THE FREQUENCY OF CHILDHOOD MALTREATMENT EXPERIENCES IN A NATIONAL CANADIAN SAMPLE OF ADULT WOMEN REPORTING A DIAGNOSIS OF ATTENTION DEFICIT HYPERACTIVITY DISORDER

by © Chelsea Canning

A Thesis submitted to the School of Graduate Studies

in partial fulfillment of the requirements for the degree of

Master of Education – Counselling Psychology

Faculty of Education

Memorial University of Newfoundland

May 2022

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Abstract

This study examined the reported frequency of childhood maltreatment (sexual and physical abuse) in adult women reporting a diagnosis of attention deficit hyperactivity disorder (ADHD). Using data from the Canadian Community Health Survey – Mental Health (CCHS-MH) (2012), a sample of 402 women who reported being diagnosed with ADHD by a health professional was compared to a sample of age-matched women not reporting a diagnosis of ADHD on the frequency that they experienced different forms of physical and sexual abuse. Group comparisons were conducted using Pearson's chi-square and effect sizes were assessed with Cramer's V. The results of the study showed that women reporting a diagnosis of ADHD reported experiencing all forms of childhood maltreatment significantly more frequently than women not reporting a diagnosis of ADHD. The implications of these findings along with directions for future research are discussed.

General Summary

This study examined the reported frequency of childhood maltreatment in the forms of sexual abuse and physical abuse in adult women reporting a diagnosis of attention deficit hyperactivity disorder (ADHD). Using data from the Canadian Community Health Survey – Mental Health (CCHS-MH) (2012), 402 women who reported being diagnosed with ADHD by a health professional was compared to women of a similar age not reporting a diagnosis of ADHD. This was then compared with frequency that they experienced different forms of physical and sexual abuse. The results of the study showed that women reporting a diagnosis of ADHD reported experiencing all forms of childhood maltreatment more frequently than women not reporting a diagnosis of ADHD. The implications of these findings along with directions for future research are discussed.

Acknowledgements

I would like to express my sincere gratitude to my supervisor, Dr. Jacqueline Hesson, for her generous mentorship and guidance throughout every stage of my graduate training. Your hard work and dedication to not only my academic but also my professional development have been invaluable. Your feedback, insight, and careful consideration helped bring this project to fruition.

To my daughters, you have been my strength and drive. While at times this degree required more patience than I had hoped, completing my graduate degree, producing a well-thought-out and informative thesis, and raising two strong, independent, girls could not have made me prouder. I hope that you can take from my experience and understand that the sky is the limit.

Finally, to my husband, Derm, without your infinite support, unyielding patience, and endless love, this would have never been possible. Thank you for being in my corner every step of the way. Thank you for challenging me, supporting me, and being my biggest fan. I would not have been able to complete this without you.

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Introduction

1.1 Attention Deficit Hyperactivity Disorder

The Diagnostic and Statistical Manual of Mental Disorders-Fifth Edition (DSM–5; American Psychiatric Association, 2013) classifies ADHD as a neurodevelopmental disorder in which an individual, displays "a persistent pattern of inattention and/or hyperactivity–impulsivity that interferes with functioning or development" (p. 314). The likelihood of an individual being diagnosed with Attention Deficit Hyperactivity Disorder (ADHD) has increased significantly in the last decade, and has been classified as one of the most prevalent childhood psychiatric disorders (Mahone & Denckla, 2017). Research has revealed that impairments for male children with ADHD persist into adulthood (Barkley et al. 2002; Klein et al., 2012). In contrast, there has been limited research that has examined adult outcomes in females with ADHD, although the available research has indicated that, like males, they are at an increased risk for persistent ADHD symptoms, comorbidities, and major life impairments as well (Babinski et al., 2011; Biederman et al., 2010; Hinshaw et al., 2006; Hinshaw et al., 2012; Mannuzza & Klein, 2000).

1.2 Females and ADHD

Research on females with ADHD is limited compared to what is available for males. Adelizzi (2003) proposed that females with ADHD have been "largely neglected by researchers because hyperactivity is usually missing in girls" (p. 28). Young et al., (2020) noted that research previously conducted concerning ADHD subjects had been plentiful for males but limited when it came to females. This is supported by other findings that indicate that ADHD in female children and youth is not identified as early in life because male ADHD patterns are overrepresented in the research and literature (Langwith, 2009). Nadeau (2002) added to the hypothesis as to the underrepresentation of females in ADHD research by stating

that due to a “stereotypical mind frame” that ADHD is a diagnosis for “hyperactive little boys” (p. 28), males frequently externalize their symptoms, presenting as in an outward, “hyper” manner as evidenced by fidgeting, restlessness, an impulsive nature and inability to effectively communicate. Whereas, females are observed to internalize symptoms such as the inability to concentrate, focusing on multiple tasks at one time and withdrawing. (CITE) As such, research regarding female ADHD had fallen to the wayside except for recent years. Males are diagnosed with ADHD four times more often than females (Ramtekkar et al., 2010), it is understandable that male individuals who are diagnosed with ADHD would be an area of focus for research. Hinshaw (2003) noted that, historically, diagnostic criteria for ADHD have been based on the symptomology of males and their presentation of ADHD, thus, females have been viewed as equal to males in their symptoms and presentation rather than account for the gender differences in the diagnosis. Today, there are three presentations of ADHD and while there are a variety of symptoms, no two individuals with ADHD present identically. As a result, viewing males and females with ADHD as equivalent is ineffective.

1.3 Childhood Maltreatment

Childhood maltreatment is defined as various forms of abuse and neglect that happen to children under 18 years of age (World Health organization, 2020). The concept of maltreatment often involves physical, sexual or emotional abuse or negligence that impacts the child’s health or wellbeing (World Health Organization, 2020).

Childhood maltreatment affects anywhere between 2% and 32% of children worldwide (Afifi et al., 2014). Many factors put a child at risk for abuse, including socio-economic status, age, gender, race, societal norms, drug and alcohol abuse, and environmental factors (Fisher et al., 2010; Gilbert et al., 2009; Kessler et al., 2006). Research indicates that individuals from lower socioeconomic status are at a higher risk for abuse (Patrick et al., 2012) while females are more likely than males to experience physical and sexual abuse

(Cotter & Savage, 2018). Having a parent who struggles with drug and alcohol abuse greatly increase the potential for abuse as substance abuse can reduce an individual's ability to regulate emotions, lower their inhibitions and often reflects poor coping skills (Patrick et al., 2012). Research has also suggested that maltreatment in childhood is associated with a higher probability of an ADHD diagnosis and increased ADHD-type symptoms (Capusan et al., 2016; Fuller-Thomson & Lewis, 2015; Sanderud, Murphy, Stern & Elkit, 2016; Singer, Humphreys, & Lee, 2016; Sugaya et al., 2012). However, the direction of the relationship between childhood maltreatment and ADHD is unclear. It may be the case that childhood maltreatment impacts the development of a child's brain, which in turn leads to the development of ADHD (Carlson, 2012). Conversely, it may be that the symptoms of ADHD result in a child being more likely to be maltreated (Sanderud, Murphy & Elkit, 2016), especially when a parent also has undiagnosed ADHD (Mokrova, O'Brien, Calkins & Keane, 2010).

1.4 The Present Study

Most of the literature has focused on whether or not an individual with ADHD experienced childhood maltreatment but not the frequency in which they experienced specific types of childhood maltreatment. Additionally, many of the studies that have looked at the relationship between ADHD and maltreatment have been conducted with clinical samples. The present study examined the frequency in which women report experiencing different forms of childhood maltreatment based on whether or not they report a diagnosis of ADD/ADHD in a large community-based sample that

Literature Review

2.1.1 Diagnostic criteria

According to the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V; APA, 2013), individuals with ADHD show a persistent pattern of either inattention and/or hyperactivity-impulsivity that interferes with daily functioning or development. Symptoms of ADHD are grouped into two categories: inattentive and hyperactive/impulsive. Inattentive symptoms include failure to attend to details at school, work, or home, having trouble holding attention, not appearing to listen when spoken to directly, having difficulty following through with tasks or instructions, difficulty organizing tasks and activities, being easily distracted, easily forgetting, often avoiding or showing reluctance to work on tasks that require mental effort, and frequently losing things. Symptoms of hyperactivity/impulsivity include: frequent fidgeting or tapping of hands or feet, often leaving one's seat when expected to remain seated, frequently running or climbing in appropriate situations, restlessness, inability to take part in leisure activities, talking excessively and frequently speaking out of turn, exhibiting trouble waiting one's turn and intruding on others.

Based on the combination of presenting symptoms, an individual can be classified as having one of three subtypes of ADHD: inattentive, hyperactive-impulsive or combination.

2.1.2 Inattentive Subtype

Presentation of the inattentive subtype includes being easily distracted, having frequent daydreams, having difficulty processing, and being unable to stay on track (Geurts et al., 2005). Females tend to be more frequently diagnosed with the inattentive subtype of ADHD while males are more often diagnosed with the hyperactive/impulsive subtype (Ramtekkar et

al., 2010). The inattentive subtype can be misdiagnosed up to 60% of the time in comparison to the hyperactive/impulsive subtype (Geurts et al., 2005) as presentation may include internalized, withdrawn characteristics it can be harder to identify the presence of the inattentive subtype, often equating these attributes to other factors. Research by Robinson et al., 2008 elaborate on this as their research has shown known that females with ADHD are more likely to internalize symptoms and become anxious and depressed and suffer emotional dysregulation.

2.1.3 Hyperactive-Impulsive Subtype

Symptoms associated with this subtype include difficulty waiting and sharing, risk-taking behaviours, a desire for constant motion that induces excessive fidgeting and an inability to remain seated, excessive vocal patterns, and difficulty engaging. In addition, time management and the inability to focus may also play a role in this subtype (Geurts et al., 2005). Males are diagnosed more frequently with this disposition of ADHD than females are (Gibbins et al., 2010). In adults, symptoms of hyperactivity tend to decrease and often present as internal restlessness (Gibbins et al., 2010).

2.1.4 Combined Subtype

The combined subtype is diagnosed when an individual possesses multiple symptoms of the inattentive and hyperactive subtypes. This subtype is the most frequently diagnosed out of all three subtypes (Geurts et al., 2005).

2.2 Prevalence of ADHD

It has been noted that research on individuals with ADHD has been plentiful for males but more limited when it comes to females (Young et al., 2020). In childhood and adolescence, males are diagnosed with ADHD approximately four times more frequently than females (Ramtekkar et al., 2010). In Canada, 5% to 9% of children and adolescents have a

diagnosis of ADHD and research suggests that at least 60% of these individuals will continue to experience the symptoms of ADHD to some degree in adulthood (Belanger et al., 2018). In addition, there are a growing number of individuals being diagnosed with ADHD for the first time in adulthood (Hamed, et al., 2015). In adulthood, the prevalence of ADHD is estimated to be 4.2 % (Song et al., 2021) with the ratio of males to females being 2:1 (Ramtekker et al., 2010).

2.3 Impacts of ADHD

While ADHD often presents as a single disorder, it frequently co-occurs with other psychiatric disorders (Bélanger et al., 2018). One of ADHD's most frequent comorbidities is depression (Swanson et al., 2014), which can result in suicidal and self-injurious behaviours. In their study on self-injurious behaviors among women, Swanson et al. (2014) found that women who were diagnosed with ADHD in childhood and continued to experience symptoms as adults had a greater frequency of suicide attempts and of severe non-suicidal, self-injurious behaviours such as burning and cutting than women without a diagnosis of ADHD.

2.4 Etiology of ADHD

ADHD is a disorder with multiple possible etiologies. It has been suggested that combinations of genetic, neurological, and environmental factors contribute to the development of ADHD and its heterogeneous phenotype (Akutagava-Martins et al., 2016).

Prematurity and low birthweight have been linked to ADHD. Prevalence of ADHD increases as gestational age decreases (Sucksdorff et al., 2016) with children who are born prior to 33 weeks gestational age reported to have a 2- to 3-fold increased risk of being diagnosed with ADHD compared to their peers born at term (Johnson et al., 2016). In addition, children born prior to 26 weeks gestational age are reported to have a four-fold

increased risk of being diagnosed with ADHD (Johnson et al., 2016). Sciberras, Mulraney, Silva & Coghill (2017) also found an increased risk of ADHD, independent of prematurity, in babies that were small for gestational age (less than 5.5 pounds). Johnson and Marlow (2011) also reported that children in their study who were born at a very low birth weight were more frequently diagnosed with ADHD relative to their normal weight peers. Johnson and Marlow (2011) also noted that the low birthweight babies showed evidence of impairment in normal brain growth and maturation which they suggested was related to the increased the risk of being diagnosed with the inattentive subtype of ADHD.

There also appear to be several gene variants that are associated with an increased risk for ADHD (Faraone & Mick, 2010). These variants are important for brain development, cell migration, and encoding for catecholamine receptor and transporter genes (Gizer et al., 2009). Since genetics can affect neurotransmitter pathways in the brain (Stergiakouli et al., 2012) it is possible that an accumulation of larger deletions and duplications has the potential to influence gene transcription, which has been noted to be more commonly found in individuals with ADHD (Williams, 2012), suggesting that there could be a genetic cause or predisposition for ADHD. Once the gene transcription encodes in the mRNA sequence this can be passed from generation to generation. This may explain why the biological relatives of probands with ADHD display higher rates of ADHD than relatives of controls (Thapar & Sergiakouli 2008).

ADHD is a complex disorder and as such is most likely influenced by a large number of genes as well as environmental factors.

2.5 Childhood Maltreatment

Childhood maltreatment is generally seen as sexual, physical or emotional abuse or neglect of an individual under the age of eighteen (Collishaw et al., 2007). While, there are numerous forms of childhood maltreatment, the focus of the present study is on physical and sexual abuse as these two types of childhood maltreatment have been shown to have a higher additive risk factor for psychopathology in general (Dube et al., 2001; Kessler & Magee, 1993; Molnar et al., 2001).

2.6 Impact of Childhood Maltreatment

Trauma in the childhood years is common with a prevalence of childhood maltreatment impacting between 2% and 32% of children worldwide (Afifi et al., 2014). The biopsychosocial stress stemming from trauma can greatly hinder one's development. Childhood maltreatment has been associated with an abundance of psychosomatic symptoms that can and often do continue into adult life (Berk, 2013). Developmental stress caused by such abuse has been associated with later-life consequences, including post-traumatic stress disorder (Widom, 1999), depression, anxiety, and difficulty forming and maintaining relationships (Dube et al., 2001).

A study conducted by Anda et al., (2006) conducted research to assess the impact of numerous, interrelated, adverse childhood experiences (ACEs) on a wide variety of health behaviors and outcomes. Anda et al., (2006) looked at a wide array of ACEs including physical abuse and sexual abuse. Research found a graded relationship between the number of ACEs and the risk of panic reactions, depressed affect, anxiety, obesity, sleep disturbances and substance use and abuse (Anda et al., 2006). In addition, there was also a relationship between ACES and impaired memory, perceived stress and poor anger management (Anda et

al., 2006). Overall, as the ACE score increased the number of comorbid outcomes increased in a graded fashion (Anda et al., 2006).

2.7 Physical Abuse

Physical abuse refers to any intentional or unintentional act causing bodily injury or trauma to another individual (Hansen et al., 1999). Physical abuse can also be considered as any unwanted and non-consensual impact or touch from another human being (Rakovec-Felser, 2014). Physical abuse has an occurrence rate that is significantly higher among women and vulnerable populations, such as children and seniors, when compared to populations such as adult males (Ravkester, 2014). Within Canada, it is estimated that 21.1% of female youth have experienced physical trauma with 9.2% reporting a past incident involving a severe physical altercation (MacMillan et al., 1997).

2.7.1 Impact of Physical Abuse

In a study conducted by Carpenter et al. (2011), it was found that cortisol levels in women who had experienced physical abuse in their childhood were greatly reduced when they were placed in a stressful environment. A reduction in cortisol levels can have negative health impacts such as fatigue, hyperglycemia, low blood sugar, and hyperpigmentation (Carpenter et al., 2011). Abuse in childhood has also been shown to increase the likelihood of one or more illnesses, physical symptoms, anxiety, anger, and depression decades later in life (Springer et al., 2007). Bick and Nelson (2016) found that child abuse and neglect can be associated with certain regions of the brain failing to form, function, or grow properly. Individuals with a history of maltreatment may be correlated with reduced volume in overall brain size and may affect the size and functioning of the amygdala, hippocampus and

cerebellum which function in processing emotions, memory and communication and higher cognitive abilities, respectively. (Bick & Nelson, 2016)

2.8 Physical Abuse and ADHD

Childhood maltreatment, in the form of physical abuse, has consistently been associated with ADHD. Stern et al. (2018) completed a meta-analysis of ADHD and physical abuse and noted that physical abuse is more prevalent among individuals with ADHD than among individuals without ADHD and that higher levels of ADHD symptoms are observed among individuals who have experienced physical abuse compared to individuals who did not have a physical abuse experience. In their meta-analysis, Stern et al. (2018) found children and youth exposed to frequent abuse had higher odds of meeting diagnostic criteria for ADHD when compared to children who were not exposed to frequent abuse. They also found that girls who had an ADHD diagnosis were more likely to experience physical abuse in comparison to their peers without ADHD and women who reported a diagnosis of ADHD were twice as likely to have a history of physical abuse independent of socio-economic factors such as age, race, income, or education (Stern et al., 2018). Fuller-Thompson et al. (2014) found that individuals with a history of physical abuse are six-times more likely to self-report ADHD than those who did not report experiencing physical abuse (Fuller-Thompson et al., 2014).

Twin studies allow for a better understanding of the long-term effects of physical abuse. Capusan et al. (2016) conducted research with monozygotic twins to examine whether an association exists between childhood maltreatment in the forms of neglect, physical abuse, sexual abuse, and a diagnosis of ADHD in adulthood. The study examined whether adults exposed to maltreatment in youth presented with more ADHD symptoms relative to their identical twin who had not been exposed to maltreatment. The effects of environment were controlled for in the study as the twins grew up in the same family home. Researchers used a

multilevel discordant twin and sibling design comparing twins versus genetic non-twin siblings and various levels of maltreatment. Capusan et al. (2016) reported an association between ADHD and maltreatment, in particular physical abuse, in monozygotic twins and noted that females who had been exposed to physical abuse were more likely to meet diagnostic criteria for ADHD than their twin who had not been exposed to abuse.

It is important to note that ADHD can also be a risk factor for maltreatment and victimization. The behaviors that are associated with ADHD may evoke negative responses from an individual's environment and produce or increase interpersonal conflicts (Sari Gokten et al., 2016). Evinc et al. (2014) conducted a study researching the difference between abusive discipline attitudes in mothers who had a child diagnosed with ADHD and mothers who had a child without diagnosis of ADHD. One hundred and twenty-five children and their mothers participated in an interview based on open ended questions regarding their views and practice of discipline (Evinc et al., 2014). Research showed that ADHD symptoms increase the risk of parental verbally and physically abusive discipline. In addition, mothers whose children were diagnosed with the hyperactive subtype of ADHD indicated they were the most favorable of physical discipline than parents whose children were diagnosed with the inattentive or combined subtype of ADHD (Evinc et al., 2014).

2.9 Sexual Abuse

Sexual abuse varies in severity and type, therefore making it a difficult concept to define (Anguelova, 2018). The World Health Organization (WHO; 2017) has defined sexual abuse as

> "the involvement of a child or adolescent in sexual activity that he or she does not fully comprehend and is unable to give informed consent to, or for which the child or adolescent is not

> developmentally prepared and cannot give consent, or that violates the laws or social taboos of society." (p. 75)

WHO (2021) extends its definition of sexual abuse by describing three distinct types of abuse—contact sexual abuse excluding intercourse, contact sexual abuse involving intercourse and non-contact sexual abuse—with three levels of severity: less severe, severe, and very severe.

- Contact sexual abuse excluding intercourse. This subtype of sexual abuse includes physical touching with or without clothing, making a child undress, physical touching, kissing, and oral sex.
- Contact sexual abuse including intercourse. This category includes using a body part or object to penetrate and rape a child.
- Non-contact sexual abuse. This subtype includes all other forms of sexual abuse, including flashing, viewing pornography, exposing a child to sexual acts, online sexual acts, and making or viewing child-abuse images or videos.

Sexual abuse may be perpetrated by adults or children, regardless of gender, who as result of their developmental stage are in a position of power or trust in relation to the victim (WHO, 2021). An occurrence may happen briefly or may be prolonged over time and can occur once or involve repeated exposure and acts of sexual abuse (WHO, 2021).

The WHO (2021) estimates that 25.6% of the world's population have reported a sexual assault at one point in their life. Among the 25.6%, 18% of the reports were from females (WHO, 2021). The Centre for Disease Control and Prevention (2019) note that one in three female rape victims are between the ages of eleven and seventeen, one in eight are age ten or younger and that 20% of female youth under the age of 18 will experience sexual abuse.

Within Canada, it is estimated that 12.8% of female youth have experienced sexual trauma, with 11.1% reporting a severe sexual altercation (MacMillan et al., 1997). Current statistics indicate an increase in the prevalence of sexual abuse with one in three women in Canada (32%) reporting that they have been sexually abuse (Cotter and Savage, 2019). This may be in part due to the rise of social movements like #MeToo and Time's Up which Rotenburg and Cotter (2018) noted have increased public discussion regarding sexual abuse; however, police-reported data collected through the Uniform Crime Reporting Survey, indicates that sexual assault remains one of the most underreported crimes (Rotenberg & Cotter, 2018).

2.9.1 Effects of Sexual Abuse.

Sexual abuse in childhood has been linked to physical, psychological, and behavioural disorders such as substance abuse, suicidal tendencies, self-harm, sexual promiscuity, PTSD, and a range of physical-health concerns (Anda et al., 2005, Maniglio, 2010; Putnam, 2003; Senn, et al., 2008). While all acts of sexual abuse have lasting impacts, more severe and invasive acts result in increased difficulties for the abused individual (Capusan et al., 2016).

2.10 Sexual Abuse and ADHD

Fuller-Thomson, Lewis and Agbeyaka (2016) conducted a study to investigate the health profile of women with self-reported ADHD. A sample of 107 adult women with self-reported ADHD were compared to a control group of 3,801 adult women not reporting a diagnosis of ADHD. Results showed that women with self-reported ADHD were 3 times more likely to have a history of sexual abuse. Sonnby et al., (2011) reported similar findings in a study in which they examined the comorbidity of ADHD and depression and sexual abuse in adolescent males and females between the ages of 15 and 18. Participants were asked

to complete a questionnaire that included self-rating questions pertaining to ADHD, depression, and sexual abuse. Results showed that 47% of female adolescents had symptoms related to either depression or ADHD and had also experienced sexual abuse in their childhood. In a study looking at childhood sexual abuse in males and females using gender-specific bivariate and logistic regression analyses with data from the 2012 Canadian Community Health Survey-Mental Health, Fuller-Thomson and Lewis (2015), found that 34% of incidents of reported sexual abuse were females with ADHD under the age of eighteen.

2.11 The Present Study

The aim of the present study was to examine whether women reporting a diagnosis of ADHD report experiencing several forms of childhood maltreatment (different types of sexual and physical abuse) more frequently than women not reporting a diagnosis of ADHD. Based on the limited available research, it was hypothesized that women reporting a diagnosis of ADHD would report experiencing all forms of childhood maltreatment more frequently than women without a self-reported diagnosis of ADHD.

Methods

3.1 Participants

Data for this study were obtained from the Canadian Community Health Survey of Mental Health (CCHS-MH; Statistics Canada, 2013), a nationally representative sample of individuals living in private dwellings in all 10 Canadian provinces. Respondents for the survey were selected in three stages. First, geographical areas were selected, followed by households within each geographical area. Finally, one respondent from each household was randomly selected. The overall national response rate was 68.9%, with the CCHS-MH providing cross-sectional data from 25,113 Canadians aged 15 to 80. The CCHS-MH database does not include data from individuals living in the three territories, those living on Indigenous reserves or settlements, full-time members of the Canadian forces, or institutional residents. However, Statistics Canada estimates that the total number of these individuals represents less than 3% of the target population (Statistics Canada, 2013).

Age in the CCHS-MH database is recorded categorically in 5-year increments from age 15 to over age 80. Data from participants in the CCHS-MH were included in the current study if they met the age requirement for participation, had identified as female, and had provided responses to the variables of interest. Participants in the 15-to-19 age category were not included in the analyses as the questions regarding childhood maltreatment were not asked of anyone under the age of 18. As the present study is focused on the experiences of adult women, data from senior women (those over age 64) were excluded from the analysis, as those aged 65 and older are typically considered to be “seniors” (Statistics Canada, 2007).

As part of the CCHS-MH interview, participants were asked to indicate whether they had been diagnosed by a health professional with a variety of mental-health conditions that had lasted or were expected to last for 6 months or longer. One of these questions was “Do you have attention deficit disorder?” Two hundred and one female participants between the

ages of 20 and 64 years responded “yes” to this question and formed the ADHD group. An age-matched sample of randomly selected adult women who did not report a diagnosis of ADHD was created as the comparison group. The study’s final sample consisted of 402 female participants, aged 20 to 64 inclusive.

3.2 Data Collection

Data collection occurred from January 2012 to December 2012. During the sampling period, 25,113 valid interviews were conducted. Detailed information regarding sampling techniques and data collection is available from Statistics Canada (2013) and are summarized below.

The CCHS-MH used a complex two-stage stratified design in which clusters made up each stratum. First, clusters were selected using a sampling method with a probability proportional to size. Next, for each cluster, dwelling lists were prepared, and a systematic sample of households was selected from these lists. Afterwards, a single member was randomly selected from each household with the assistance of selection probabilities based on household composition and age.

Prior to the commencement of data collection, introductory letters and brochures were sent to the 43,030 selected households explaining the purpose of the study. The importance of survey participation, along with examples outlining how the CCHS-MH data would be utilized, were provided. Participants were made aware that their contributions would be meaningful and important, but that completion of the survey was entirely voluntary.

3.2.1 Minimizing Non-Response.

Computer assisted interviewers were instructed to make initial personal contact with randomly selected survey respondents from each dwelling. Every reasonable effort was made to obtain interviews. Respondents were contacted by phone initially to arrange an

appointment time for the in-person interview. However, respondents were also offered the opportunity to complete the interview by phone if they were available immediately. Proxy interviews were not permitted for the CCHS-MH.

To further minimize the incidence of non-response, a letter underscoring the importance of the household's participation in the survey was sent to those respondents who initially refused to complete the survey. This was followed by a second contact by a Statistics Canada representative (either in person or by phone) to further stress the importance of participation in the survey.

3.2.2 Use of Computer-Assisted Personal Interviewing Method

Data were collected directly from survey respondents by trained individuals from Statistics Canada's collections planning and management division. The majority of interviews (87%) for the CCHS-MH were conducted in person, with the remaining completed by telephone. All interviews were completed using the *computer-assisted personal interviewing method* (CAPI). This system allows for custom interviews for each respondent based on their individual characteristics and survey results, ensuring the interviewers do not ask questions that do not apply to the respondent.

3.2.3 Weighting

Each respondent was assigned a survey weight value that corresponded to the number of people in the entire population that the respondent was intended to represent. Weighting is done so that estimates derived from a set of data can be representative of the entire population and not just the sample itself.

3.3 Instrument Description

The CCHS-MH was designed by Statistics Canada in consultation with representatives from various governmental agencies, the Mental Health Commission of Canada, and

academic experts in mental health. Subjects covered in the survey included health, health-care services, lifestyle and social conditions, mental health and well-being, and prevention and detection of disease. The survey was composed of 30 modules. The decision to include an in-depth module assessing for symptoms of a given diagnostic psychiatric disorder was guided by recommendations from the CCHS-MH expert committee. Modules to be incorporated into the CCHS-MH were selected based upon numerous factors including currently available estimates of prevalence, relevance to current programs/policy, perceived impact on health-care costs, and comparability with previous CCHS-MH cycles (Statistics Canada, 2013).

3.4 Measures

3.4.1 Frequency of Childhood Maltreatment

The CCHS-MH interview included a section on Childhood Experiences of Violence Questionnaire – Short Form (CEVQ-SF), dealing with physical and sexual abuse before the age of 16 (Walsh et al., 2008). Respondents were reminded at the onset that all information they provided would remain confidential. The questions on the CEVQ-SF ask respondents to indicate how often, before the age of 16, they experienced specific episodes of maltreatment. The questions included “How many times did an adult slap you on the face, head, or ears or hit or spank you with something hard to hurt you?”, “How many times did an adult push, grab, shove, or throw something at you to hurt you?”, “How many times did an adult kick, bite, punch, choke, burn you, or physically attack you in some way?”, “How many times did an adult force you or attempt to force you into any unwanted sexual activity, by threatening you, holding you down, or hurting you in some way?”, and “How many times did an adult touch you against your will in any sexual way? By this, I mean anything from unwanted touching or grabbing to kissing or fondling.” Respondents indicated their responses on a 5-point scale, ranging from *never* to *more than 10 times*.

3.5 Data Analyses

SPSS (Statistical Package for the Social Sciences) Version 26 software was used to perform the data analyses. A series of chi-square tests was performed to assess whether differences existed in the frequency that women presenting with a diagnosis of ADHD and women not reporting a diagnosis of ADHD reported experiencing several types of childhood maltreatment (physical and sexual in nature mental health). Cramer's Vs were calculated for each comparison to determine effect size.

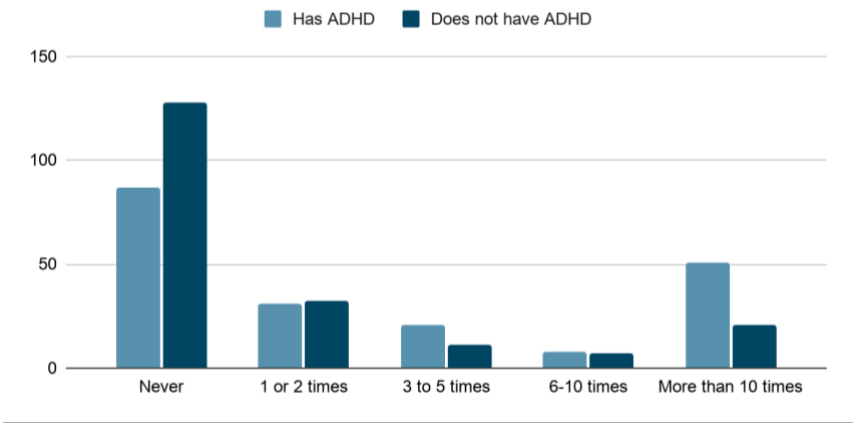
Results

4.1 ADHD and Physical Abuse

Chi-square analyses were conducted to compare the frequency that women reporting a diagnosis of ADHD experienced several types of physical maltreatment prior to age 16 relative to women not reporting such a diagnosis. Chi-square analyses were also conducted to compare the frequency that women reporting a diagnosis of ADHD reported being slapped, spanked or hit prior to the age of 16 compared to the women in the control group The results of this analysis (Figure 1) showed that women who reported a diagnosis of ADHD were significantly more likely to report experiencing these types of physical abuse more frequently than women who did not report a diagnosis of ADHD, $\chi(4) = 23.5$, $p < .001$. Specifically, women in the ADHD group were less likely to report that they had never experienced this type of physical abuse than women in the control group and were more likely than women in the control group to report experiencing this type of abuse on more than ten occasions during childhood. The effect size was medium (0.24).

Figure 1

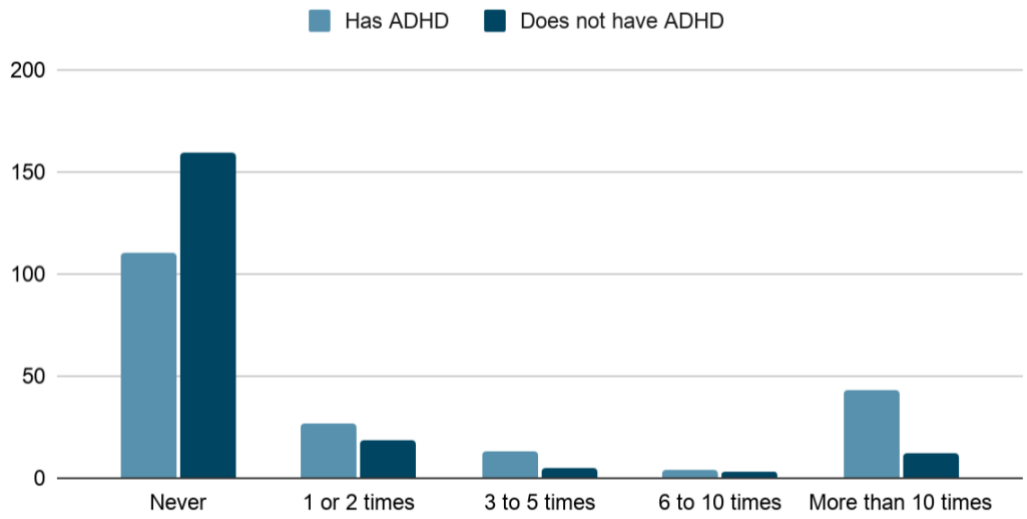
Frequency of a Participant Being Slapped, Hit, or Spanked



Chi-square analysis was also used to compare the ADHD and non-ADHD groups in terms of the number of incidents they reported being physically thrown, grabbed, shoved, or pushed by an adult (Figure 2).

Figure 2

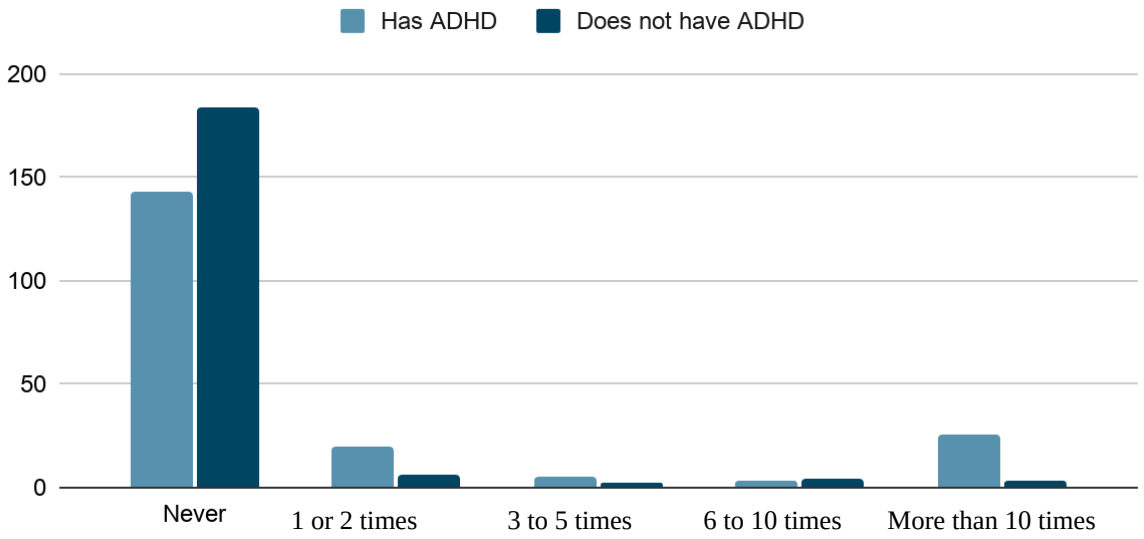
Frequency of a Participant Being Pushed, Grabbed, Thrown, or Shoved by an Adult



The results of this analysis showed significant differences in terms of the frequency that women in the ADHD and control group experienced being physically thrown, grabbed, or pushed by an adult prior to the age of 16, $\chi(4) = 31.5$, $p < .001$. Specifically, women in the ADHD group were less likely to report never having experienced this type of abuse and more likely to have experienced it more than ten times than women in the control group. The effect size was medium (0.28).

Finally, a chi-square analysis was conducted to compare the frequency that the two groups reported being physically attacked—punched, kicked, or bitten (Figure 3). The results of this analysis showed significant differences in terms of the frequency that women in the ADHD and control group reported experiencing this type of abuse, $\chi(4) = 32.3$, $p <.001$. Specifically, women in the ADHD group were less likely than women in the control group to report never experiencing this type of abuse and more likely than women in the control group to report experiencing this type of abuse ten or more times. The effect size was medium (0.29).

Figure 3
Frequency of a Participant Being Physically Attacked

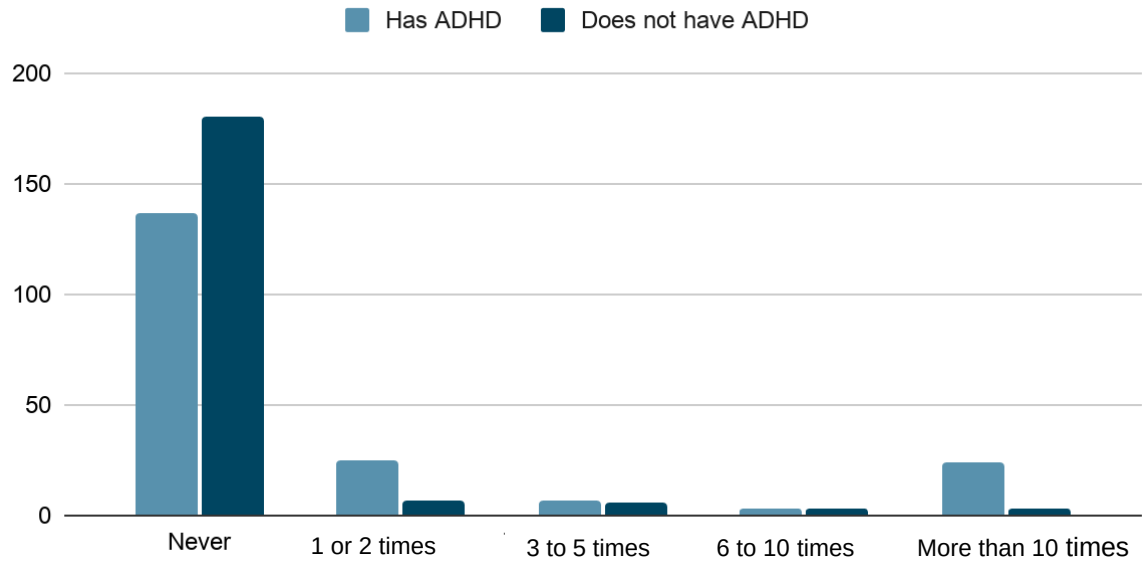


4.2 ADHD and Sexual Abuse

Chi-square analyses were conducted to compare the frequency that women reporting a diagnosis of ADHD experienced several types of sexual maltreatment prior to age 16 relative to women not reporting such a diagnosis. The first analysis explored the frequency that participants in the two groups experienced real or attempted forced sexual activity before the age of 16 (Figure 4). The results of this analysis showed significant differences in the frequency that women in the ADHD group and women in the control group experienced this type of activity, $\chi(4) = 32.3$, $p < .001$. Specifically, women in the ADHD group were less likely than women in the control group to report not experiencing this type of activity and more likely to report experiencing this type of activity more than ten times. The effect size was medium (0.29)

Figure 4

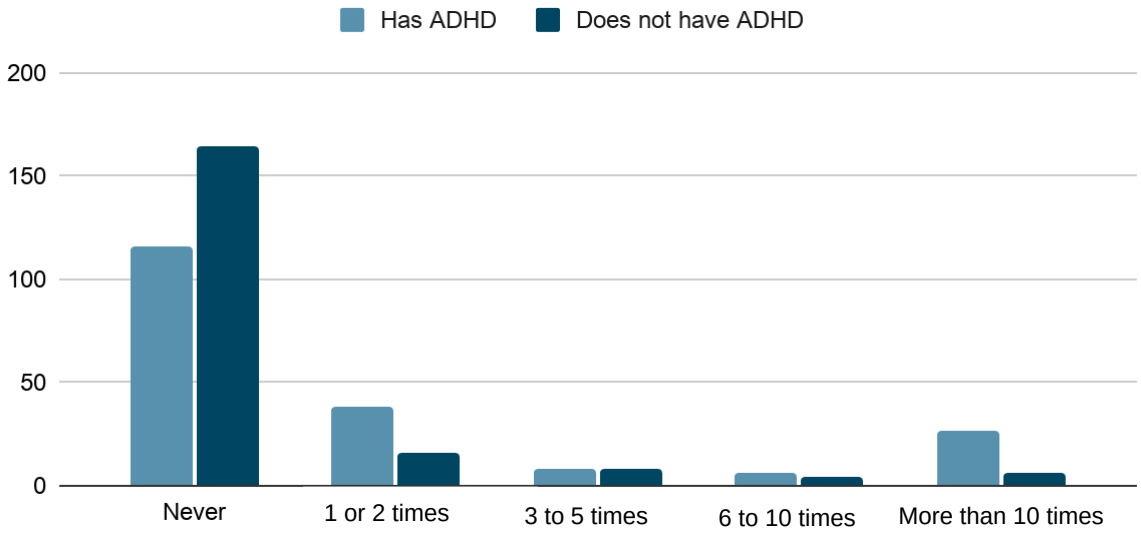
Frequency of a Participant Experiencing Actual or Attempted Forced Sexual Activity



In addition, a chi-square analysis was conducted to compare the frequency that women reporting a diagnosis of ADHD experienced sexual touching prior to age 16 relative to women not reporting such a diagnosis (Figure 5). The results of this analysis showed significant differences in the frequency that the women in the ADHD group and the control group reported experiencing this activity, $\chi(4) = 30.9$, $p < .001$. Specifically, women in the ADHD group were less likely to report never experiencing this type of activity and more likely to report experiencing it ten or more times than women in the control group. The effect size was medium (0.28).

Figure 5

Frequency of a Participant Experiencing Sexual Touching



Discussion

5.1 Discussion

While previous research has examined the relationship between childhood maltreatment and adult ADHD in women, the research is limited. The present study adds to our knowledge in this area by comparing the frequency that women who report a diagnosis of ADHD and women who do not report a diagnosis of ADHD report experiencing different forms of childhood maltreatment.

The results of the study showed that women with a self-reported diagnosis of ADHD were significantly more likely to report experiencing all the forms of childhood maltreatment examined more frequently than their non-ADHD peers. The present findings are consistent with the literature. Earlier studies have found that, in comparison to women without ADHD, a higher percentage of females with ADHD have experienced childhood maltreatment in some form (Briscoe-Smith & Hinshaw, 2006). Stern et al. (2018) completed a meta-analysis of ADHD and maltreatment and noted that childhood maltreatment is more common among individuals with ADHD than individuals without the disorder. Capusan et al. (2006) found similar results in their twin study and concluded that children and youth exposed to frequent abuse had higher odds of meeting diagnostic criteria for ADHD when compared to children who were not exposed to frequent abuse. In addition, children meeting diagnostic criteria for ADHD were more likely to experience more physical abuse when compared to their peers who did not report an ADHD diagnosis (Capusan et al., 2006).

5.2 What Is the Relationship between ADHD, physical abuse, and sexual abuse?

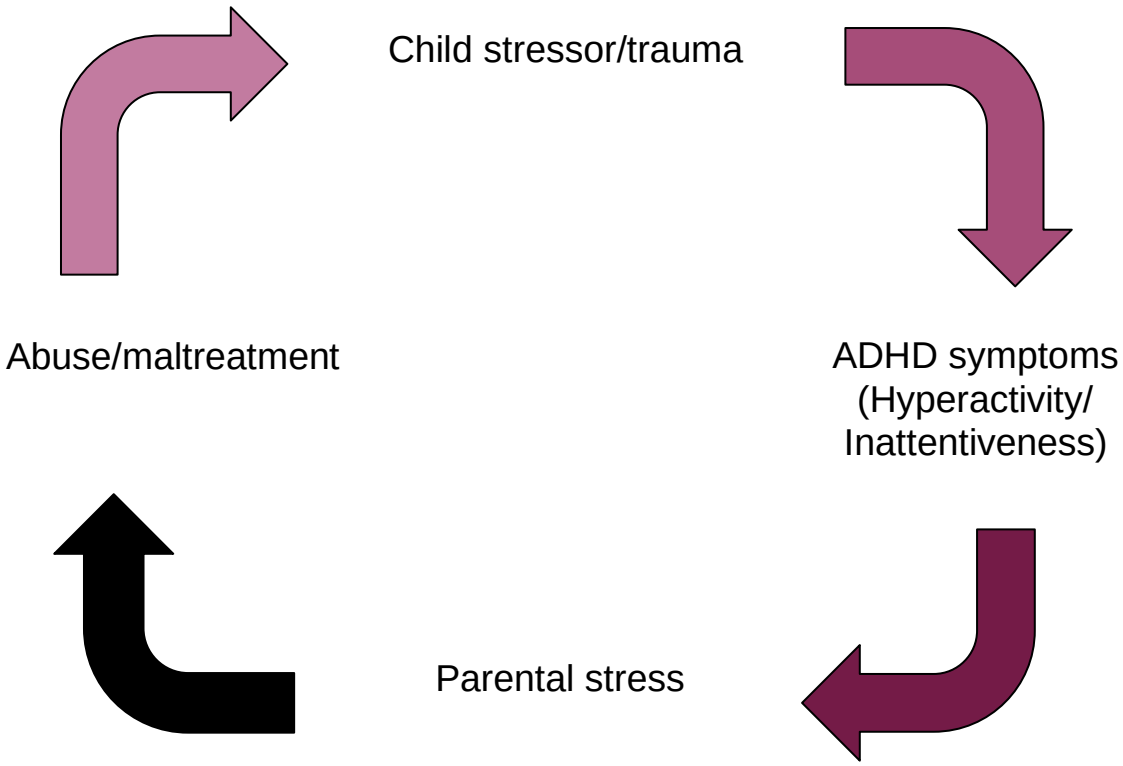
The present study also sought to further our understanding of the relationship between ADHD, physical abuse, and sexual abuse. The results indicated that women who self-reported a diagnosis of ADHD were subjected to more frequent abuse across all types of abuse. This

suggests that there is a significant relationship between all forms of childhood maltreatment and ADHD. While the nature of the present study does not allow us to determine causation or the direction of the relationship between childhood maltreatment and ADHD, previous research suggests that the symptomatology of ADHD may be either a precursor to the maltreatment or a result of it.

Childhood maltreatment is rarely an isolated incident, especially when it comes to physical abuse (Springer et al., 2007). The results of the present study are consistent with this in that women with who reported a diagnosis of ADHD were more likely to report all types of abuse as occurring ten times of more than women not reporting a diagnosis of ADHD. Over the course of the last several decades, scientific research has attempted to understand the neurological consequences of childhood maltreatment with a growing body of literature linking ADHD onset and severity to psychosocial and neurocognitive factors, such as the experience of stressful life events (Vrijsen, et al., 2018). The exposure to stressful life events, and, more specifically, childhood trauma, has been shown to predict ADHD onset as well as persistence of the disorder into adulthood (Biederman et al, 1995; Vrijsen et al., 2018).

A proposed negative feedback loop linking ADHD and abuse is shown in Figure 6. The cycle starts with trauma or a stressor which causes a child to present with ADHD-type symptoms that may be because of trauma and stress on neural development and changes in neural pathways and brain structures (Anda et al., 2006; Carlson, 2013). These behaviours can then create parental stress, fostering an inability to effectively parent and cope with the behaviours of the child (McLaughlin et al., 2014). Due to parental stress, there is an increased probability of physical punishment (Becker & McCloskey, 2002) and the cycle starts again.

Figure 6
ADHD vs. Childhood Maltreatment Negative Feedback Loop



As previously noted, it was not possible within the context of the present study to determine whether the women with ADHD experienced abuse because of their ADHD symptoms or developed symptoms of ADHD subsequent to experiencing abuse. The direction of the relationship between childhood maltreatment and ADHD needs to be explored further with prospective, longitudinal research studies.

5.3 Limitations and Recommendations for Future Research

While one of the strengths of this study is that it included a large sample of women from a community-based, nationally representative database, there are a number of limitations to the study. First, the focus of the current study was on adult females with ADHD so it is not clear if the findings will generalize to adult males with ADHD although the research would suggest a similar pattern of results would be observed (Wilens & Spencer, 2010). A second gender-related limitation is that the CCHS database codes gender as either male or female. As

a result, there was no option to identify transgender women or individuals identifying as non-binary in the study. Recently, Cheung et al. (2018) conducted a study with transgender individuals that examined sociodemographic and mental health variables. The results showed that of the 540 male and female transgender participants, there was a prevalence of ADHD in the transgender group was 4.3%, which is higher than the prevalence in the general population. Given that these results indicate that ADHD is present within the transgender population, it is important to include these individuals in future studies of childhood maltreatment and ADHD.

In the present study, an ADHD diagnosis was based on self-report. As is the case with all research studies, self-report is a limitation as it can result in response bias (Rosenman et al., 2011). Response bias is known as tendencies for participants to respond inaccurately or falsely to questions and it is most prevalent in self-report, surveys and structured interviews (Rosenman et al., 2011). This may have affected the association between ADHD and reported childhood maltreatment in that individuals self-reporting a diagnosis of ADHD may have been those with a tendency to report themselves as disordered in general and therefore may have been more likely to endorse experiencing maltreatment more frequently. However, some research has shown that the results from self-report measures are in fact highly correlated with objective measures (Kormos & Gifford, 2014). Future studies could avoid the issue of self-report by looking at the prevalence of childhood maltreatment in a group of individuals with a confirmed diagnosis of ADHD from a medical professional or through assessment of ADHD symptoms at the time of study participation along with documentation to support the experience of childhood maltreatment.

Another limitation is the design of the study. This study was cross-sectional in nature, so cause and effect could not be determined and the direction of the relationship between childhood maltreatment and ADHD could not be established. Future research studies that use

a longitudinal prospective data collection approach in which at-risk children are followed into young adulthood may help to clarify the nature and direction of the relationship between ADHD and childhood maltreatment.

The database also did not include data about the subtype of ADHD that an individual had been diagnosed with. Research has suggested that hyperactivity and impulsivity elevate the risk of aggression within relationships while inattention may increase the risk of victimization (Fang et al., 2010). Future research studies should explore the different types of childhood maltreatment and their prevalence within the three subtypes rather than looking at ADHD as a unitary disorder.

A final limitation of the present study is that the CCHS-MH (Statistics Canada, 2012) excludes military personnel and incarcerated individuals, both of whom have been known to have higher rates of ADHD than members of the general population (Antshel et al., 2013; Facer-Irwin et al., 2019). In addition, a study completed by Bodkin et al. (2019) found that 65.7% of incarcerated individuals reported experiencing one or more forms of childhood maltreatment while Afifi et al. (2016) found that the prevalence of child abuse in any form was 47.7% for military personnel and 49.9% for military personnel living on a base or reserve. Future research should specifically examine the relationship between childhood maltreatment and ADHD in incarcerated individuals and military personnel and all studies examining these variables need to be sure to include individuals from these groups.

5.4 Conclusion

The results of the present study suggest that women who report a diagnosis of ADHD experience all types of childhood maltreatment more frequently than women who do not report a diagnosis of ADHD. This finding is relevant for those who work with adult survivors of childhood maltreatment or adult women with ADHD as it suggests that it is important to

assess for a history of childhood maltreatment in women presenting with ADHD symptoms and it is also important to assess for ADHD symptoms in women with a history of childhood maltreatment.

While the direction of the relationship between ADHD and childhood maltreatment is not known, the current findings indicate that it is imperative to understand potential precursors to abuse and identify ways to prevent it. The risk of experiencing childhood maltreatment and its negative impact on an individual's long-term well-being can be reduced by identifying symptoms of ADHD.

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