some researchers believe that chromosome 16 may also be a potential cause of ADHD because of its implication in other neurodevelopmental disorders (Butrross, 2007).

Further research on the causes of ADHD has explored the heritability factor of ADHD through adoption and familial studies first prominent in the 1970s (Buttross, 2007). The

heritability of ADHD has been estimated between 77 and 88% as determined through these studies (Grimm et al., 2020). Several adoption studies aimed to discover whether the development of ADHD in children is caused by genetic or environmental factors. These studies found that there are higher rates of ADHD between biological parents and children versus adoptive parents and children (Faraone & Larsson, 2019). The higher prevalence of ADHD between biological parents and children versus adoptive parents and children suggests that ADHD is more likely hereditary rather than the product of an individual's environment (Faraone & Larsson, 2019). Similarly, twin studies examined the rate of ADHD diagnosis, along with symptoms of hyperactivity and inattentiveness, between identical (i.e., monozygotic) and fraternal twins (i.e., dizygotic). These twin studies found similar rates of heritability of 74% (Faraone & Larsson, 2019). ADHD, therefore, seems to have a considerable hereditability rate and strong genetic component as demonstrated through both genetic analyses and familial studies.

Neuropsychological models. Several neuroimaging studies led to the development of neuropsychological models that further explored the causes of ADHD. The most predominant neuropsychological model is the *Hybrid Model of Executive Functions* where Barkley (1997) suggested that ADHD is caused by primary deficits in executive functioning related to self-regulation, problem solving, working memory, and response inhibition. Barkley (1997) stipulated that it is the 'goal directed self-regulated form of sustained attention' (i.e., concentration) that is compromised within ADHD and thus impacts the performance of motor behaviour (p.201). He further suggested that these deficits in executive functions, related to behavioural inhibition, may affect motor control and not an individual's knowledge of how to perform motor tasks (Barkley, 1997). For example, behavioural inhibition may be caused by

deficits in non-verbal working memory, verbal working memory, self-regulation of motivation and emotions, and reconstruction of behaviour based on observation of one's environment (Barkley, 1997, pp.191). In other words, individuals with ADHD do not face difficulties of knowing how to perform a task but rather of performing what they know due to these cognitive deficits (Barkley, 1997, p. 335).

Inattention and deficits in executive functioning of children with ADHD were hypothesized to be caused by impaired prefrontal-striatal circuits through the *Dual-Pathway Model* (Sonuga-Barke, 2003). He further suggested that the overactivity experienced by some children with ADHD is linked to frontal-limbic dysfunction (Sonuga-Barke, 2005). Frontal-limbic dysfunction is hypothesized to be responsible for the regulation of motivation and reward responses (Sonuga-Barke, 2005). The first circuit of the model is the executive circuit which is hypothesized to be responsible for cognitive functioning (Sonuga-Barke, 2003). Impairments within the executive circuit can lead to cognitive deficits such as difficulty regulating behaviour (Sonuga-Barke, 2003). The second circuit is the reward circuit which is hypothesized to be responsible for attention and reward processes such as the positive reinforcement of behaviours and deferring instant gratification to obtain more desirable rewards in the future (Sonuga-Barke, 2003). Impairment in the reward circuit may lead to delay aversion which occurs when an individual chooses instant gratification rather than waiting for more desirable rewards (Sonuga-Barke, 2003). Delay aversion can lead to impulsive decision making, difficulty waiting, and maintaining concentration (Sonuga-Barke, 2003).

A third model, the *Executive Function Theory of ADHD*, is one where researchers posit that the symptomology of ADHD may be caused by impaired signaling in the prefrontal cortex (Durston et al., 2003). The prefrontal cortex is hypothesized to affect an individual's ability to

produce appropriate emotional responses (Durston et al., 2003). More specifically, Smith et al. (2006) found through functional MRI that children with ADHD may experience 'hypoactivation' of the frontoparietal and ventral attentional networks located in the prefrontal cortex. These networks are hypothesized to be responsible for attention and executive functioning (Smith et al., 2006). This impaired signaling within the ventral attentional network, particularly in the right hemisphere of the brain, may affect selective attention (McGough, 2014). Selective attention is the ability of a child to filter and interpret information from their environment (McGough, 2014). When impaired signaling occurs, the attention of a child with ADHD is taken away from important and salient environmental stimuli which, in turn, may cause inappropriate or suboptimal decision making (Johnson et al., 2009).

Although the location of the dysfunction differs amongst the models, each particular author strongly suggested that the root cause of ADHD is neurological in nature and related to cognitive functioning (i.e., executive functions and working memory). In addition to these neuropsychological models, several environmental and social risk factors have also been examined for their influence and potential role in the causality of ADHD in school-aged youth. Environmental and social risk factors related to pregnancy, family and home life, and exposure to harmful toxins will be discussed in the following section.

Environmental and social risk factors. A risk factor is defined as an occurrence that increases the likelihood of developing a particular disease or disorder (Willadsen et al., 2016). There are several types of risk factors for ADHD. The first set of factors that will be discussed are associated with pregnancy (i.e., maternal consumption of alcohol and tobacco), maternal health and age, and infant health throughout the birthing process. Social risk factors such as parenting styles, familial stability, and socioeconomic status will then be discussed. The last set

of risk factors to be discussed are environmental factors such as exposure to harmful toxins such as lead and mercury and myths surrounding the consumption of artificial preservatives and food colouring.

First, there are several risk factors during pregnancy that occur in the prenatal period that may potentially increase the likelihood of an infant developing symptoms of ADHD (Barkley, 2006). Consumption of alcohol during pregnancy may lead to fetal alcohol spectrum disorder (FASD) with ADHD being a prominent comorbidity (Buttross, 2007). Likewise, smoking tobacco during pregnancy, especially beyond the second trimester, has also been linked with an increased risk for the development of ADHD symptoms with impulsivity being most common (Buttross, 2007). Poor maternal physical health throughout pregnancy, such as high blood pressure and infection, is also considered a risk factor along with the age of the mother (Butrross, 2007; McGough, 2014). Some perinatal risk factors include premature or delayed birth (i.e., earlier than 28 weeks and longer than 42 weeks) and fetal distress during a long labour (McGough, 2014). Researchers have also found several postnatal risk factors for ADHD such as neonatal anoxia (i.e., infant loss of oxygen to the brain anytime throughout the birthing process), brain hemorrhaging, and seizures (McGough, 2014).

Second, there are social risk factors that have been linked to the development of ADHD during childhood which include the experience of maladaptive parenting, physical and emotional abuse, and unstable home environments (American Psychiatric Association, [APA], 2013). Childhood experience of familial instability and maladaptive parenting styles may affect the severity of symptoms or the development of comorbid behavioural issues even without direct causality (APA, 2013). In addition, research has been done to examine whether low socioeconomic status (SES) affects development and severity of ADHD. Martel (2013)

examined the effects of ethnicity, sex, and family income on ADHD and executive functioning. The author found that children from families with lower SES seemed to demonstrate more severe symptoms of inattentiveness and hyperactivity along with impairments in executive functions (Martel, 2013).

Finally, there are environmental risk factors, that have been previously studied in relation to ADHD and inattention which include the ingestion and/or inhalation of environmental toxins such as lead and mercury through food contamination and presence in household products such as paint during the first two-to-three years of life (Barkley, 2006; Eubig et al., 2010). Lead poisoning yields similar deficits in attention and awareness as ADHD which alerted researchers to a possible connection (Eubig et al., 2010). However, no direct causal link has been found as the presence of such chemicals in these products have decreased since the 1970s (Eubig et al., 2010). Similarly, it was also once believed that the addition of artificial chemicals in foods for preservation, flavour, and colouring caused hyperactivity in children which gave rise to the Feingold diet in the 1970s (Smith, 2011). The Feingold diet involved the elimination of all foods with preservatives and additives to decrease hyperactivity within children (Smith, 2011). However, there was a lack of scientific evidence to support the diet and it was also highly criticized for eliminating healthy foods with salicylic acid such as cucumber, tomatoes, and apples (Smith, 2011).

In conclusion, it is evident that there are several possible causes and a multitude of risk factors related to the etiology of ADHD. These potential causes and risk factors of ADHD, ultimately, demonstrate the complexity of ADHD as a neurodevelopmental disorder and its presentation within individuals. A discussion of the diagnosis, characteristics, and subtypes of ADHD follows.

Diagnosis

The following section provides information associated with a diagnosis of ADHD including the diagnostic criteria from the DSM-V and the three subtypes of ADHD. A discussion of diagnostic challenges, including differential diagnosis and comorbidity, follows. Lastly, age and sex differences of the manifestation of ADHD symptoms will be presented.

Diagnostic Criteria

ADHD is characterized by three main categories of symptoms which include inattention (i.e., difficulty maintaining prolonged attention), impulsivity (i.e., acting before thinking), and hyperactivity (i.e., difficulty remaining still for long periods of time) (McGough, 2014). A clinical diagnosis of ADHD is given to an individual by a physician when they demonstrate symptoms of inattention and/or hyperactivity-impulsivity for a minimum of six months (APA, 2013). The symptoms must manifest in at least two settings including the home, school, or in the community and must negatively impact the individual's social and/or academic functioning. Symptoms should first manifest prior to the age of 12 years and they should not be attributed to another mental disorder or a period of psychosis. In addition, there is a spectrum of impairment levels that increase in severity and range from mild to severe (APA, 2013).

Subtypes. There are three subtypes of ADHD: predominantly inattentive, predominantly hyperactive-impulsive, and combined. The predominantly inattentive subtype is characterized by a general lack of focus and concentration. It is diagnosed when at least 6 out of 9 symptoms of inattention are identified (APA, 2013). Examples of inattention symptoms include difficulty maintaining prolonged attention, the making of careless errors and lack of details in work, forgetfulness, and avoidance of activities that involve "sustained mental effort" (APA, 2013, p. 50-51). The predominantly hyperactive-impulsive subtype is characterized by excessive and

inappropriate motor activity as well as acting without thinking. At least 6 out of 9 designated symptoms should be identified for the predominantly inattentive subtype of ADHD to be diagnosed. The associated symptoms include fidgeting, inappropriate bursts of physical activity such as running or climbing, excessive speaking while interrupting others, and difficulty waiting one's turn. Lastly, the combined subtype is diagnosed when a child meets the diagnostic criteria for both the predominantly inattentive and predominantly hyperactive-impulsive subtypes (APA, 2013).

Diagnostic Challenges

Potential challenges with the diagnosis of ADHD may arise due to the presence of differential diagnoses and comorbidities. An accurate diagnosis is, therefore, dependent on the knowledge and experience of the physician and treatment team who need to recognize when an individual is exhibiting characteristics of ADHD and not those of another psychological disorder (Davidovitch et al., 2017).

Differential diagnosis. A differential diagnosis is the process in which a health professional chooses the psychological disorder most responsible for symptoms by ruling out any other possible disorders (First, 2014). Differential diagnosis occurs when there are other possible psychological disorders that may also explain the presence of symptoms (First, 2014). For example, ADHD shares symptoms with autism spectrum disorder and intellectual disability such as impaired social skills (e.g., difficulty interpreting verbal and behavioural cues) and impaired gross motor skill coordination and clumsiness (APA, 2013; Hartley & Sikora, 2009; Reiersen & Todd, 2008). ADHD also shares similar symptoms with disruptive behaviour disorders (e.g., oppositional defiant disorder, conduct disorder) such as non-compliance to tasks and with learning disorders such as inattention and poor academic performance (APA, 2013). Therefore, it

is the task of the physician and treatment team to evaluate and find the most appropriate and mutually exclusive diagnosis (First, 2014). However, the symptoms of ADHD do not always occur in isolation and may occur alongside other psychological disorders (Quinn, 2005).

Comorbidity. Comorbidity is the presence of additional psychological disorders and/or biological diseases in combination with an individual's predominant diagnosis (Valderas et al., 2009). The presence of one or more disorders interacts with the main disorder and impacts the way in which symptoms manifest within and are experienced by an individual (Valderas et al., 2009). Children with ADHD are often likely to experience co-occurring psychological disorders which can include mood disorders (i.e., depression, bipolar disorder), anxiety disorders (i.e., generalized anxiety disorder, obsessive-compulsive disorder), and behavioural disorders (i.e., oppositional defiant disorder, conduct disorder) (Barkley, 2006; Wright, et al., 2009).

Children with ADHD may also experience developmental coordination disorder (Barkley, 2006). For example, approximately 47% of children with ADHD also fulfill the DSM criteria for developmental coordination disorder (Barkley, 2006). Adolescents with ADHD often experience higher rates of comorbid substance use disorders and long-term addictions to alcohol and narcotics in comparison to adolescents without ADHD (Bunford et al., 2015). The diagnosis of ADHD in school-aged children and adolescents, therefore, may pose a challenge to treatment teams due to the possibility of having differential diagnoses and co-occurring psychological disorders (Davidovitch et al., 2017).

Age and sex differences

The presentation of symptoms and overall experience of ADHD can differ based on the age and sex of a child or adolescent. The presentation of ADHD symptoms, based on age (i.e., childhood and adolescence) and biological sex (i.e., female and male), will be discussed below.

Age differences. The manifestation and severity of ADHD symptoms may vary by age although the general characteristics of inattention, hyperactivity, and impulsivity often remain the same (DuPaul et al., 2020). Younger children tend to demonstrate hyperactive and impulsive behaviours that are more observable and disruptive such as getting up and running during inappropriate moments or settings. Adolescents with ADHD may demonstrate hyperactive and impulsive behaviours in more subtle ways such as fidgeting and/or having difficulty sitting still over long periods of time. DuPaul et al. (2020) found that differences in behaviour between children and adolescents with ADHD tend to align to typical developmental milestones. For example, as children mature developmentally their behaviours become less disorderly and they begin to demonstrate restraint over random gross motor activity (DuPaul et al., 2020).

The symptoms of ADHD persist as a child matures, although severity levels will often decrease with age (Barkley et al., 1990). Barkley et al. (1990) found that 80% of children diagnosed with the predominantly hyperactive and impulsive subtype of ADHD continued to experience symptoms at similar severity levels during adolescence and potentially into young adulthood. Similarly, Weiss and Hechtman (1993) found that symptoms of ADHD persisted through adolescence and into adulthood through their 10-to-15-year longitudinal studies. For example, they found that approximately 50% of young adults with ADHD still experienced symptoms of hyperactivity and impulsivity that negatively impacted their work and personal relationships (Weiss & Hechtman, 1993). Ruiz-Goikoetxea et al. (2018) found that children and adolescents with ADHD were equally at a higher risk for injuries than their neurotypical counterparts because of their tendency to act without thinking and lack of risk assessment. In addition, both children and adolescents with ADHD were more likely to experience difficulties creating and maintaining friendships, and later romantic relationships (Barkley, 2006).

Difficulty creating and maintaining personal relationships may be caused by poor interpersonal communication skills such as misinterpreting the verbal and behavioural cues of others (Barkley, 2006).

Bonati et al. (2018) also found that there may be differences between the prevalence of ADHD between children born within the same year and not just between different ages. Children, born between September and December, tend to receive higher rates of clinical diagnosis than children born earlier in the year though the reasoning is not clear. Children, between the ages of 6 and 9 years, seem to have a higher diagnosis rate during the academic year in comparison to children 10 years and older. This difference of diagnosis rates between younger and older school age children may potentially be explained by a 'maturational lag.' This term suggests that younger children with ADHD are less likely to self-regulate their behaviour and, therefore, are more often recommended for behavioural and psychological assessment in comparison to older children with ADHD (Bonati et al., 2018).

Sex differences. The prevalence of ADHD and its presentation of symptoms differ between the sexes (Quinn, 2005). The prevalence ratio of ADHD between males and females is approximately 9:1 in clinical samples while the ratio in population samples is 3:1 (Ruiz-Goikoetxea et al., 2018). The presentation of ADHD symptoms in males is overt with visibly disruptive behaviour while the presentation of symptoms in females is covert in nature (Quinn, 2005). Hence, girls with ADHD seem be underdiagnosed in comparison to boys with ADHD (Quinn, 2005). The underdiagnosis of ADHD in girls has generally been attributed to the belief that girls are much more likely to internalize symptoms compared to their male counterparts and, therefore, the disorder is more difficult to detect (Quinn, 2005). ADHD in school-aged girls may not manifest as excessive and inappropriate motor activity but rather as emotional reactivity and

excessive speaking (Quinn, 2005). DuPaul et al. (2020) found that teachers and parents of children with ADHD rated girls as more likely to interrupt and speak over others. Boys with ADHD, on the other hand, were rated by parents and teachers as being more likely to have random outbursts of running and fidgeting when sitting (DuPaul et al., 2020).

Elkins et al. (2011) found that school-aged girls, diagnosed with the predominantly inattentive ADHD subtype, seemed to experience more anxiety, bullying, and academic difficulties compared to their male counterparts. School-aged girls with ADHD have also been found to demonstrate less aggressive behaviours in comparison to their male counterparts (Barkley, 2006). However, girls with ADHD tend to be more aggressive than girls their own age without ADHD (Barkley, 2006). Girls with ADHD have been found to be more frequently diagnosed with comorbid depression and anxiety than diagnosed with ADHD alone (Quinn, 2005). This difference in diagnosis may occur because physicians may more easily detect the symptoms of depression and anxiety (e.g., feelings of sadness and negative thought patterns) than the symptoms of ADHD (Quinn, 2005).

Leisure

The most common and simple definition of leisure is the participation of an individual in an enjoyable activity during one's free time away from obligations (Stebbins, 2018). The right to leisure, and meaningful and fulfilling leisure experiences, is a human right protected under the United Nations' *Universal Declaration of Human Rights* (Stumbo & Peterson, 2018; Veal, 2015). This section will begin by exploring definitions and key concepts of leisure (i.e., perceived freedom, self-determination, and intrinsic motivation). Lastly, the two main categories of leisure activities (i.e., active and non-active leisure) will be explored along with examples and a discussion of benefits of participation.

Definitions and Key Concepts of Leisure

The word leisure has historical roots in both the Latin word, *licere* (i.e., freedom), and the Greek word, *skole* (i.e., school) (Anderson & Heyne, 2012; Pieper, 1952). Leisure in Ancient Greece and Rome was perceived as the opportunity for the elite class to obtain spiritual knowledge through intellectual work (i.e., education) to become the best version of themselves (Anderson & Heyne, 2012; Pieper, 1952). This meaning of leisure transformed throughout history especially during the industrial revolution (Anderson & Heyne, 2012). However, the key concepts of self-actualization and freedom of choice have remained the same (Stebbins, 2018).

Leisure is currently defined as an activity that is freely chosen and performed by an intrinsically motivated individual (Stebbins, 2018). Perceived freedom, self-determination, and intrinsic motivation are three constructs that can be drawn from this definition of leisure. Perceived freedom is the notion that an individual believes they have the liberty of choice in the activities they participate in (Anderson & Heyne, 2012). Self-determination is defined as when an individual makes decisions independent from outside influences (Anderson & Heyne, 2012). This concept of self-determination closely relates to an individual's internal (or personal) locus of control (Iso-Ahola, 1980). For instance, an individual understands that they, themself, are responsible for their own behaviours (Iso-Ahola, 1980). Leisure, therefore, provides the opportunity for individuals to develop self-efficacy (Iso-Ahola, 1997). The last significant concept from this definition of leisure is intrinsic motivation. It is the inherent satisfaction and pleasure derived from participating in a leisure activity (Anderson & Heyne, 2012).

Categories of Leisure

There are several types of leisure activities that exist (e.g., serious leisure, project-

based, and casual leisure). Leisure can generally be divided into two distinct categories: non-active leisure and active leisure. The defining characteristics of non-active leisure and associated examples will be discussed in addition to benefits of participation. The defining characteristics and examples of active leisure will also be discussed along with benefits of participation.

Non-active leisure. Non- active, or passive, leisure can be defined as recreational activities that do not demand physical exertion of energy and often involve an element of enjoyment and/or relaxation (Stebbins, 2013). Examples of non-active leisure include traditional leisure activities based in creative arts and hobby projects such as painting, drawing, writing, knitting, and playing an instrument (Tinsley & Eldredge, 1995; Cho et al., 2018). These project-based leisure activities often involve an exertion of mental energy (i.e., cognitive stimulation) rather than physical energy (Stebbins, 2013; Tinsley & Eldredge, 1995). For example, arts-based leisure activities provide the opportunity for self-expression and the fulfillment of aesthetic experiences that cannot be typically fulfilled during daily life obligations (Tinsley & Eldredge, 1995). Arts-based leisure activities have also been found to support positive youth mental health and development (Oberle et al., 2019).

Creative leisure activities may provide the opportunity for children and adolescents to pursue the development of new skills (Oberle et al., 2019). For instance, children and adolescents may develop new artistic skills through painting and drawing and interpersonal communication skills through acting (Oberle et al., 2019). In addition, engagement in group activities may provide support systems for children and adolescents through the development of friendships with individuals who share similar interests and goals (Chang et al., 2018; Oberle et al., 2019). Group leisure activities may also provide the opportunity for individuals to deepen the connections of existing friendships (Chang et al., 2018).

Passive leisure further includes entertainment-based or digital activities such as watching television and movies, videogaming, social media usage, and internet browsing (Bolic et al., 2018; Roy & Orazem, 2021). Entertainment-based recreation is often referred to as sedentary leisure as it involves long time periods of sitting and minimal mental stimulation (Cho et al., 2018). Long periods of inactivity due to sitting have been linked to an increased risk for obesity which, in turn, can lead to additional health issues (Cook et al., 2015). However, digital leisure may provide children with additional opportunities to connect to their peers outside of school and extracurricular activities. For example, Holder et al. (2009) found that feelings of loneliness decreased in children through their internet usage. Overall findings from their study, however, suggested that passive leisure was negatively correlated with poor physical health while active leisure was positively correlated with good physical health.

Active leisure. Active leisure, often referred to as leisure-time physical activity, can be described as recreational activities that involve the use of both gross and fine motor skills and an expenditure of physical energy (Tinsley & Eldredge, 1995). A frequently defining characteristic of physical activity is that it involves an increase in heart rate from its resting level as the activity intensifies (Poulsen & Ziviani, 2004). A traditional example of active leisure is playing sports (Holder et al., 2009; Kelly, 2012). Active leisure also includes indoor and outdoor recreational activities such as gardening, walks in nature, dancing, and swimming (Tinsley & Eldredge, 1995). Playground games such as throwing and catching a ball, hide and seek, and tag are considered as active forms of leisure for children (Pfeifer et al., 2011).

Participation in active forms of leisure may have beneficial outcomes that promote optimal physical and mental health of individuals (Iso-Ahola, 1997). Active leisure has been found to be positively correlated with positive health and well-being of children, adolescents,

and adults (Holder et al., 2009). It has also been found to ameliorate the physical health of children through exercise (Holder et al., 2009). Active leisure may also improve the mental health of children through the experience of enjoyment and self-efficacy when engaging in physical activity (Holder et al., 2009).

The participation of children and adolescents in active leisure, especially in group settings, may have additional health protective benefits (Oberle et al., 2019). Oberle et al. (2019) found that school-aged youth between the grades four and seven, who participated in group active leisure, had greater levels of positive mental health and lower levels of negative mental health. For example, they found that the youth, who played on a recreational sports team, felt a stronger sense of belonging and had a lower risk for depressive symptoms than their peers who did not play on recreational sports teams (Oberle et al., 2019). An initial examination of the leisure experiences of school-aged youth with ADHD will be discussed in the following section.

Leisure and ADHD

The following section provides a brief discussion of how the leisure experiences of children with ADHD have been described in some research studies. It is an initial examination of the leisure activities that children with ADHD were found to participate in and potential reasons and motivating factors behind their participation are included.

It becomes evident when reading some of the existing literature on the leisure of children with ADHD that the concept of leisure as an activity has been ill-defined and interpreted in different ways by various researchers. For example, some researchers have described leisure as participation in activities of daily living (ADLs, Engel-Yeger & Ziv-On, 2011) that are defined as daily tasks or basic skills used to fulfill basic physical needs (Mlinac & Feng, 2016). Examples of ADLs include maintaining personal hygiene, eating, and dressing independently

(Mlinac & Feng, 2016). Other researchers have categorized leisure as active leisure such as the physical activities and sports played during recreation (Barfield & Driessnack, 2018; Harvey et al., 2014). Leisure has also been categorized by other researchers as non-active leisure or entertainment-based activities such as television watching and videogaming (Bolic et al., 2018; Kostyrka-Allchorne et al., 2020; Whalen et al., 2002). However, leisure has been traditionally defined as activity that is freely chosen through the intrinsic motivation of an individual (Stebbins, 2018). Leisure interpreted as an ADL does not fulfill the contemporary definition of leisure. For example, ADLs are not freely chosen by an individual and they are not motivated by the experience of enjoyment and pleasure of leisure (Stebbins, 2018).

These differences in definitions of leisure have led researchers to make contrasting conclusions on the leisure participation of children with ADHD. Some researchers have speculated that children with ADHD do not participate in active forms of leisure (Bolic et al., 2018; Kostyrka-Allchorne et al., 2020; Pfeifer et al., 2011). Others have found that these children do participate in active forms of leisure (Barfield & Driessnack, 2018; Harvey et al., 2014; Fogel et al., 2020; Shimoni et al., 2010).

The extent to which the leisure participation of children with ADHD has been addressed within the literature is unclear. It becomes challenging to examine the leisure participation patterns of children with ADHD when our understanding of their leisure is poor. Therefore, it was deemed necessary to determine the scope of the literature that has been produced on the topic. This scoping review aimed to address this gap that exists within the literature by examining the participation of children with ADHD in both non-active and active leisure activities. In addition, there was an attempt to provide a clearer and more cohesive picture of how children with ADHD leisure.

Non-Active Leisure and ADHD

Some researchers have suggested that children with ADHD prefer passive forms of leisure to active forms of leisure (Bolic et al., 2018; Kostyrka-Allchorne et al., 2020; Pfeifer et al., 2011). For example, they suggested that children with ADHD preferred activities such as computer gaming and watching television to activities such as traditional sports, cycling, and swimming (Bolic et al., 2018; Kostyrka-Allchorne et al., 2020; Pfeifer et al., 2011). For example, Bolic et al. (2018) found that boys with ADHD were less likely to participate in sports compared to their neurotypical peers. Girls with ADHD were more likely to engage in computer gaming in comparison to their neurotypical counterparts (Bolic et al., 2018).

Kostyrka-Allchorne et al. (2020) found that there may be a link between digital leisure use and symptom severity in children with ADHD. The children, who had many symptoms of comorbid emotional dysregulation and conduct symptoms, participated in increased digital leisure time. However, these children engaged in less screen time and more sports and physical activity when the severity of these symptoms decreased. Similarly, adolescents with ADHD with higher levels of symptom severity were found to engage in entertainment-based leisure (Whalen et al., 2002). Entertainment-based activities included activities such as watching television, playing video games, and general screen time use (Whalen et al., 2002). While children with ADHD engaged in non-active leisure, there was some conflicting evidence to suggest that children and adolescents with ADHD may prefer to participate or engage in active leisure.

Active Leisure and ADHD

Cook et al. (2015) found that children with ADHD were less likely than their neurotypical peers to participate in physical activity at least three times a week. They also found that comorbidity with other psychological disorders (e.g., learning disorders) may increase the

likelihood of inactivity in youth with ADHD (Cook et al., 2015). Harvey et al. (2007) also hypothesized that comorbidity may lead to greater problems with fundamental movement skill (FMS) performance which, in turn, may decrease the physical activity participation of children with ADHD (Harvey et al., 2009). This inactivity may increase the risk of obesity and other health-related issues for these children (Cook et al., 2015; Harvey et al., 2007). Similarly, Mercurio et al., (2021) found that children with ADHD were less likely to fulfill the recommended 60 minutes of daily physical activity. Girls with ADHD were reported to have the lowest rates of daily physical activity when compared to boys with ADHD and neurotypical peers (Mercurio et al., 2021).

The lack of participation in active leisure of children with ADHD may be attributed to several different factors. A significant factor is that children with ADHD experience poor FMS performance (Harvey et al., 2009). Children with ADHD, due to their poor FMS performance, often experience difficulties with participation in physical activities and sports (Harvey et al., 2009). The experience of poor FMS performance that leads to these difficulties during physical activities may be caused by the deficits in executive function, particularly in relation to motor control, discussed earlier within this chapter (Barkley, 2006). In addition, it has been found that children with ADHD often experience social exclusion during physical activity because of these difficulties in self-regulating behaviours (Harvey et al., 2009). Exhibition of poor social skills by children with ADHD may also contribute to the social exclusion experienced during physical activity (Harvey et al., 2007; Harvey et al., 2014). These negative physical activity experiences may, therefore, lead children with ADHD to avoid participating in sports and other active forms of leisure (Harvey et al., 2007; Harvey et al., 2009; Poulsen & Ziviani, 2004).

There is, however, research that suggests that children with ADHD do participate and enjoy active leisure regardless of the difficulties experience during participation. Several studies have examined the frequency of participation in physical activity of youth with ADHD. These studies have found that youth with ADHD participate in physical activity at a similar frequency to youth without ADHD (Fogel et al., 2020; Shimoni et al., 2010).

Barfield and Driessnack (2018) found that children with ADHD participated in active forms of leisure alone and with others, especially outdoors. Some of the active leisure pursuits of the children included participation in traditional sports, swimming at a pool or beach, and playing at the park (Barfield & Driessnack, 2018). The predominant motivating factor behind their participation was the enjoyment they experienced during the activities. Similarly, Harvey at al. (2014) found that children with ADHD engaged in active forms of leisure such as playing pitch and catch, riding bikes, skating, and hide and seek. They found that the motivating factors behind the children's engagement in physical activity included enjoyment and developing and nurturing friendships (Harvey et al., 2014).

Participation in active leisure activities has been found to have a positive effect on the mental health and moods of children and adolescents with ADHD. For instance, Gawrilow et al. (2016) found that an increase in physical activity participation led to a decrease in negative affect for children with ADHD. More specifically, participation in active leisure activities led to a decrease in feelings of depression for children with ADHD. These researchers found the largest effect of physical activity on mental affect occurred for children with the predominantly hyperactive-impulsive ADHD subtype. These children reported virtually no feelings of depression when they engaged in longer periods of physical activity than they typically engaged in. However, they reported feelings of depression after having participated in little to no physical

activity. Kiluk et al. (2009) also found that leisure-time physical activity may be associated with a decrease in feelings of anxiety and depression in children with ADHD. More specifically, they found that children with ADHD, who played at least three sports, experienced fewer symptoms of depression and anxiety than children with ADHD who played less than three sports (Kiluk et al., 2009). Similarly, Koch et al. (2022) found that adolescents with ADHD, regardless of subtype, experienced an increase in positive affect after engaging in physical activity. Adolescents with the combined subtype, however, experienced the greatest increase in positive affect and decrease in negative affect post physical activity participation (Koch et al., 2022).

Scoping Reviews

Literature reviews are conducted and used by researchers to examine how existing literature on a particular topic has been studied for a specific phenomenon (Grant & Booth, 2009). Literature reviews allow researchers to determine what has been accomplished within their field of study prior to beginning a new research study (Grant & Booth, 2009). A literature review can be conducted as a stand-alone study or act as a preliminary step before conducting an original study (Arksey & O'Malley, 2005, Grant & Booth, 2009).

A scoping review is a type of literature synthesis that aims to broadly identify key concepts that have been examined and existing data that have been collected within a particular subject of a field of study (Arksey & O'Malley, 2005). This form of review often examines a broad research topic and includes studies of differing research designs and methodologies (Arksey & O'Malley, 2005). The four common purposes for conducting a scoping review include: (1) to determine the extent and types of research already done, (2) as a preliminary step before conducting a systematic review, (3) to summarize and present existing research findings to stakeholders, and (4) to identify research gaps (Arksey & O'Malley, 2005). The *Arksey and*

O'Malley Framework (2005) was the first methodological framework that outlined the necessary stages for conducting a scoping review. The six stages of this framework are described below.

Arksey and O'Malley Framework

The aim of the *Arksey and O'Malley Framework* for scoping reviews (Arksey & O'Malley, 2005) is to broadly identify how a particular phenomenon has been examined through the existing literature. The framework consists of a six-stage process that aids the researcher to identify all relevant literature and the key concepts that have been studied thus far. The six stages are as follows: (1) identifying the research question, (2) identifying relevant studies, (3) selecting studies (4) charting data, (5) collating, summarizing, and reporting results, and (6) consulting with stakeholders.

The research question is identified, and search parameters are defined in the first stage of the framework (Arksey & O'Malley, 2005). It is important for the researcher to maintain a broad scope when creating and communicating the research question (Westphaln et al., 2021). This approach ensures that the researcher will not limit the search parameters needed for the following stage (Arksey & O'Malley, 2005). It is recommended to consider the specific population and context(s) in relation to the study purpose when refining the research question (Daudt et al., 2013). The goal of the second stage is to identify all relevant studies by searching through databases, reference lists, and hand searches of key journals in the field of study (Arksey & O'Malley, 2005). This stage also requires the researcher to establish a range of years for publication and key search terms that will be used in the researcher's search strategies (Arksey & O'Malley, 2005). Levac et al. (2010) recommended using a team-based approach during the study selection process that includes individuals with content and methodological expertise.

Studies are then selected for the third stage based on the inclusion and exclusion criteria that are specifically set to identify important study characteristics (Arksey & O'Malley, 2005). Two reviewers independently apply the inclusion and exclusion criteria to the study abstracts. The reviewers together select the final articles that will be read in depth during the following stage. A third reviewer may be brought to review the selected studies if any disagreements occur (Levac et al., 2010). The data are then retrieved from the selected articles and charted during the fourth stage by using either a narrative or descriptive-analytical approach. For example, the team of reviewers create a data charting form that includes key themes, general information about the studies, and specific information related to the research question (Daudt et al., 2013). Levac et al. (2010) recommended that each reviewer charts the data from the first 5- 10 studies individually before meeting to ensure consistency during this process.

The fifth stage is when the results of the data charting stage are collated, summarized, and reported (Arksey & O'Malley, 2005). Data is quantified to generate a descriptive numerical summary and a thematic analysis is conducted to guide the interpretation of the predetermined categories related to the research question. The results of the descriptive numerical summary are presented in charts and graphs while the textual information for each theme is presented in table form. The six and final stage involves a consultation exercise with stakeholders and is considered optional (Arksey & O'Malley, 2005). However, Levac et al. (2010) and Daudt et al. (2013) suggested this exercise to be a necessary step to evaluate the accuracy of findings by stakeholders who are professionals within a field. No directives are given as to when or how this consultation process is conducted (Levac et al., 2010). The actual process, and which persons are considered as stakeholders is, therefore, at the discretion of the researchers (Daudt et al., 2013).

Quality Assessment

The inclusion of a quality assessment within this scoping review seems timely and appropriate because the scope and methodological quality of existing research on the leisure participation of children and adolescents with ADHD has not yet been determined. A quality assessment of research methodology is a tool that allows researchers to evaluate the quality and rigour of the evidence found through a literature synthesis (Sirriyeh et al., 2012). Quality assessments are a crucial step during some literature syntheses such as a meta-analysis or systematic review (Sirriyeh et al., 2011). It is not a typical or common element of a scoping review due to the broad nature of its research objectives and questions (Arbour-Nicitopoulos et al., 2018). However, quality assessments have been used lately in combination with scoping reviews by some researchers to evaluate the strength of research when methodological rigour is unknown or inconsistent (Arbour-Nicitopoulos et al., 2018; Glegg et al., 2014; Orr et al., 2021). For example, Glegg et al. (2014) suggested that a quality assessment should be conducted within a scoping review to allow researchers to determine the extent of research that has been conducted on a specific topic and help guide how future research should proceed, especially with reference to research designs.

Glegg et al. (2014) used the Arksey and O'Malley Framework to conduct a scoping review on the use of the virtual reality system, GestureTek, during physical and cognitive rehabilitation. They included a quality appraisal rating for each selected study adapted from the systematic review methodology of the American Academy for Cerebral Palsy and Developmental Medicine (AACPDM, Glegg et al., 2014). Arbour-Nicitopoulos et al. (2018) also included a quality assessment tool within their scoping review using the Arksey and O'Malley Framework. They used the Quality Assessment Tool for Studies with Diverse Designs

(QATSDD, Sirriyeh et al., 2012) to evaluate the methodological strength of the studies found on inclusive extracurricular physical activity programs for youth with physical disabilities (Arbour-Nicitopoulos et al., 2018). Similarly, Orr et al. (2021) utilized the QATSSD within their scoping review about inclusive extracurricular physical activity programs for youth with social and cognitive impairments. These researchers provided recommendations for either best practices or effective approaches with future research because of the ratings obtained from the quality assessments (Arbour-Nicitopoulos et al., 2018; Glegg et al., 2014; Orr et al., 2021).

The QATSDD (Sirriyeh et al., 2012) has been previously used alongside the Arksey and O'Malley Framework for Scoping Reviews (2005) within the field of APA (Arbour-Nicitopoulos et al., 2018; Orr et al., 2021). Therefore, it was incorporated within the current scoping review to evaluate the methodological rigour of the studies found about the leisure participation of children and adolescents with ADHD. The QATSDD is a 16-item quality assessment tool that allows for the evaluation of the strength and rigour of quantitative and qualitative research as well as mixed methods studies (Sirriyeh et al., 2012). Sirriyeh et al. (2012) found the QATSDD exhibited interrater (κ= 71.5%) and test-retest reliability for evaluating rigour across various research designs and methodologies. In addition, content validity was determined by academic and health researchers and experts from the York Centre for Reviews and Dissemination.

The QATSDD consists of 12 general items applicable to most research designs, two additional items specific to quantitative research designs only, and two additional items specific to qualitative research designs only (Sirriyeh et al., 2012). Therefore, 14 items are applied to either quantitative or qualitative research methods studies respectively and all 16 items are applied to mixed methods research studies. Each of the test items are given a rating from 0-3 and percentages are calculated using the highest score possible. For example, a perfect score on

the QATSDD for a qualitative study would be 42 (i.e., a score of 3 for each of the 14 applicable items). A percentage of 66.7% would be given to a qualitative study that scored 28 out of a possible 42 total points (i.e., a score of 2 for each applicable item). Arbour-Nicitopoulos et al. (2018) and Orr et al. (2021) also provided descriptors for the strength ratings that ranged from low (less than 60%) to medium (between 60 and 79%) to high (greater than 80%). These descriptors were arbitrarily determined through discussions between reviewers (Arbour-Nicitopoulos et al., 2018; Orr et al., 2021). Findings on the strength and rigour of existing research methodology may provide insights and recommendations for the development of future research about the leisure participation of children and adolescents with ADHD.

Chapter 3

Method

The purpose of this study was to determine the extent of research on the leisure participation of children and adolescents with ADHD and associated research methods. The two guiding frameworks of this study included the Arksey and O'Malley framework for scoping reviews (2005) and the Quality Assessment for Studies with Diverse Designs (QATSDD, Sirriyeh et al., 2012) for evaluating the methodological strength of selected studies.

Philosophical Foundations

The current scoping review was grounded in a pragmatic paradigm. This paradigm helped to guide the research team in their examination of the research surrounding the leisure participation of children and adolescents with ADHD and associated research methods. This scoping review aligned with a pragmatist ontology where reality is created through individual experiences and therefore changes with time (Creswell & Plano Clark, 2018). Knowledge, in turn, is constructed through shared social experiences and has practical implications in the real world (Weaver, 2018). Therefore, the beliefs and experiences of the researchers of the current scoping review also informed the construction and interpretation of knowledge of the study. The aim of this scoping review was to gain a better understanding of the leisure experiences of school-aged youth with ADHD through the knowledge created by others and as interpreted through our research team.

Arksey and O'Malley Framework

This scoping review was conducted using the Arksey and O'Malley framework including adaptations suggested by Levac et al. (2010). The framework consists of six stages that helped to identify relevant literature and key concepts in a particular field of research (Arksey &

O'Malley, 2005). The six stages were as follows: (1) identifying the research question, (2) identifying relevant studies, (3) selecting studies (4) charting data, (5) collating, summarizing, and reporting results, and (6) consulting with stakeholders (Arksey & O'Malley, 2005).

Identifying the Research Question

The first stage of the Arksey and O'Malley Framework (2005) involved identifying the research question that guided the study. The research question must be broad in nature to ensure that the search parameters developed and used within the next stage were not limited (Westphaln et al., 2021). Hence, the following overarching research question guided this investigation and established the broad topics that were explored: What is known about the leisure participation of children and adolescents with ADHD? Additional sub-questions were used to help to define the scope of this study and provided clear direction through the provision of parameters of interest (Levac et al., 2010). The following sub-questions were, therefore, posed: (1) How do the operational definitions of leisure relate or differ across studies about children and adolescents with ADHD? (2) What forms of non-active and active leisure do children and adolescents with ADHD participate in? (3) Where do children and adolescents with ADHD leisure? (4) Who do children and adolescents with ADHD leisure with? (5) What types of research methods have been used to examine the leisure participation of children and adolescents with ADHD? (6) What are the quality indicators of the leisure research performed to date for children and adolescents with ADHD?

Identifying Relevant Studies

The objective of the second stage of the framework was to identify relevant studies. This involved a search through databases, citation chasing using reference lists, and a hand search of key journals of the field of study (Arksey & O'Malley, 2005). This stage also required the

research team to establish a range for publication years and key search terms that were used in the researcher's search strategies (Arksey & O'Malley, 2005). A team-based approach, that includes individuals with content and methodological expertise, is recommended (Levac et al., 2010). Therefore, the search strategy for this scoping review was developed through consultation with a reference librarian and discussions between the research team members.

Key search terms related to leisure, physical activity, youth, and ADHD were used for the search strategies (See Appendix A, Table 1 for complete search strategy). The following databases were searched: PsycINFO, SportDiscus, Web of Science, Sports Medicine and Education Index, and MEDLINE. Two other methods were also employed to find additional studies related to the leisure participation of school-aged youth with ADHD that may have not been included in the database searches. Citation chasing was employed by utilizing the reference lists of selected articles and the hand searching of the following key journals: *Adapted Physical Activity Quarterly*, *Therapeutic Recreation Journal*, and *Journal of Attention Disorders*.

Selecting Studies

Studies that addressed the research questions were selected based on established inclusion and exclusion criteria for the third stage of the Arksey and O'Malley framework (2005). The set of inclusion and inclusion criteria that were used to select studies were established prior to the start of the searches. The following inclusion and exclusion criteria were used to select studies relevant to the leisure participation of children and adolescents with ADHD:

1) Only articles published in English were included.
2) Articles from all years of publication were included.

3) Only peer-reviewed articles published in academic journals and dissertations were included. Grey literature was not included for study selection (e.g., reports, conference presentations).
4) The articles that were selected must have included children and adolescents with ADHD between the ages of 5 and 18 years.
5) Researchers must have studied the participation of children and adolescents with ADHD in leisure activities.
6) Studies that required periods of physical education were excluded.

The selection of studies is an iterative process that may involve modifications to the inclusion and exclusion criteria and the variables (i.e., data) to be extracted in the next stage (Levac et al., 2010). Levac et al. (2010), therefore, recommended researchers apply a systematic and team-based approach to ensure that the process is transparent, replicable, and upholds methodological rigour. Hence, the inclusion and exclusion criteria were established through discussion between members of the research team. These criteria were also reviewed by the research team throughout the study selection process and modified when necessary. The inclusion and exclusion criteria were first applied to study abstracts by the principal investigator (PI) to determine relevancy to the established research questions (Arksey & O'Malley, 2005; Levac et al., 2010). The selected studies were read in full by the PI to evaluate whether the studies fulfilled the criteria for final study selection (Arksey & O'Malley, 2005; Levac et al., 2010).

The process of selecting studies that fulfilled the inclusion and exclusion criteria of this current scoping review also involved the use of two software. The first software used was Endnote. It is a reference management software that was used to export articles and remove

duplicates prior to the application of the inclusion and exclusion criteria. The removal of duplicates followed the Bramer et al. (2016) systematic three-stage process that involved the customization of settings on a draft file before completing the final de-duplication. The second software that was used is Rayyan. It is a web-based software intended to aid in the study selection process of a knowledge synthesis (Ouzzani et al., 2016). The keyword function of Rayyan was used to identify and set keywords for inclusion and exclusion of studies during the study selection process (Ouzzani et al., 2016). Suggested keywords were first generated by the software but were subject to refinement by the PI before applying the final criteria (Ouzzani et al., 2016). The keyword function of the software was also used to review and, subsequently, apply the inclusion and exclusion criteria to study titles and abstracts.

Charting the Data

The fourth stage of the Arksey and O'Malley framework (2005) was named charting the data. It involved the identification and extraction of relevant information that was charted into categories to help answer the research questions. The data extraction and charting process was completed using a narrative and/or descriptive-analytical approach (Arksey & O'Malley, 2005). For example, the research team created a data charting form that included categories that were related to the research questions and descriptive information that were obtained about the studies (Daudt et al., 2013). These categories were later renamed as themes during the thematic analysis in stage five of the Arksey and O'Malley framework (e.g., collating, summarizing, and reporting).

This fourth stage involved an iterative process where researchers returned to the form and updated both the categories and data as needed (Levac et al., 2010). The data charting was completed twice by the PI to ensure trustworthiness. The first phase of data charting involved

reading each of the selected studies and extracting the information for each of the categories. The second phase of data charting involved exploring the categories individually and confirming the existing data extraction. Data was updated if new information or details were found during this phase. Levac et al. (2010) recommended that the data extraction and charting process be completed by two reviewers to ensure consistency and alignment with the study's purpose and research questions. Therefore, a member of the research team with research knowledge of ADHD and leisure reviewed and confirmed the accuracy of the data charted by the PI.

Categories were derived from the key themes of the research sub-questions: (1) definitions of leisure, (2) forms of leisure, (3) context of leisure participation, (4) research methods, and (5) quality assessment (See Appendix B, Table 2 for full list of categories). Additional categories, including sub-categories, were developed during the charting process if necessary (Levac et al., 2010). For example, descriptive information about the studies included study characteristics such as names of authors, years of publication, study participants, methodology, and results (Arksey & O'Malley, 2005). The data charting form also included a column for the QATSDD scores the in form of percentages and descriptors of strength (i.e., low, medium, high) as performed by Arbour-Nicitopoulos et al. (2018) and Orr et al. (2021).

Collating, Summarizing, and Reporting Results

The results of the data charting were collated, summarized, and reported in the fifth stage (Arksey & O'Malley, 2005). The data and relevant information that were extracted about key themes were analyzed and interpreted to answer the overarching research question and associated sub-questions. Key themes were derived from the categories from the data charting form of the previous stage (e.g., stage four of the Arksey & O'Malley framework). Data were quantified to generate a descriptive numerical summary and a thematic analysis was conducted to guide the

interpretation of the deductive themes related to the research questions. The results of the descriptive numerical summary are presented in charts and graphs while the textual information for each of the themes are presented in table form.

The descriptive numerical summary is a presentation of findings on specific study characteristics using descriptive statistics (Levac et al., 2010). These specific characteristics typically include the number of studies selected, years of publication, research methods used, population characteristics, and the countries of origin where the studies were conducted (Arksey & O' Malley, 2005). The thematic analysis helped to answer both the overarching research question and sub-questions in depth by coding the data and organizing the codes into the broader themes (Arksey & O'Malley, 2005). The broader themes directly related to the sub-questions about how children and adolescents with ADHD participated in leisure activities and the research methods that were used to study their participation. It was strongly recommended that researchers consider the broad implications of their findings in relation to research, practice, and policy while analyzing and presenting the findings (Levac et al., 2010).

The deductive themes, related to the research questions, that guided the thematic analysis of this scoping review included: (1) definitions of leisure, (2) forms of leisure, (3) context of leisure participation, (4) research method, and (5) quality assessment. Definitions of leisure included how study author(s) defined leisure. Forms of leisure described the types of leisure activities (i.e., non-active or active leisure) that the children and adolescents with ADHD were reported to have participated in. Context of leisure participation included information on the types of settings (i.e., environment) that children and adolescents with ADHD leisured in and whether they participated in leisure activities alone or in groups. The theme of research method encompassed various elements of each study including the use of specific types of research

methods, designs, and analyses. The theme of quality assessment encompassed assessment indicators (i.e., percentage scored) and descriptors of methodological strength for the quality assessment of each study (i.e., low, medium, or high).

Consulting with Stakeholders

A consultation exercise with stakeholders was the sixth and final stage of the Arksey and O'Malley framework (2005). It was considered optional in the original framework (Arksey & O'Malley, 2005). However, Levac et al. (2010) and Daudt et al. (2013) suggested the consultation exercise is a necessary and important step that should be included in a scoping review. Therefore, a consultation exercise with stakeholders was considered for the present scoping review. No directives within the Arksey and O'Malley framework (2005) are given as to when or how this consultation process should occur (Levac et al., 2010). Hence, it is our intention to complete the stakeholder consultation after the scoping review has been completed. The actual consultation process, and who is included as a stakeholder, is also at the discretion of the researchers (Daudt et al., 2013).

The objective of a consultation exercise with stakeholders is to evaluate the accuracy of preliminary findings by asking the opinions of professionals or experts in the associated field (Levac et al., 2010). Stakeholders are asked to provide feedback on the preliminary findings from stage five of the framework (e.g., collating, summarizing, and reporting) and recommendations for knowledge translation (Levac et al., 2010). A minimum of two stakeholders from the fields of adapted physical activity and therapeutic recreation are expected to serve as stakeholders for the current scoping review. A summary of the results and discussion will be shared with stakeholders through an oral presentation followed by a guided discussion

where stakeholders will be asked to share their thoughts and opinions with the research team (Michaud, 2021).

Quality Assessment for Studies with Diverse Designs

Researchers can evaluate the quality and rigour of the evidence found through a literature synthesis by performing a quality assessment of research methodology (Sirriyeh et al., 2012). The current scoping review included the addition of a quality assessment tool, the Quality Assessment Tool for Studies with Diverse Designs (QATSDD, Sirriyeh et al., 2012), to evaluate the research methods used within the selected studies (See Appendix C, Table 3).

The QATSDD is a 16-item questionnaire that allows for the assessment of the methodological strength of quantitative, qualitative, and mixed methods research designs (Sirriyeh et al., 2012). It is comprised of 16 items that pertain to elements of research methods. For example, the QATSDD includes items concerning the data collection process, presence of research questions and objectives, and descriptions of sample size and population demographics. There are also items that specifically address the fit between the study's research questions and the data collection methods and analysis. There are 12 items of this assessment tool that are applicable to all studies, with two additional items that are particular to quantitative research studies and two additional items specific to qualitative research studies. Thus, 14 out of the total 16 items are applied to quantitative and qualitative research studies respectively. All 16 items are, however, applied to mixed methods research studies (Sirriyeh et al., 2012). See Appendix C to view the QATSDD (Sirriyeh et al., 2012).

Each selected study was explored with the QATSDD and each assessment question was assigned a score from 0 to 3 by the PI (Sirriyeh et al., 2012). The total score obtained for each study was converted into a percentage (Sirriyeh et al., 2012). The assessment indicator (i.e.,

percentage) is obtained by dividing the total score calculated for an individual study by the respective number of items (i.e., highest score possible on the quantitative, qualitative, or mixed methods QATSDD test items). The highest score possible on the QATSDD is 42 for studies of qualitative and quantitative research studies respectfully (i.e., a score of 3 for each of the 14 applicable items). The highest score for studies using mixed methods research is 48 (i.e., a score of 3 for all the 16 items). For example, a percentage of 83.3% would be given to a qualitative study that scored 35 out of a possible 42 total points. However, a mixed methods study would be given a percentage of 72.9% if the score is 35 out of a possible 48.

Scores from the QATSDD for each of the selected studies was included as a category in the data charting form (e.g., stage four of the Arksey & O'Malley framework). The descriptor of methodological strength was also included alongside total percentages on the form (e.g., Arbour-Nicitopoulos et al., 2018; Orr et al., 2021). Studies that scored less than 60% were assigned the strength descriptor of "low" (Arbour-Nicitopoulos et al., 2018; Orr et al., 2021). Studies that scored between 60-79% were assigned the strength descriptor of "medium" (Arbour-Nicitopoulos et al., 2018; Orr et al., 2021). Studies that scored 80% and above were assigned with the strength descriptor of "high" (Arbour-Nicitopoulos et al., 2018; Orr et al., 2021). A discussion of the assessment indicators (i.e., percentage scored) and descriptors of methodological strength were included within the category of quality assessment.

Chapter 4

Results

The purpose of this study was to determine the extent of research on the leisure participation of children and adolescents with ADHD and associated research methods. The scoping review was conducted in alignment with the Arksey and O'Malley framework (2005) and associated recommendations (Levac et al., 2010). Results from the study selection process and the data charting phase are presented in this chapter. The data, extracted from the selected studies, were utilized to produce a descriptive numerical summary and conduct a thematic analysis to answer the overarching question and sub-questions of this study. A quality assessment was also conducted for each of the 25 studies (Sirriyeh et al., 2012).

The study selection phase began with 7,297 studies where 7,296 studies were identified by the primary investigator (PI) through the established database search strategy. One study was identified through the hand searching of key journals. The total number of studies was reduced to 5,359 studies as 1,938 studies were removed during the de-duplication process. An additional 823 studies were excluded as they were either classified as review studies, book chapters or grey literature (i.e., conference papers and editorials). A visual representation of the study selection process can be found in Figure 1 (see Appendix D).

The remaining 4,536 studies were screened by the PI to evaluate whether the studies fit the study inclusion criteria that were established by the research team. The title, abstract, and keywords of each study were first assessed for fit with the inclusion criteria by the PI. This process resulted in the exclusion of 4,479 studies as they did not fit the inclusion criteria. The methods sections of the remaining 57 studies were then reviewed so that a decision could be made concerning the eligibility for each study. This process resulted in the exclusion of an

additional 22 studies. The remaining 35 studies were then subsequently read in full to confirm their eligibility for the study and an additional 10 studies were excluded. Lastly, the inclusion of the final 25 studies was confirmed by a second research team member who has extensive knowledge and experience in ADHD and leisure. These studies were utilized for analysis in this scoping review.

Data from the 25 studies were charted by the PI based on categories established by the research team (Arksey & O'Malley, 2005). The results from the data charting categories are presented in this chapter through five overarching categories: (1) study characteristics, (2) participant information, (3) research methods, (4) leisure participation, and (5) quality assessment. These results were used to generate a descriptive numerical summary and categories were transformed into themes for interpretation during the thematic analysis to ultimately answer the research questions of this study (Arksey & O'Malley, 2005). A complete summary of these studies can be found in Table 4 (see Appendix E). The graphs and tables of the descriptive numerical summary can be found in Appendix F.

Study Characteristics

The category of study characteristics included descriptive information taken from the data charting categories of authors, years of publication and countries of university affiliation of the first author. The years of publication of the 25 studies ranged from the earliest publication in 2004 with the latest publication in 2022. Most studies were published between 2010 and 2021 (See Appendix F, Figure 2 for a list of years of publications). The country of university affiliation of first author can be observed in Figure 3 in Appendix F. Most publications were from the United States (n = 9), followed by Turkey and Canada (n = 3 respectively).

Participant Information

The category of participant information included information related to study sample size, followed by the age, biological sex, diagnosis, and comorbidities of the participants from the studies included for this scoping review (See Appendix F, Tables 4 & 5).

Sample Size. Five studies had small sample sizes (n = 10-32 participants). The smallest sample size of the 25 studies was 10 children in a mixed methods study that incorporated fundamental movement skills assessments and semi-structured interviews (i.e., Harvey et al., 2014). Three studies had medium sample sizes (n = 50-58). Thirteen studies had large sample sizes (n = 100-1,243 participants). Lastly, there were four population-based studies with very large sample sizes (n = 34,675-68,634). The largest sample size was 68,634 children in a national survey concerning children's health (i.e., Lingeneni et al., 2012).

Age and Biological Sex. The ages of the participants ranged from 5-18 years. The narrowest age range of a study was a sample of children between 9-10 years (i.e., Harvey et al., 2014). The widest age range of a study was a sample of school-aged youth between 5-18 years (i.e., Swansburg et al., 2021). Twelve out of 25 studies had samples of children only (5–12 years). One study had a sample of adolescents between 12-18 years only (i.e., Bolic Baric et al., 2018). The remaining 12 studies had samples with both children and adolescents (5–18 years).

The subcategory of biological sex included studies where either a mixed sample of males and females or all-male samples were recruited. Both males and females were included in 20 out of the 25 studies. Three studies consisted of all-male samples of children and adolescents with ADHD. The biological sex of the sample was not specified in the remaining two studies. However, the proportion of males and females was discussed as a covariate during statistical

analysis and results in these two latter studies (i.e., Acevado-Polakovich et al., 2007; Holton & Nigg, 2020).

Diagnosis and Comorbidity. There were varying proportions of ADHD and/or comorbid disorders identified for the school-aged youth included in the samples of the selected studies. The samples of the studies consisted of either exclusively school-aged youth with ADHD, a combination of school-aged youth with and without ADHD, or a combination of school-aged youth with ADHD and youth with other psychological disorders. More specifically, a sample of children and adolescents with and without ADHD was utilized in 17 out of 25 studies. Five studies had a sample consisting exclusively of children and adolescents with ADHD. There were a mixed sample of children and adolescents with ADHD and children and adolescents with other psychological disorders, such as ASD and DCD, in the remaining three studies.

Children and adolescents were diagnosed with ADHD by a qualified medical professional or identified through a parent-report questionnaire. Eleven studies specified that the youth with ADHD had a formal clinical diagnosis of ADHD made by a medical professional or team of professionals. For example, the professionals in these 11 studies were generally classified as either a team of clinicians (n = 5) or specifically identified as child psychiatrists (n= 4), pediatricians (n= 1), or neurologists (n= 1). Parent reports were used exclusively to determine the presence of ADHD symptoms in six studies. The results for the parent reports of ADHD were obtained through diagnostic questionnaires such as the Swanson, Nolan, and Pelham questionnaire (SNAP-IV, Swanson et al., 2001), the revised Conners' Parent Rating Scale (CPRS-r, Connors et al., 1998), and the Kiddie Schedule for Affective Disorders and Schizophrenia for DSM-V (K-SADS-5, Kaufman et al., 2016).

Researchers used a combination of a formal clinical diagnosis and a parent diagnostic questionnaire(s) in five studies. Researchers did not specify how the diagnosis of ADHD of the participant samples was performed in the remaining three studies. However, the researchers either referenced the DSM-IV or DSM-V criteria for ADHD (n= 1), mentioned that medical records were reviewed for clinical diagnosis (n= 1) or utilized a combination of both these methods (n= 1).

The presence of comorbidity in the samples was either purposefully excluded, included, or not reported at all. For example, only participants with ADHD were included in five out of 25 studies. The presence of comorbidity within the ADHD samples were reported in seven out of 25 studies. These comorbid disorders included depression, anxiety, learning disabilities, autism spectrum disorder (ASD), developmental coordination disorder (DCD), and internet addiction. Lastly, there were 13 studies that did not report the presence of any comorbidities.

Research Method

The category of research method included information related to the specific types of research methods, designs, and analyses that were conducted in the selected studies (Creswell, 2014). Types of research method(s) referred to (a) whether the studies were classified as quantitative, qualitative, or mixed methods research studies and associated philosophical worldviews and theoretical frameworks, (b) research designs, (c) procedures and instruments used to obtain the data, and (d) analytical techniques used to interpret the data (i.e., statistical analysis, content or thematic analysis, etc.).

Quantitative. Twenty-one out of 25 studies were classified as quantitative research where survey questionnaires were used in each investigation. Philosophical worldviews and theoretical frameworks were not mentioned in these quantitative studies. However, we presume

that authors employed a post-positivist worldview during the research process (Tamminen & Poucher, 2020). Studies were categorized as cross-sectional (n = 19), retrospective cross-sectional (n = 1), and longitudinal (n = 1) research designs. For example, data were retrieved from national surveys in two cross-sectional studies (i.e., Lingenini et al., 2012; Mercurio et al., 2021). Online questionnaires were utilized to collect data in two studies as they occurred during the COVID-19 pandemic lockdowns (i.e., Swansburg et al., 2021; Werling et al., 2021). The questionnaire topics varied by specific study purpose and either focused on participation in leisure activities (e.g., videogaming, arts and crafts, and sports) or general lifestyle habits (e.g., diet, sleep, screen time, and physical activity). Parents completed survey questionnaires about their child's leisure participation or lifestyle habits in 13 out of 21 quantitative studies. Both parents and their children completed questionnaires in five studies. Children and/or adolescents completed questionnaires by themselves in only three studies. The analytical techniques in the quantitative studies ranged from correlations, t-tests, ANOVAS, and regressions.

Qualitative. There were two studies classified as qualitative research (i.e., Barfield & Driessnack, 2017; Coussens et al., 2020). The researchers of these studies did not disclose their philosophical worldviews. However, the researchers of both studies did include the theoretical frameworks in which their studies were grounded. For example, the authors of one study utilized Bronfenbrenner's Bioecological Model of Human Development (Bronfenbrenner & Morris, 2006) to guide their research (Barfield & Driessnackk, 2017). While the authors of the second study utilized the Development Consolidated Criteria for Reporting Qualitative Research (COREQ; Tong et al., 2007) to guide their research (Coussens et al., 2020). The researchers employed phenomenological research designs through the use of semi-structured interviews, with an added artistic component, to gather the data in these two studies. Researchers utilized

draw-and-tell conversations in one study where children with ADHD were asked to draw activities that brought them joy (e.g., Barfield & Driessnack, 2017). Researchers used photo elicitation interviews in the other qualitative study to gather information on the physical activity participation and preferences of children with developmental disorders from three different subsets of the sample (i.e., ADHD, ASD, and DCD; Coussens et al., 2020). Data from the draw-and-tell interviews were interpreted using qualitative content analysis (i.e., Barfield & Driessnack, 2017). Data from the photo elicitation interviews were interpreted through a thematic analysis (e.g., Coussens et al., 2020).

Mixed Methods. There were two studies classified as mixed methods research (i.e.. Harvey et al., 2009; Harvey et al., 2014). Philosophical worldviews of authors were not included in either of the mixed methods studies. However, the theoretical frameworks that the authors used to interpret their research was included in one of the studies. For example, the knowledge-based approach (Wall et al., 1985) and the inhibitory model of executive function (Barkley, 1997) were used together in one mixed methods study (Harvey et al., 2009). The researchers employed concurrent mixed methods designs. More specifically, they used a combination of fundamental movement skill assessments such as the Test of Gross Motor Development (TGMD-2, Ulrich, 2000) and the Movement Assessment Battery for Children (MABC-2, Henderson et al., 2007) and semi-structured interviews to collect the data in both these studies. Researchers used concurrent scrapbook interviews in one of the two studies to stimulate the children's recall and reflection of their physical activity experiences (i.e., Harvey et al., 2014). Descriptive statistics and thematic analyses were used to interpret the results for both mixed methods studies.

Leisure Participation

The category of leisure participation included information related to the operational definitions of leisure provided by the researchers who conducted the studies selected for this scoping review. It also includes information related to the leisure activities, leisure places, and leisure partners of the children and adolescents with ADHD within the 25 selected studies.

Leisure definitions. Definitions of leisure were not frequently provided within the 25 studies. No definition for leisure was provided in 15 out of 25 studies. A formal definition for leisure was provided in only two out of 25 studies where leisure was referred to as being either simply an activity or an activity that occurs during a child or adolescent's free time outside of school (e.g., Bolic Barac et al., 2018; Kietglaiwansiri & Chonchaiya, 2018).

Definitions were provided for types of leisure-related activities in eight out of the 25 studies which included recreational activities, informal physical activities, participation in life events, types of play, and lifestyle behaviours. Recreational activities were generally defined as preferred activities outside of school, with some definitions including enhanced well-being as an additional component of leisure (i.e., Cowart et al., 2004). Informal physical activities were defined as physical activities that occurred during a child's free time and outside of organized sports (i.e., Harvey et al., 2014; Tandon et al., 2019). Participation in life events was defined using the International Classification of Functioning, Disability and Health (WHO, 2001) and included physical, recreational, social, skill development, and self-improvement activities (i.e., Coussens et al., 2020; Engel-Yeger & Ziv-On, 2011, Shimoni et al., 2010). Types of play were defined as the ways in which children play that included imaginative and motor play (Pfeiffer et al., 2011). Daily lifestyle behaviours included exercise, screen time, and dietary habits (Tong et al., 2016). The commonality within the two formal definitions and the eight leisure-related

activity definitions was that leisure could be an active and/or non-active activity that occurred during free time outside of school.

Leisure Activities. The leisure activities that were identified in the studies of this scoping review were categorized into non-active leisure, active leisure or a mixture of both (See Appendix F, Table 6). Participation in non-active leisure activities was examined in seven out of 25 studies. For example, non-active leisure predominantly focused on passive leisure activities such as screen time usage. Participation in active leisure activities, focused on sports and physical activities, was examined in two studies (i.e., riding bikes, swimming, and playing at the park). One of the two studies, with a purpose to examine active leisure, also reported findings related to non-active leisure mentioned by participants. For example, the children with ADHD mentioned participating in passive leisure such as watching television and playing video games during their discussion of informal leisure activities (e.g., Harvey et al., 2014). Participation in both non-active and active leisure activities, while also making comparisons between participation in each type of leisure, was examined in the remaining 16 studies.

These leisure themes were further grouped into seven leisure subthemes for the purpose of the current scoping review's thematic analysis. The subthemes belonging to the non-active leisure category included *screen time, creative arts, socializing with friends, hobbies,* and *community activities*. The subtheme *screen time* referred to the activities identified in the studies that involved screen time usage with computers, televisions, tablets, and cellphones. The activities making up screen time included watching television, browsing the internet, scrolling through social media, communicating with others (e.g., texting, direct messages, and chat rooms), listening to music, and playing video games (e.g., Parraga et al., 2019). One study included the watching of pornography by adolescents under screen time usage (e.g., Bolic Baric

et al., 2018). The subtheme *creative arts* included activities that involved a creative component and included drawing, painting, crafting, acting, and playing an instrument (e.g., Cowart et al., 2014). The subtheme *socializing with friends* represented the activities that involved the school-aged youth with ADHD who interacted with their friends that included hanging out with friends at home, going to the mall or movies with friends, eating at restaurants with friends, and going to parties with friends. The subtheme *community activities* included activities that revolved around community engagement. Examples included girl guides, boy scouts, volunteer work, and membership to a community and/or a cultural club (e.g., Coussens et al., 2020). Lastly, the subtheme *hobbies* encompassed leisure activities that did not easily fall into the subthemes above. These activities included pleasure reading, playing board games, and construction games using building blocks (e.g., Swansburg et al., 2021).

The subthemes belonging to the active leisure category included *sports*, *physical activity*, and *outdoor play*. The subtheme of *sports* represented activities identified as either team or individual competitive sports that commonly included basketball, soccer, and football (e.g., Barfield & Driessnack, 2017). There were studies that examined individual and team sports but, unfortunately, did not identify any specific sports that the children or adolescents may have participated in (e.g., Holton & Nigg, 2020). The subtheme of *physical activities* encompassed activities that involved physical exertion and the use of motor skills which included swimming, cycling, skipping rope, skateboarding, rollerblading, taking walks, and dance (e.g., Harvey et al., 2009). The subtheme of *outdoor play* represented the motor play of the children with ADHD that occurred outdoors such as playing at the park (e.g., slides, swings, monkey bars), hide and seek, game of tag, hop-scotch, flying kites, and building sandcastles (e.g., Pfeifer et al., 2011).

Leisure places. Leisure places referred to the environmental settings where the leisure participation of the children and adolescents with ADHD were reported to have occurred in the selected studies (See Appendix F, Table 7). Leisure places included the home, the community, indoors and outdoors. School-aged youth with ADHD were reported to participate in leisure at home and within the community in 15 out of the 25 studies. Indoor locations included the home, the library, community recreation centres, the movie theatre, and the mall. Outdoor locations included the backyard, playgrounds, parks, lakes, and beaches. School-aged youth with ADHD were reported to participate in their leisure exclusively at home in 9 out of 25 studies. These studies often focused on the screen time use of children and adolescents with ADHD which was reported to usually occur at home. Only one study did not report the places where the leisure of school-aged youth with ADHD occurred in (e.g., Engel-Yeger & Ziv-On, 2011).

Leisure Partners. Leisure partners were the people with whom the children and adolescents of the studies participated with in their leisure (See Appendix F, Table 8). Children and adolescents with ADHD were reported to have participated in leisure alone and with others (i.e., family, peers, and friends) in 10 studies. Children and adolescents with ADHD were reported to have participated in leisure alone in one study. It was not specified who the school-aged youth participated with during their leisure in 14 out of 25 studies.

The preferred leisure partners of the children and adolescents were their friends and peers in two studies (i.e., Bolic Baric et al., 2018; Parraga et al., 2019) and their parents in only one study (i.e., Coussens et al., 2020). Parents were reported as the least preferred leisure partners of participants with ADHD possibly due to their mediation and/or monitoring of activities and behaviours (Arrizabalaga-Crespo et al., 2010; Pfeifer et al., 2011).

The types of activities that the children and adolescents with ADHD preferred to participate alone were often non-active in nature and occurred indoors. While children with ADHD often watched television with their families, adolescents used their screen time to communicate with friends through videogaming and social media. In contrast, the types of activities that children and adolescents with ADHD participated in with others were often active in nature and occurred outdoors. Children with ADHD reported that an important factor for physical activity participation was creating new friendships rather than competitiveness which was the important factor for their neurotypical counterparts (i.e., Barfield & Driessnack, 2017; Harvey et al., 2014).

Quality Assessment

The methodological strength and quality of each of the 25 studies was assessed using the Quality Assessment for Studies with Diverse Designs (QATSDD, Sirriyeh et al., 2012). Quantitative and qualitative studies were scored out of a total of 42 points while mixed methods studies were scored out of a total of 48 points. Each score was converted into a percentage. The percentages were then given a descriptor of methodological strength (i.e., low, medium, and high) as recommended by Arbour-Nicitopoulos et al. (2018) and Orr et al. (2021). For example, studies were categorized into low (n=8), medium (n=17) and high (n = 0) methodological strength (See Appendix F, Table 9).

The overall range of scores of the 25 studies was between 19 to 38 points. The range of scores for eight of 25 studies was 19 to 25 points, or below 60%, which led these studies to be categorized as having low methodological strength. For example, the lowest score was assigned to a quantitative study (e.g., 19 out of 42 or 45%). This study received a score of zero on six out of 14 quantitative study items (Acevado- Polakovitch et al., 2007). The scores for 17 studies

ranged from 26 to 38 points, or between 60% - 79%, so they were categorized as having medium methodological strength. For example, the highest score was assigned to a mixed methods study (e.g., 38 out of 48, or 79%). This study received a score of three on nine of the 16 mixed method study items (Harvey et al., 2009). The overarching categories (i.e., study characteristics, participant information, research method, leisure participation, and quality assessment) derived from the descriptive numerical summary and thematic analysis of these 25 studies will now be discussed as findings in the following chapter to help answer the research questions of this study.

Chapter 5

Discussion

The purpose of this study was to determine the extent of research on the leisure participation of children and adolescents with ADHD and associated research methods. This chapter consists of five sections where the findings of this scoping review are presented. The first section is a discussion about the types of definitions for leisure that were provided in the studies. It helped to answer the first research sub-question: How do the operational definitions of leisure relate or differ across studies about children and adolescents with ADHD? The second section identifies the types of leisure activities that the children and adolescents with ADHD were reported to have participated in during the studies. It also addresses the second sub-question: What forms of non-active and active leisure do children and adolescents with ADHD participate in? The third section presents findings concerning the places or contexts where children and adolescents with ADHD participated in leisure and with whom they participated with. It helps to answer two sub-questions: (1) Where do children and adolescents with ADHD leisure? (2) Who do children and adolescents with ADHD leisure with? The fourth section presents the research methods used in the selected studies. It addressed the sub-question: What types of research methods have been used to examine the leisure participation of children and adolescents with ADHD? Lastly, the fifth section of this chapter concerns the methodological strength of the 25 studies included in the scoping review. This final section helps to answer the sub-question: What are the quality indicators of the leisure research performed to date for children and adolescents with ADHD?

Definitions of Leisure

The similarities and differences between the definitions of leisure and related terms from the selected studies are discussed in this section. There were very few operational definitions provided for the term "leisure" in the selected studies. For example, only two groups of researchers defined leisure as an activity that a child and/or adolescent participated in during their free time outside of school (i.e., Bolic Barac et al., 2018; Kietglaiwansiri & Chonchaiya, 2018). This type of definition has been historically included in leisure studies because the activity occurs during a person's free time away from daily obligations (Stebbins, 2018). However, the authors may have an omitted two major constructs, intrinsic motivation and self-actualization, that are traditionally included in the definition of leisure (Stebbins, 2018). For example, a person who is intrinsically motivated freely chooses an activity for the inherent enjoyment and satisfaction experienced during leisure participation (Stebbins, 2018). Furthermore, the person chooses an activity where they may engage in self-actualization. This process enables individuals to reach their fullest potential and become the best versions of themselves through their leisure participation (Stebbins, 2018).

The researchers in other studies used terms related to leisure. These activities included participation in life events (Coussens et al., 2020; Engel-Yeger & Ziv-On, 2011, Shimoni et al., 2010), recreational activities (Cowart et al., 2004), informal physical activities (Harvey et al., 2014; Tandon et al., 2019), types of play (Pfeiffer et al., 2011), and lifestyle behaviours (Tong et al., 2016). The research focus was only on activity participation, not on formal leisure per se, regardless of whether the chosen activities were based on intrinsic motivation and/or self-actualization. Again, we note that intrinsic motivation and self-actualization may not have been considered in the researchers' terms related to recreation (Stebbins, 2018). Harvey et al. (2014)

seems to be the one exception as the researchers focused on the selection, choice and purpose of the activity participation. For example, children with ADHD were asked why they chose to participate in various physical activities during a scrapbook interview process.

There was one major similarity and two major differences found when examining the leisure definitions and terms related to recreation in the selected studies. The major commonality was the time and place where the participation occurred. For instance, the activities occurred during the child and/or adolescent's free time outside of school. This time outside of school usually referred to any physical or recreational activities that did not occur during physical education classes, recess, or school affiliated organized sports. This point is important because leisure scholars have suggested activities may be perceived as obligations or 'work-like' if they occur during school hours which do not reflect the very essence of leisure (Stebbins, 2018).

There were two main differences evident in the leisure definitions and terms related to recreation. These differences related to depth of the definitions provided for activity and the type of activity reported (i.e., active or non-active). First, most studies' definitions and related recreational terms did not include whether the activities had to be active or non-active in nature. This finding may prove to be problematic as the authors may not have realized the variety of activities that constituted leisure. However, there were a few studies where the purpose focused solely on participation in physical activity (i.e., Harvey et al., 2014; Tandon et al., 2019). Second, a broader understanding of what constitutes a leisure activity was provided in some of the selected studies while a narrower understanding of leisure activity seems to underlie other studies. For example, researchers identified participation in either a life event or lifestyle behaviours as leisure that, in turn, could be considered as a very broad understanding of what activity participation may have entailed. For instance, the life events listed in the International

Classification of Functioning, Disability and Health (ICF; WHO, 2001) definition of participation includes physical, recreational, social, skill development, and self-improvement activities. The researchers, that used the ICF's term 'participation in a life event', examined daily participation patterns and activity preferences within the field of occupational therapy (Engel-Yeger & Ziv-On, 2011, Shimoni et al., 2010). For example, they explored activities of daily living (ADLs) as leisure activities in the two studies (Engel-Yeger & Ziv-On, 2011, Shimoni et al., 2010). The key criterion to be aware of is that the activities occurred outside of formal school hours which allowed for a larger variety of activities to be included and considered as related to leisure. The term lifestyle behaviours included exercise, screen time, sleep, and dietary habits (Tong et al., 2016). Researchers seemed to employ a narrower understanding of what constituted a leisure activity in other studies where participation was limited to recreational activities, physical activities, and types of play. Specific activities such as team (e.g., soccer & hockey) and individual sports (e.g., swimming & cycling) were identified as leisure activities in some of the selected studies (i.e., Cowart et al., 2004; Harvey et al., 2014; Tandon et al., 2019).

This type of broad understanding of a leisure activity has permitted the inclusion of events that have not been traditionally accepted as leisure activities. For example, ADLs have usually been described as basic daily skills and tasks used to fulfill basic physical needs such as the maintenance of personal hygiene (Mlinac & Feng, 2016). ADLs are not considered leisure activities because they are not freely chosen by an individual and not motivated by the experience of enjoyment (Stebbins, 2018). However, the occupational therapy researchers referred to ADLs as leisure activities in their studies (Engel-Yeger & Ziv-On, 2011; Shimoni et al., 2010). Although they occured outside of school hours, ADLs are not usually considered as leisure or recreational activities because these tasks do not facilitate self-expression and self-

fulfillment like leisure activities do (Tinsley & Eldredge, 1995). Hence, such a broad understanding of leisure activities raises concerns of how leisure research has been conducted in the area of ADHD. This issue, in turn, may affect the validity of leisure research about school-aged youth with ADHD. The purpose of leisure for children and adolescents with ADHD also remains unclear. For example, do these children freely choose their leisure activities and what role do intrinsic motivation and self-actualization play in their leisure choices and pursuits?

We believe that the scope of the literature has been captured, however, we understand that the lack of standard operational definitions for the term leisure within the selected studies may be considered as concerning. This original finding will hopefully lead researchers to use widely accepted definitions for leisure to ensure that activities are being accurately studied in the context of leisure. While it was challenging to define the scope of the literature in this study due to these definitional issues, we have gained a better understanding of the leisure activities pursued by the school-aged youth with ADHD. This new understanding of their leisure participation will be discussed in the following section.

Leisure Participation

The preferences and types of leisure activities as well as associated participation rates for school-aged youth with ADHD are discussed in this section. The preference of leisure activities for school-aged youth with and without ADHD were compared in some of the selected studies. For example, Cowart et al. (2004) found there were no differences in the preference of leisure activities between school-aged youth with ADHD and their age- and sex-matched peers. In contrast, Engel-Yeger and Ziv-On (2011) found that boys with ADHD demonstrated a lower preference towards physical, social, skill-and rule-based activities when compared to their peers without ADHD. They found this phenomenon was particularly true for boys with the inattentive

subtype who showed the lowest preference towards all leisure activities (Engel-Yeger & Ziv-On, 2011).

This contrast in findings affirms the need for future research to confirm the differences and examine the reasons behind the differences in the leisure activity preferences of children with ADHD. We further suggest researchers to explore biological sex differences in leisure activities. For example, study samples in this scoping review were predominantly male as was expected because the clinical and population male-to-female sex ratios have been reported as 9:1 and 3:1 respectively (Ruiz-Goikoetxea et al.,2018). While females were included, and thus represented in most of the selected studies; there is a serious dearth of research on the leisure activities of females with ADHD. For instance, there were few considerations of biological sex differences in relation to leisure activity preferences despite the presence of males and females with ADHD in study samples. It is highly recommended that future researchers should explore biological sex differences to determine the leisure preferences, choices, and activities of all school-aged youth with ADHD. For example, what factors motivate females with ADHD when they are choosing non-active and active leisure activities that they prefer?

Children and adolescents were reported to have participated in non-active and active leisure activities within the selected studies. There were a variety of divergent findings concerning the non-active leisure activities of school-aged youth with ADHD in this scoping review. For example, there were studies that found that children and adolescents with ADHD had higher rates of screen time and media use than age-matched peers without ADHD. In contrast, Parraga et al. (2019) found that the children and adolescents with ADHD had lower screen time usage than those without ADHD due to more time allotted to studying and tutoring. Furthermore, Rosenthal et al. (2021) found no difference in rates of screen time and media use

between children and adolescents with and without ADHD. This original finding from our scoping review highlights a gap in the literature and the need for future research where the screen time usage of school-aged youth with ADHD is studied more extensively in the leisure context. For instance, what are the reasons behind the differences in screen time usage?

Children and adolescents with ADHD were also reported to have participated in active leisure activities. For example, researchers found that children with ADHD participated in active leisure activities such as traditional sports (e.g., soccer and hockey), physical activities (e.g., swimming and cycling), and outdoor motor play (e.g., playing at the park and hide and seek) (Barfield & Driessnack, 2017; Coussens et al., 2020; Harvey et al., 2013). This is an important finding because it was previously thought that youth with ADHD avoided physical activities (Whalen et al., 2002). Future research should continue to examine the physical activity participation of youth with ADHD during their leisure time. For example, future research could more closely examine the physical activity preferences of these youth and the ways in which to facilitate their participation in active leisure. In turn, findings on preferences and facilitators of active leisure participation can be used by leisure and physical activity practitioners and professionals to develop programs to encourage youth with ADHD to pursue active leisure.

Participation rates were also examined in some of the selected studies in our investigation. For example, the participation rates for the active leisure activities of children and adolescents with ADHD were often found to be lower than their neurotypical counterparts (e.g., Kim et al., 2011). It has been suggested that lower participation rates in active leisure activities may be linked to severity of ADHD symptoms (e.g., Tandon et al., 2019; Werling et al., 2021). For example, children with severe ADHD symptoms were found less likely to participate in sports in comparison to those with moderate to mild ADHD symptoms (Tandon et al., 2019).

Similarly, Karci and Gurbuz (2021) found that the severity of ADHD symptoms during the COVID-19 pandemic lockdowns was impacted by a lack of physical activity participation. Hence, participation in physical activity may act as a protective factor for ADHD symptomatology (Karci & Gurbuz, 2021).

However, we have identified another gap in the literature because some researchers also reported that there were no differences between the leisure participation rates in the non-active and active leisure activities of school-aged youth with ADHD and their neurotypical counterparts. For example, Shimoni et al. (2010) reported that boys with ADHD spent similar amounts of time in both physical and recreational activities as their peers without ADHD. Furthermore, Mercurio et al. (2021) also reported that both boys and girls with ADHD had similar participation frequencies in non-active and active leisure activities as their age- and sex-matched peers. This gap in the literature represents an original finding from our study that helps us to raise the following question. What are the reasons for the differences in leisure participation rates of school-aged youth with ADHD? For example, this discrepancy of findings on the participation rates of school-aged youth with ADHD emphasizes the need for future research to consider the facilitators and barriers to physical activity for youth with ADHD. For instance, our study findings indicate some participation barriers can be identified for the active leisure of children and adolescents with ADHD. These barriers for active leisure included a lack of equipment and community spaces (i.e., Harvey et al., 2013), lack of familial finances to pay for activities (i.e., Tandon et al., 2019), lack of free time (i.e., Parraga et al., 2019) and the social demands of physical activities (i.e., Kaya Kara et al., 2021). This type of future research may not only help to explain the different findings of these studies but lead researchers and physical

activity professionals to assist the youth with ADHD to become physically active and healthy in a variety of different leisure contexts.

Context of Leisure Participation

The leisure settings and partners of the children and adolescents with ADHD in the selected studies are discussed in this section. The school-aged youth with ADHD participated in leisure alone and with others in a variety of different settings. For example, they participated in activities at home and in various community settings. Their leisure participation with partners often occurred within the community both indoors and outdoors.

Some of the indoor settings where the school-aged youth with ADHD participated in leisure activities included their home, the local library, community recreation centres, the movie theatre, and the mall. The solitary leisure of school-aged youth with ADHD, especially for adolescents with ADHD, typically occurred in the home. For instance, researchers examined the screen time usage of children and adolescents with ADHD which mostly occurred at home in some of the studies within this scoping review. This finding may potentially explain why the home was the most frequently reported leisure setting of school-aged youth with ADHD. Perhaps this phenomenon may also be related to participation barriers such as lack of community spaces and resources. Therefore, researchers should consider examining the various leisure activities that children and adolescents with ADHD participate in and the reasons why most of their leisure seems to occur at home? Researchers could also explore whether participation barriers are also associated with this phenomenon. In turn, leisure practitioners and physical activity professionals may use these findings and develop programs to aid school-aged youth with ADHD to overcome potential barriers to participating in leisure in their communities.

Some of the outdoor settings where the school-aged youth with ADHD participated in leisure activities included their own backyards, local playgrounds and parks, lakes, and beaches (Barfield & Driessnack, 2017; Coussens et al., 2020; Harvey et al., 2014). Their outdoor leisure pursuits included playing at the park, bicycling through their neighbourhoods, swimming in outdoor pools, lakes, beaches, and playing team sports such as soccer and football (e.g., Harvey et al., 2009; Pfeifer et al., 2011). Barfield and Driessnack (2017) suggested that the reason why children with ADHD choose to participate in activities that occur outdoors was to benefit from the restorative nature of outdoor play. For example, they suggested that playing in nature was found to reduce stress and enhance well-being so their study participants were intrinsically choosing activities that were done outdoors (Barfield & Driessnack, 2017). Coussens et al. (2020) also found that children with ADHD participated in activities that were health-enhancing which often included outdoor play. Future research should, therefore, be conducted to more thoroughly examine the settings where the leisure of school-aged youth with ADHD occurs. For example, leisure researchers should consider the potential health enhancing benefits that certain settings may have (e.g., outdoors/in nature) over others for individuals with ADHD. For example, does spending time in nature decrease or lessen the severity of ADHD symptoms? Furthermore, better understandings of the leisure settings of these school-aged youth may provide valuable information for leisure and physical activity practitioners and professionals to use when designing and implementing programs. For example, practitioners could incorporate non-active and active leisure in nature into their programs to explore the potential stress reducing and mood boosting benefits of spending time in the outdoors for youth with ADHD. This form of knowledge again may be useful for these professionals in assisting school-aged youth with

ADHD to make healthy and positive choices through their leisure. It may also serve to introduce these youth to other like-minded individuals who can partner with them in this leisure pursuit.

Leisure partners were the individuals with whom the youth with ADHD were reported to participate with in leisure activities. Past research has suggested that school-aged youth with ADHD have difficulties creating and maintaining friendships (Barkley, 2006). This difficulty, in turn, may lead to school-aged youth with ADHD participating in their leisure alone. It was confirmed in this scoping review that school-aged youth with ADHD did participate in leisure alone and it was often by choice. A potential reason for solitary participation is the combination of physical and social demands of activities especially physical activities (Kaya Kara et al., 2021). It seems there was a large challenge for study participants with ADHD to perform an activity while also maintaining the social demands of the activity (Kaya Kara et al., 2021). For example, it may be difficult to maintain the physical demands of a sport while, at the same time, maintaining a social component of team sports such as interpersonal communication. Therefore, some school-aged youth with ADHD may turn to individual sports instead where their focus can be maintained solely on individual physical demands (Kaya Kara et al., 2021). This finding is important for leisure practitioners and physical activity professionals to consider when performing leisure education counselling and programming leisure activities especially for physical activities. For example, they may consider adapting team sports in ways that could improve physical and social skills in sport by taking a balanced approach. For instance, more time may be required to teach and learn the intricacies involved in various sports and, thus, decrease the burden of balancing physical and social demands of the specific sport or activity. It would also be a good idea to perform research into the social demands of individual and team sports to then integrate all of the findings into leisure and physical activity programming.

Other studies of this scoping review reported that youth with ADHD participated in leisure activities with others. Their leisure partners were their friends, peers, and family members such as siblings, cousins, and parents (i.e., Bolic Baric et al., 2018; Parraga et al., 2019). Although parents were the most reported leisure partners of the youth with ADHD, they were also considered as the least favourable partners of their children. Parental supervision and management of the leisure participation of their children were suggested as potential causes of parents being reported as the least favourable leisure partners (Arrizabalaga-Crespo et al., 2010; Pfeifer et al., 2011). However, there were no studies found in this scoping review that specifically explored the family leisure of youth with ADHD. Thus, there is an opportunity for future researchers to examine family leisure in the context of ADHD. For example, researchers could examine the different dynamics that exist between family members during leisure activities and discover ways to improve the potentially negative perceptions that the youth with ADHD may have of their parents during leisure activities. An improvement in family dynamics may also, in turn, ameliorate ADHD symptoms of the youth. This type of research has the potential to improve individual symptoms of ADHD while improving family functioning. Hence, these type of research findings may also help to address the familial instability and maladaptive parenting styles that have been found to be risk factors for ADHD. Leisure practitioners could further use this type of knowledge to create leisure activities and programs where youth with ADHD and their families can participate freely in, enjoy together and thrive!

The school-aged youth with ADHD also used their leisure activities as an opportunity to create and foster new friendships as reported within the selected studies of this review. This sentiment was evident regarding participation in sports, especially team sports. Children with ADHD often participated in sports in order to make new friends in addition to maintaining their

existing friendships (i.e., Barfield & Driessnack, 2017; Harvey et al., 2013). Playing with friends was seemingly more valued to children with ADHD than winning at the games or sports they were playing (Coussens et al., 2020). Adolescents with ADHD also participated with others which occurred virtually by using technology to socialize with their friends. They did so with computers and cell phones to communicate with friends through social media platforms and video conferencing tools (e.g., Arrizabalago-Crespo et al., 2010; Swansburg et al., 2021). For example, they used their time playing video games to talk with their friends (e.g., Bolic Baric et al., 2018). Video gaming further provided the opportunity for these adolescents to create new friendships while playing multiplayer games (e.g., Bolic Baric et al., 2018).

Hence, the creation and maintenance of friendships are important factors for participation in the non-active and active leisure pursuits of the school-aged youth with ADHD. This finding of our study is important because children with ADHD often experience social exclusion during physical activities (Harvey et al., 2009) which, in turn, may result in social isolation of youth with ADHD. Researchers of future studies on ADHD and leisure should consider developing in depth examinations of the barriers to leisure participation with friends and ways in which youth with ADHD may overcome these barriers. For example, do school-aged youth wish to make friends through various forms of leisure but engage in self-stigmatization after being repeatedly excluded from non-active and active activities? Perhaps leisure and physical activity researchers and professionals could create intervention programs to develop new and nurture existing friendships through a variety of activities in different leisure contexts. Clearly, more research is required to develop leisure interventions to foster more and better friendship opportunities for school-aged youth with ADHD through their leisure activities.

Research Method

The research methods that were used to examine the leisure participation of children and adolescents with ADHD are discussed in this section. Most of the selected studies of this scoping review were considered as quantitative research approaches. Philosophical worldviews were not mentioned in the majority of these quantitative studies but we imagine that a post-positivist worldview would have driven the research process (Tamminen & Poucher, 2020). The researchers in these quantitative studies commonly employed non-experimental research designs, along with questionnaires, to collect data for their studies. A majority of studies utilized questionnaires that were mostly responded to by parents while the remaining studies included combinations of parent and child centred questionnaires. Unfortunately, parent-reported questionnaires may not always accurately reflect the nature of a phenomenon due to a potential social desirability bias (Paulhus, 1991). For example, the parents of youth with ADHD may have provided socially desirable responses to the survey questions about the leisure activities of their children. The potential for the social desirability response bias raises a concern regarding the validity of survey results because the responses may not accurately reflect the leisure participation, behaviours, and choices of the youth participants with ADHD (Paulhus, 1991). Moreover, there is a possibility that parents may not know the full extent of their children's leisure activities because youth may not always share this type of information with their parents (Arrizabalaga-Crespo et al., 2010).

Thus, researchers of future studies on the leisure participation of school-aged youth with ADHD should consider the additional use of child-reported questionaries to ensure that survey results more accurately depict the leisure participation of youth with ADHD. For example, results from parent reported questionnaires may be combined with the results of child-reported

questionnaires to gain a better picture and deeper understanding of the youth's leisure participation. While there is the potential that the youth may also provide socially desirable responses, comparing the survey results of parents and children may also control for potential bias and support the validity of study findings. The use of child-centred questionnaires may further be the starting point to provide space for youth with ADHD to have their voices heard about their own leisure pursuits. For example, qualitative and mixed methods research approaches may empower children and adolescents with ADHD to share their leisure activity experiences and forge new paths forward.

Few of the selected studies of this scoping review were considered as qualitative or mixed methods research approaches in this scoping review. There was a lack of explicit statements of the researchers' worldviews in the qualitative research studies. However, the qualitative researchers did use different theoretical frameworks or guiding concepts to guide their research studies. For example, Bronfenbrenner's Bioecological Model of Human Development (Bronfenbrenner & Morris, 2006) was used as a theoretical framework in one qualitative study (Barfield & Driessnack, 2017) while the Development Consolidated Criteria for Reporting Qualitative Research (COREQ; Tong et al., 2007) was incorporated in the other qualitative investigation (Coussens et al., 2020). Phenomenological research designs were employed in these qualitative studies where semi-structured art-based interviews were conducted to gather their study data (Barfield & Driessnack, 2017; Coussens et al., 2020). Mixed methods researchers did not include an explicit statement of their philosophical worldviews. However, a combination of the knowledge-based approach (Wall et al., 1985) and the inhibitory model of executive function (Barkley, 1997) were used together as the theoretical framework for one mixed methods study (Harvey et al., 2009). No theoretical framework was stated in the second

mixed methods study. Concurrent mixed methods research designs were used along with a combination of fundamental movement skill assessments and semi-structured interviews to gather data for these two studies (Harvey et al., 2009; Harvey et al., 2014).

It is important that researchers disclose the philosophical worldviews and the theoretical frameworks that their research is grounded in because it informs consumers of research about the beliefs and assumptions that guide the studies that researchers conduct (Harvey et al., 2020). Philosophical worldviews and theoretical frameworks help to shape the research questions and, in turn, shape the collection of and interpretation of data and findings (Harvey et al., 2020). Therefore, researchers should include an explicit statement of their philosophical worldviews and theoretical framework(s) to allow readers to observe the connection between the elements of a study and understand the perspective the researcher is taking.

The lack of interview techniques in leisure research for school-aged youth with ADHD also highlights the need for more qualitative and mixed methods research studies. These types of research studies will help leisure researchers to acquire richer and deeper information to ultimately draw a more complete picture of the youth's leisure pursuits. For example, school-aged youth with ADHD could be provided greater opportunities to discuss their own leisure interests, preferences, and reasons behind their leisure choices through semi-structured interviews. In addition, the use of arts-based interview methods, such as concurrent scrapbook interviews and draw-and-tell conversations, will help to stimulate the memory of children and enhance interviewee participation as children are asked to share the meaning underlying the photographs they took or the drawings they made (Barfield & Driessnack, 2017; Harvey et al., 2014). The associated semi-structured interviews may enable a deeper exploration into the leisure participation of youth with ADHD by considering their leisure activity choices and the

rationale behind these choices. For example, an interview guide could include questions that aim to uncover if the youth with ADHD are satisfied with their current leisure participation. Further, how do children and youth with ADHD decide how to leisure and what are the factors that may be inhibiting their participation in their desired leisure activities. The voices of these youth need to be heard concerning their own activity participation and the use of arts-based semi-structured interviews has been shown to be an effective way to achieve this valuable outcome (Driessnack & Furukawa, 2011).

Quality Assessment

The Quality Assessment Tool for Studies with Diverse Designs (QATSDD, Sirreyeh et al., 2012) was used to evaluate the methodological strength for each of the selected studies. The findings related to these quality assessments are discussed within this section. The selected studies of the current scoping review were deemed as having low or medium methodological strength. The labels of low and medium methodological strength suggests that some elements of the research methods of the selected studies could be improved. The quantitative research studies received low to medium descriptors for methodological strength. In contrast, the studies that were categorized as qualitative or mixed methods research all received the descriptor of medium methodological strength. The lack of high-quality research on the leisure participation of children and adolescents with ADHD is concerning as this finding suggests that their leisure may not be accurately, appropriately, or comprehensively examined.

Two main issues arise when we consider some of the specific quality indicators or the quality assessment questionnaire items. For example, researchers seldomly discussed which theoretical frameworks or guiding concepts that led their studies and they did not identify the reliability and validity of data collection tools used in their studies. First, as we have already

mentioned, there was a dearth of statements about theoretical frameworks or guiding concepts in the selected studies. This was an area of concern and large gap in the quality assessment also. The lack of theoretical frameworks or guiding principles was especially true for the quantitative studies in the scoping review. While it may be assumed that researchers in the quantitative paradigm would be grounded in a post-positivist worldview, we are being careful not to draw concrete conclusions about the guiding principles of these studies (Tamminen & Poucher, 2020). In contrast, the guiding theoretical frameworks were mentioned for the qualitative or mixed methods research studies of this scoping review. The inclusion of a theoretical framework or guiding principle is important in research as it may help to inform the reader about the worldview and methodological underpinnings of the principal investigator, the research team and the study (Harvey et al., 2020). This information enables the reader to observe the coherency of the research study from its inception until its completion (Harvey et al., 2020). For example, the reader would be able to read about the worldview and theoretical framework to observe how it may impact the collection of data, analysis and related interpretations. Therefore, researchers of future studies on ADHD and leisure should strongly consider the inclusion of a statement that identifies the philosophical worldview and the theoretical framework while ensuring coherency in the research process.

Second, most of the selected studies included a statement regarding the reliability of the data collection tools that were used. However, some of the survey studies did not specify if their data collection instruments were reliable or valid. Given the parameters of the quantitative research paradigm, it behooves researchers of quantitative studies to disclose the reliability and validity status of the data collection instruments utilized. The inclusion of statements for both reliability and validity may allow research consumers to recognize that the data collection

methods were accurate and the study results can be trusted (Kimberlin & Winterstein, 2008). The inclusion of statements of reliability and validity may also ensure that leisure practitioners and related professionals are integrating relevant and accurate findings into their practice.

In summary, the findings of our study were presented in this chapter and they have helped to answer the overarching research question and sub-questions of this scoping review. Potential directions of future research were suggested and included: (a) the provision of standard definitions for leisure, (b) the exploration of the research gaps in the non-active and active research findings on the leisure participation of youth with ADHD, (c) the investigation of the context of leisure participation in relation to making friendships and improving family relationships, and (d) the improvement of the research methods to develop higher quality research studies on the leisure pursuits of school-aged youth with ADHD. The findings of the quality assessments were also discussed and we recommended real-world interventions that were discussed in this chapter. A deeper examination of the leisure of school-aged youth with ADHD may help to produce leisure and recreational programs that are specially designed to meet the preferences and needs of children and adolescents with ADHD. A comprehensive summary of the insights from this scoping review are provided in the following chapter.

Chapter 6

Summary

Attention Deficit Hyperactivity Disorder (ADHD) is one of the most prevalent neurodevelopmental disorders of childhood (McGough, 2014). Symptoms of ADHD may affect various aspects of a child or adolescent's daily functioning in academic and social settings (APA, 2013). However, to our knowledge, an area that has not been extensively examined is the participation of children and adolescents with ADHD in leisure activities. Thus**,** the purpose of this study was to determine the extent of research on the leisure participation of children and adolescents with ADHD and associated research methods.

This scoping review was conducted through the use of the Arksey and O'Malley framework (2005), including adaptations suggested by Levac et al. (2010). The framework consisted of six stages: (1) identifying the research question, (2) identifying relevant studies, (3) selecting studies (4) charting data, (5) collating, summarizing, and reporting results, and (6) consulting with stakeholders (Arksey & O'Malley, 2005). The stakeholder consultation was not completed during this scoping review as it has been considered optional. Three methods were employed to identify relevant studies: electronic database searching (i.e., PsycINFO, SportDiscus, Web of Science, Sports Medicine and Education Index, and MEDLINE), citation chasing, and hand-searching of key journals (i.e., Adapted Physical Activity Quarterly, *Therapeutic Recreation Journal*, and *Journal of Attention Disorders*). Key terms related to leisure, ADHD, and school-aged youth were used to create a search strategy for the database searches. The search strategy was developed with a reference librarian and approved by the research team for use. A total of 7,297 studies were reviewed to determine whether the studies fit

the inclusion criteria determined by the research team. Twenty-five studies were used for analysis in this scoping review.

The process of data extraction and subsequent charting followed an iterative approach (Levac et al., 2010). The following overarching categories were derived from this process and from the themes of the established research questions: (1) definitions of leisure, (2) leisure participation, (3) context of leisure participation, (4) research method, and (5) quality assessment. The data charting process also produced two additional categories: (1) study characteristics and (2) participant information. Study characteristics referred to the year of publication of selected research articles and the country of affiliation of the primary authors. Participant information referred to sample size of selected studies and information about study participants (i.e., age, biological sex, ADHD diagnosis, and any reported comorbidity).

Conclusions

Study Characteristics

- The years of publication of the selected studies ranged from 2004 to 2022. The years of 2011 and 2021 were the years with the most publications (n = 4 each respective year).
- The lead authors of the selected studies had university affiliations associated mostly with the United States (36%), Turkey (12%), and Canada (12%).

Participant Information

- The sample sizes of the selected studies ranged from small (n = 10) to very large (n = 68,634).
- Ages of participants ranged from 5 to 18 years. Twelve studies had samples consisting of children from 5–12 years. One study had a sample of adolescents between 12-18 years

while the remaining 12 studies consisted of samples with both children and adolescents together (e.g., 5–18 years).

- Twenty studies (80%) included both male and female participants in their samples. Three studies (12%) included only male participants. Two studies (8%) did not specify the biological sex of participants but it was discussed as a covariate during statistical analyses.
- A majority of the studies (68%) consisted of samples that included both school-aged youth with and without ADHD. Few studies (20%) consisted of samples with only school-aged youth with ADHD while even fewer studies (12%) consisted of samples of school-aged youth with ADHD and other comorbid disorders.

Definitions of Leisure

- Majority of studies (92%) provided no formal or operational definition of leisure.
- Very few studies (8%) provided a formal or operational definition of leisure.
- Several studies (32%) provided operational definitions for terms related to leisure; such as participation in life events, recreational activities, informal physical activities, types of play, and daily lifestyle behaviours.

Leisure Participation

- A majority of the studies examined both non-active and active leisure participation (64%). Fewer studies examined non-active leisure participation only (28%) and even fewer studies examined only active leisure participation (8%).
- School-aged youth with ADHD were reported to participate in the following non-active leisure activities: screen time, creative arts, socializing with friends, hobbies, and community activities.

- School-aged youth with ADHD were reported to participate in the following active leisure activities: sports, physical activity, and outdoor play.

Context of Leisure Participation

- The leisure places where the school-aged youth with ADHD participated included the home and community spaces.
- Leisure participation at home and in the community was reported in 15 studies (60%). Home participation was reported in nine studies (36%) and no leisure places were reported in one study (4%).
- The leisure partners of the school-aged youth with ADHD were reported to be friends, family, and peers. Parents were the most reported leisure partners but perceived as the least favourable ones by youth with ADHD.
- Participation alone and with others was reported in 10 studies (40%), participation alone only was reported in one study (4%), while no leisure partners were identified in 14 studies (56%).
- Solitary leisure participation was predominantly non-active and occurred indoors while leisure activities with others were often active and occurred outdoors.

Research Method

- None of the studies included an explicit statement of the researchers' worldviews. However, three studies (12%) did include the theoretical frameworks that researchers used to guide their studies.
- The majority of studies (84%) were identified as quantitative investigations where survey questionnaires were used to collect the data. These studies were categorized as cross-sectional, retrospective-cross sectional, and longitudinal research designs.

- Parents completed survey questionnaires in 13 quantitative studies (61.9%). Parents and their youth with ADHD completed survey questionnaires in five studies (23.8%). The youth with ADHD completed survey questionnaires in three studies (14.3%).
- Two studies (8%) were categorized as qualitative research investigations where semi-structured interviews were used to gather the data. Draw-and-tell conversations and photo elicitation interviews were the specific data collection methods for these studies.
- Two studies (8%) were categorized as mixed-methods research. A combination of fundamental movement skill assessments were used in conjunction with semi-structured interviews for the two studies. Researchers in one of the mixed-methods studies used a concurrent scrapbook interview method.

Quality Assessment

- Quality assessments were conducted with the Quality Assessment for Studies with Diverse Designs (QATSDD; Siriyeh et al., 2012) for each of the selected studies. Eight studies (32%) were categorized as low methodological strength, 17 studies (68%) were categorized as medium methodological strength and no studies were categorized as high methodological strength.

Directions of Future Research and Practical Applications

This scoping review has enabled us to determine the extent of the existing literature on the leisure participation of school-aged youth with ADHD and associated research methods. Gaps in the existing research have been identified and suggestions were made to address them through future research. Important practical insights were also highlighted that may be of use to leisure practitioners and physical activity professionals who work with school-aged youth with ADHD and their families.

First, inconsistencies in existing research concerning the leisure activity preferences and participation of children and adolescents with ADHD were identified through this scoping review. We suggested that future research should be conducted to confirm these differences and examine the reasons behind the potential differences in leisure activity preferences and participation rates of these youth. Potential barriers to community leisure participation of the youth with ADHD were also identified based on the findings of this scoping review. We, therefore, recommended that future researchers investigate the facilitators and barriers to the leisure participation of the youth with ADHD. For example, the identification and understanding of facilitators and barriers to their leisure participation may lead leisure and physical activity professionals to develop novel interventions to help youth with ADHD to participate thoroughly in a variety of non-active and active leisure activities through different leisure contexts. Furthermore, our recommendation that biological sex differences should also be examined may also lead to a comprehensive understanding of the leisure preferences, choices and activities of all school-aged youth with ADHD.

Second, important factors related to the leisure participation of children and adolescents with ADHD were identified through this scoping review. For example, the creation of new friendships and the maintenance of existing ones were important factors for the youth with ADHD when participating in non-active and active leisure activities. We, therefore, recommended that future research should be conducted to examine leisure participation with friends and the ways in which potential obstacles can be overcome as youth with ADHD may experience social isolation. In turn, leisure and physical activity professionals may create leisure programs to foster new friendships and nurture the existing friendships of the children and adolescents with ADHD. Similarly, parental involvement during the leisure participation of the

youth with ADHD was identified as another important factor. Parents were the most reported leisure partners of the youth with ADHD. However, they were perceived as the least favourable partners to their children. Thus, we recommended that future research should explore family leisure through the perspective of ADHD. Positive family leisure experiences may have positive implications on family dynamics and, in turn, ameliorate the ADHD symptoms of youth with the disorder.

Lastly, our findings on the research methods of the selected studies led to the recommendation for stronger research to be conducted in leisure for school-aged youth with ADHD. The findings of this scoping review point to the need for future quantitative research that utilizes child-centred survey questionnaires and qualitative research that utilizes semi-structured interviews to fully explore leisure in the ADHD context. These types of child-centred research studies would allow for a more accurate depiction of the leisure activities and preferences of youth with ADHD and empower these youth to share their lived leisure experiences. Similarly, the findings from the quality assessment, conducted for each of the 25 studies, revealed the lack of philosophical worldviews and guiding theoretical frameworks to guide these investigations. Only three of the 25 selected studies included statements of guiding theoretical frameworks. Therefore, our recommendation is for researchers to include explicit statements of their philosophical worldviews and theoretical frameworks to allow readers to understand the perspectives of researchers and the influence it has on each step of the research process. We further recommended that this research is coherent and follows the same intent from study inception to study completion (e.g., Harvey et al., 2020).

Limitations and Recommendations

This scoping review has provided a better understanding of the leisure pursuits of children and adolescents with ADHD, recommendations for future research on the topic, and ways in which leisure and physical activity professionals may incorporate findings into practice. However, there are some study limitations that should be addressed. First, there is the possibility that some studies relevant to ADHD and leisure may have been missed during the study selection process because of choices related to search terms and electronic databases used. However, the choices made concerning the development of the search strategy used and selection of electronic databases were made in consultation with a reference librarian and members of the research team to minimize the chances of missed studies from occurring. Second, the study selection and data extraction processes were completed by the primary investigator (PI) and not two reviewers as recommended in the Arksey and O'Malley framework (2005). However, a second member of the research team was involved throughout the process to guard against any biases imposed during study selection and data extraction by the PI. In addition, the knowledge synthesis software Rayyan was used during the study selection process to ensure that a systematic approach was followed. Finally, some of the selected studies were classified as leisure research based on the knowledge and expertise of the research team. It is, therefore, possible that some of the researchers of these studies would disagree with our leisure classification of their research study. This point highlights the importance of including a formal or operational definition for the types of activities being examined or explored. This is especially true for leisure related activities as the formal definition for leisure has changed over time.

In summary, this scoping review is one of the first studies of its kind to explore how the leisure participation of children and adolescents with ADHD has been examined in the existing

body of literature. We have identified divergent findings from various studies that were related to the leisure activity preferences and participation rates of school-aged youth with ADHD in both non-active and active leisure pursuits. Findings of previous research on ADHD, leisure, and physical activity were also confirmed in this scoping review. The findings on the research methods of selected studies allowed for the development of recommendations for potential directions of future research to examine the leisure participation of these youth more closely. Future studies should be designed with the highest quality of research methods in mind. Suggestions of how findings may be incorporated into practice by leisure and physical activity professional were also provided. A stronger understanding of the leisure activities and interests of children and adolescents with ADHD has been produced through this study. It is our hope that our study findings will lead to better designed research that, in turn, will ultimately help to empower school-aged youth with ADHD to make positive leisure choices that will enable them to live long, healthy, and happy lives.

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Appendix A

Table 1

Search Strategy used during Database Searches

Terms	Search Terms Used
Leisure	Leisure OR recreation* OR "leisure time" OR play OR "physical activit*" OR sport* OR “screen time” OR "passive leisure" OR "activity participation"
Attention Deficit Hyperactivity Disorder	“ADHD” OR “Attention Deficit Hyperactivity Disorder” OR "Attention-deficit/hyperactivity disorder" OR Hyperactivity OR “Attention-Deficit” OR “ADD” OR “Hyperkinetic Disorders” OR Hyperkinesis
Youth	Youth* OR Child* OR Adolescent* OR Teen* OR Preteen* OR Boy* OR Girl*

Appendix B

Table 2

Data Charting Categories

Overarching Category	Subcategory
Study Characteristics	Author Year Country
Participant Information	Age Biological Sex Diagnosis Comorbidities Sample Size
Research Methods	Study Purpose Research Method Analysis Results
Leisure Participation	Leisure Definition Non-Active Leisure Active Leisure Leisure Places Leisure Partners
Quality Assessment	QATSDD Score

Appendix C

Table 3

Quality Assessment for Studies with Diverse Designs

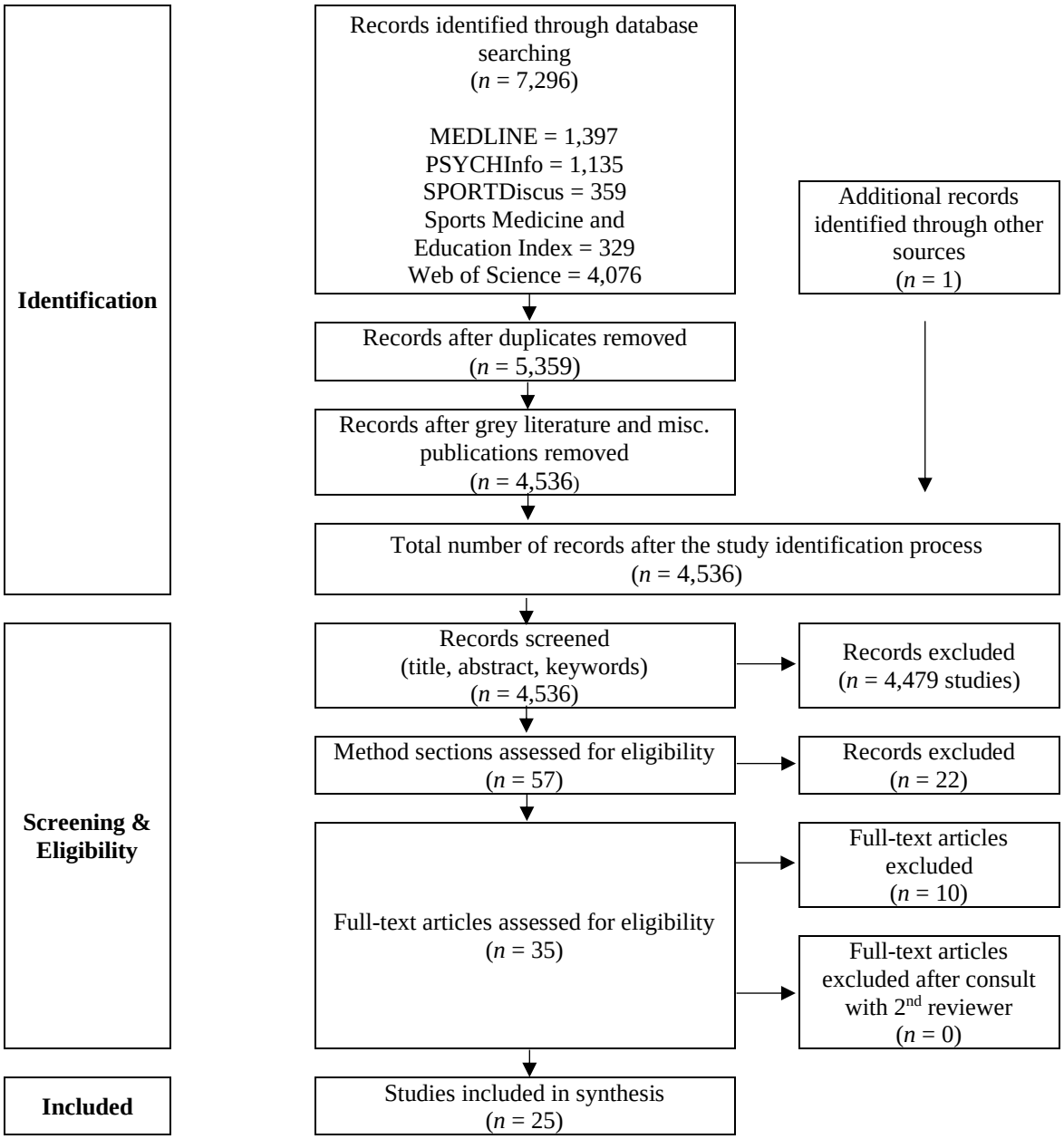
Criteria	Score (0-3)				
	Paper 1	**Paper 2**	**Paper 3**	**Paper 4**	**Paper 5**
Explicit theoretical framework					
Statement of aims/objectives in main body of report					
Clear description of research setting					
Evidence of sample size considered in terms of analysis					
Representative sample of target group of a reasonable size					
Description of procedure for data collection					
Rationale for choice of data collection tool(s)					
Detailed recruitment data					
Statistical assessment of reliability and validity of measurement tool(s) (Quantitative only)					
Fit between stated research question and method of data collection (Quantitative only)					
Fit between stated research question and format and content of data collection tool e.g. interview schedule (Qualitative only)					
Fit between research question and method of analysis					
Good justification for analytic method selected					
Assessment of reliability of analytic process (Qualitative only)					
Evidence of user involvement in design					
Strengths and limitations critically discussed					
Total score with descriptor of methodological strength (i.e., low, medium, high)					

Note. Adapted from QATSDD; Sirriyeh et al. (2012)

Appendix D

Figure 1

Flow Diagram of the Study Selection Process



Appendix E

Table 4

Summary of Included Studies

Authors	Participants	Research Method	Leisure Participation	Study Findings
Acevado-Polakovitch et al. (2007)	Children *n*= 188, M-F, 4-9 years, with/without ADHD	Quantitative Parent-Reported (Questionnaire)	Non-Active (reading, tv watching)	Children with ADHD watch significantly more tv and read less than peers without ADHD
Arrizabalaga-Crespo et al. (2010)	Children & Adolescents *n* = 228, M=128, F=96, 8-18 years, with/without ADHD	Quantitative (Questionnaire)	Non-Active (screen time)	School-aged youth without ADHD spend more time using the internet compared to group with ADHD
Barfield & Driessnack (2017)	Children *n* = 20, M=11, F =9, 7-11 years, with ADHD	Qualitative (Draw and tell interview)	Active (sports, PA) Non-Active (imaginary play, construction games)	90% of children engaged in stress reducing activity, often outdoors, and with others.
Basay et al. (2020)	Children & Adolescents *n* = 277, M=148, F=129, 7-17 years, ADHD & other psych disorders, Parents *n* =277	Quantitative (Cross-sectional questionnaire)	Non-Active (screen time)	Children and adolescents with ADHD and/or conduct disorder had significantly longer screen time use than those without diagnosis
Bolic Baric et al. (2018)	Adolescents *n* = 815, M=427, F= 388, 12-18 years, with/without ADHD	Quantitative (Cross-sectional questionnaire)	Non-Active (screen time, arts activities) Active (sports)	The leisure of adolescents with ADHD centred around internet activities. Online games seen as a means for social interaction
Coussens et al. (2020)	Children *n*= 16, M= 13-F=3, 5-9 years, Developmental Disorders	Qualitative (Photo Elicitation Interview	Non-Active (playing, make believe) Active (sports, PA)	Activities most satisfying for children with ADHD when they can play, learn, and be amongst others (e.g., sports, PA, playing with toys, and make believe)

Authors	Participants	Research Method	Leisure Participation	Study Findings
Cowart et al. (2004)	Children & Adolescents. *n* = 196, M=106, F= 90, 5-14 years, with/without ADHD	Quantitative (Parent Reported Questionnaire)	Non-Active (screen time, art projects) Active (sports, PA)	No significant differences of recreational preferences. Preference for video games correlated with poor social skills for children with ADHD
Engel-Yeger & Ziv-On (2011)	Children *n* = 58, M, 6-10 years, with/without ADHD	Quantitative (Questionnaire)	Non-Active. (reading, spending time with friends) Active (sports, PA)	Children with ADHD showed a significantly lower preference towards physical, social, skill-based, and rule-based activities when compared to the children without ADHD
Harvey et al. (2009)	Children *n* = 12, M, 9-12 years, with/without ADHD	Concurrent Mixed Methods	Active (sports, PA)	Boys with ADHD participated in more individual sports but less team sports, PA, and spontaneous play
Harvey et al. (2013)	Children *n* = 10, M=8, F=2, 9-10 years, ADHD	Concurrent Mixed Methods	Non-Active (screen time) Active (individual and team sports, PA)	Children with ADHD participated in PA but exhibited poor FMS. Socialisation expressed as motivation for sports participation
Holton & Nigg (2020)	Children *n* = 288, M-F, 7-11 years, with/without ADHD, Parents (*n* = 288)	Quantitative (Questionnaire)	Non-Active (reading, screen time) Active (sports & PA)	Increase in daily screen time (>2 hrs) of the children with ADHD was correlated with less time spent being active and reading

Authors	Participants	Research Method	Leisure Participation	Study Findings
Karci & Gurbuz (2022)	Children & Adolescents *n* = 100, M= 75, F= 25, 7-17 years, ADHD	Quantitative (Questionnaire)	Non-Active (screen time) Active (sports, outdoor PA)	Significantly more time spent using the internet and watching television and less time outdoors during the pandemic lockdowns. Significant differences in symptom severity found between those who were physically active and those who were not.
Kaya Kara et al. (2021)	Children *n* = 55, M= 4, F=8, 6-11 years, ADHD	Quantitative (Questionnaire)	Non-Active (screen time, art projects, time with friends, hobbies)	Videogaming, screen time, participation in arts and crafts significantly higher during the pandemic than pre pandemic participation
Kietglaiwansiri & Chonchyaiya (2018)	Children & Adolescents *n*= 182, M-F (4:1), 6-19 years, with/without ADHD	Quantitative (Questionnaire)	Non-Active (video & computer gaming)	School-aged youth with ADHD had significantly higher rates of compulsive video gaming than those without ADHD.
Kim et al. (2011)	Children & Adolescents *n*= 66707, M= 12.3%, F=5%, 6-17 years with/without ADHD	Quantitative (National Survey)	Non-Active (screen time, reading, social club) Active (organized sports, PA)	Children with ADHD were less physically active, participated in less organized sports & pleasure reading than their age and biologically sex matched peers.
Lingineni et al. (2012)	Children & Adolescents *n* = 68634, M=35677, F=32863, 5-17 years, with/without ADHD	Quantitative (Cross-Sectional National Survey)	Non-Active (screen time) Active (sports)	School-aged youth with ADHD reported significantly less sports participation but increased screen time than their age matched peers. Significant difference lost with medication effect

Authors	Participants	Research Method	Leisure Participation	Study Findings
Mercurio et al. (2021)	Children & Adolescents *n* = 34675, M=17,716, F=18, 646, 6-17 years, with/without ADHD	Quantitative (Retrospective Cross-Sectional National Survey)	Non-Active (screen time) Active (PA)	School-aged youth with ADHD significantly less likely to participate in daily PA when compared to school-aged youth without ADHD
Parraga et al. (2019)	Children & Adolescents *n* = 160, M=104, F=56, 6-16 years, with/without ADHD	Quantitative (Questionnaire)	Non-Active (screen time, reading) Active (PA, playing with friends)	School-aged youth with ADHD had significantly higher screen time usage and lower participation in PA than their peers without ADHD. Time allotted to studying may decrease time allotted for PA participation of school-aged youth with ADHD
Pfeifer et al., (2011)	Children *n* = 32, M= 28-F=4, 7-12 years, with/without ADHD	Quantitative (Parent Reported Questionnaire)	Non-Active (screen time, art projects) Active (playground games)	Most preferred play types of children with ADHD were motor and symbolic play
Rosenthal et al., (2021)	Children & Adolescents *n* = 1243, M=70%, F=30%, $\bar{x}$= 12.4 years, with/without ADHD	Quantitative (Longitudinal Survey)	Non-Active (screen time) Active (PA)	No significant differences found for screen time use and daily PA between ADHD and control groups
Shimoni et al., (2010)	Children *n*= 50, M, 8-11 years, with/without ADHD	Quantitative (Questionnaire)	Non-Active (social, recreational) Active (sports,PA)	No significant differences in general activity scores. Similar frequency scores in PA participation of boys with and without ADHD

Authors	Participants	Research Method	Leisure Participation	Findings
Swansburg et al. (2021)	Children & Adolescents *n* = 587, M = 421, F= 166, 5-18 years, ADHD	Quantitative (Caregiver Reported Survey)	Non-Active (screen time, art projects, board games, reading) Active (PA)	Less time spent in PA but more time videogaming, watching television, reading, listening to music & doing crafts during COVID-19 pandemic
Tandon et al. (2019)	Children & Adolescents *n* = 57518, M-F, 6-18 years, ADHD, ASD & asthma	Quantitative (National Survey)	Non-Active (screen time, clubs, organizations) Active (sports, PA)	Children with severe ADHD and low SES reported the least amount of sports participation. All groups reported > 2 hours of screen time per day.
Tong et al. (2016)	Children & Adolescents *n* = 785, M=409, F=376, 9-13 years, with/without ADHD	Quantitative (Questionnaire)	Non-Active (screen time) Active (PA levels)	Children with ADHD had significantly longer screen time use and more sedentary behaviours than their peers without ADHD. No difference found for PA participation between groups with and without ADHD
Werling et al. (2021)	Children & Adolescents *n* = 126, M=94, F= 32, 10-18 years, with ADHD	Quantitative (Questionnaire)	Non-Active (Media Usage)	Significant increases in screen time usage during pandemic lockdowns. Boys with ADHD had an increase in gaming while girls with ADHD had an increase in social media us

Appendix F

Results from Descriptive Numerical Summary

Figure 2

Bar Graph Representing Years of Publications

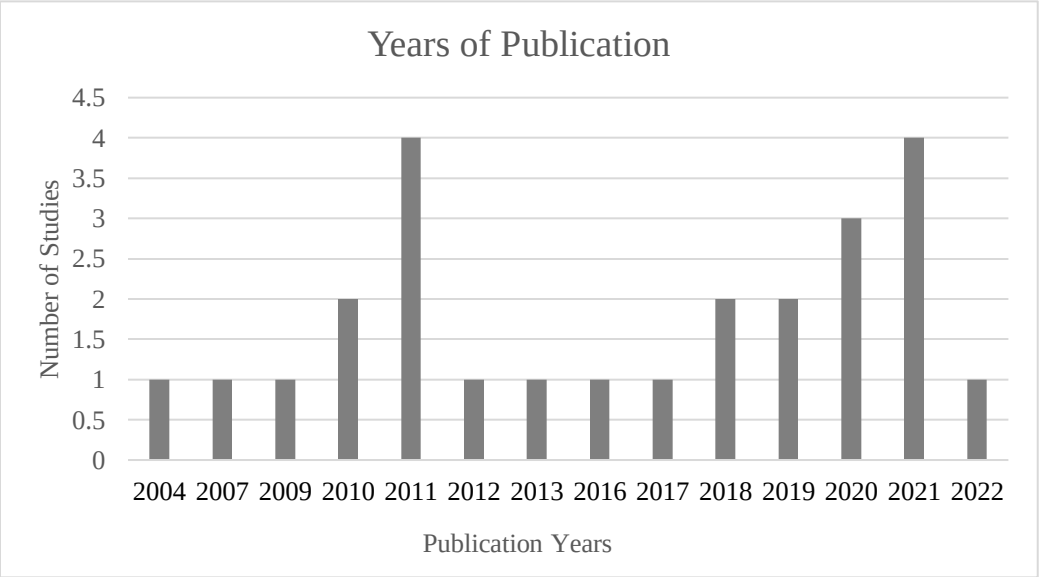


Figure 3

Bar Graph Representing Countries of University Affiliation

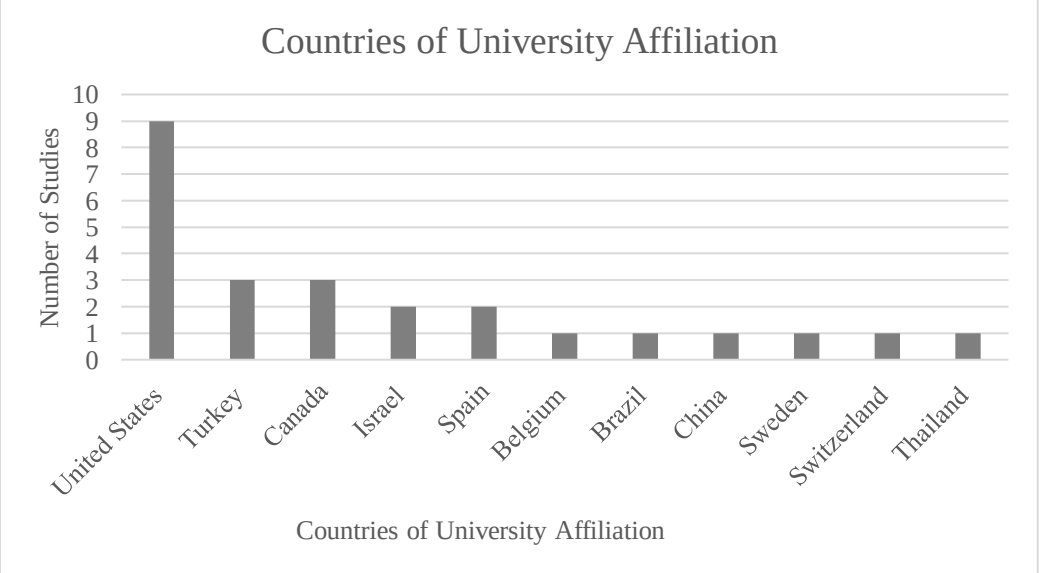


Table 5

Participant Information

Subcategory	Details	n	%
Sample Size	Small	5	20
	Medium	3	12
	Large	13	52
	Very Large	4	16
Age Range	Children (5-12 years)	12	48
	Adolescents (13-18 years)	1	4
	Wide Age Range (5-18 years)	12	48
Biological Sex	Male and female	20	80
	All male	3	12
	Not specified	2	8
Diagnosis	Clinical Diagnosis of ADHD	11	44
	Parent Reported ADHD	6	24
	Both Clinical and Parent Reported	5	20
	Not Specified	3	32
Comorbidity	Present (Other Psychological Disorders)	7	28
	Excluded	5	20
	Not Reported	13	52

Table 6

Types of Leisure

Leisure Types	Activity Subthemes	n	%
Non-Active	Screen time, creative arts, socializing with friends, hobbies, community activities	7	28
Active	Physical activity, sports, outdoor play	2	8
Both	Non-active & active activities	16	64

Table 7

Leisure Places

Leisure Places	Settings	n	%
Both at home & in the community	Both indoors & outdoors	15	60
At home	Only indoors	9	36
Not specified	Not specified	1	4

Table 8

Leisure Partners

Leisure Partners	Examples	n	%
With others	Family, friends, peers	10	40
Alone	No leisure partners	1	4
Not reported	Not specified	14	56

Table 9

Results from QATSDD

Methodological Strength	Scores	n	%
Low (Below 60%)	19 – 2	8	32
Medium (60-79%)	26 – 38	17	68
High (80% and above)	No scores	0	0