



## Research article

# The relationship between early adversities and attention-deficit/hyperactivity disorder<sup>☆</sup>



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## ABSTRACT

This study examined whether retrospectively reported childhood physical abuse, childhood sexual abuse and/or exposure to parental domestic violence were associated with self-report of a health-professional diagnosis of attention-deficit/hyperactivity disorder (ADHD) among adults. We analyzed nationally representative data from the 2012 Canadian Community Health Survey-Mental Health using gender-specific bivariate and logistic regression analyses ( $n = 10,496$  men;  $n = 12,877$  women). For both men and women, childhood physical abuse was associated with significantly higher odds of reporting ADHD (men odds ratio [OR] = 1.66,  $p < .001$ ; women OR = 1.95,  $p < .001$ ). For both genders, childhood sexual abuse was also significantly related to higher odds of ADHD (men OR = 2.57,  $p < .001$ ; women OR = 2.55,  $p < .001$ ); however, exposure to parental domestic violence was only associated with elevated odds of ADHD among women (men OR = 0.89,  $p = .60$ ; women OR = 1.54,  $p = .03$ ). The results demonstrate a link between childhood physical and sexual abuse and ADHD for both men and women. Future prospective studies are required to further understand this interesting relationship.

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Attention-deficit/hyperactivity disorder (ADHD) affects approximately 4.4% of adults (i.e., 18–44) in the USA (Kessler et al., 2006; Willcutt, 2012; Zwaan et al., 2012). ADHD has three subtypes that describe the symptoms associated with the diagnosis: primarily inattentive, primarily hyperactive/impulsive, and combined inattentive and hyperactive/impulsive (American Psychiatric Association, 2013). The terminology used to describe ADHD has changed several times over the years. In the 1980s, symptoms of inattention with or without hyperactivity were classified as attention deficit disorder (ADD) (American Psychiatric Association, 1980). In 1987, the diagnosis of ADHD was introduced and, in 1994, it was split into the three subtypes used today (American Psychiatric Association, 1994). Since the 1990s, prevalence of the disorder has been rising (Akinbami, Liu, Pastor, & Reuben, 2011). Because ADHD is shown to be highly correlated with a variety of behavioral, social, familial, academic, substance use, and mental health problems (Ryan-Krause, 2010), it is important to consider its early risk factors.

Research has begun to demonstrate a relationship between ADHD and adverse childhood experiences (ACEs), including physical abuse, sexual abuse, and witnessing parental domestic violence. Using the National Longitudinal Study of Adolescent Health, Ouyang, Fang, Mercy, Perou, and Grosse (2008) showed that adolescents with a history of childhood physical abuse had higher odds of self-reported symptoms of both inattentive and hyperactive subtypes of ADHD. Those with a

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history of sexual abuse also had significantly higher odds of the inattentive subtype, but not the hyperactive one. Another large study, this time using a representative sample of adult Canadians, found that those with a history of physical abuse had over six times higher odds of self-reporting a health professional diagnosis of ADHD (Fuller-Thomson, Mehta, & Valeo, 2014). Several smaller clinical studies have also linked ADHD to ACEs: Briscoe-Smith and Hinshaw (2006) found that a higher percentage of girls with ADHD reported any type of abuse than a matched comparison group. They also showed that most of the abuse occurred in the combination ADHD type as opposed to the inattentive type. Ford et al. (2000) revealed, among children and adolescents, that a history of physical or sexual maltreatment was associated with a diagnosis of ADHD. Finally, Biederman et al. (1995) found that children presenting with ADHD at a pediatric clinic disproportionately came from families who had experienced high levels of conflict.

The mechanisms underlying the relationship between ACEs and ADHD have yet to be clearly delineated, but may involve at least three pathways: (1) stress resulting from exposure to early adversities may cause changes in brain functioning (Anda et al., 2006) (2) learned experiences of threat and/or deprivation may affect neural development, resulting in alterations in brain structures consistent with ADHD (McLaughlin, Sheridan, Winter, et al., 2014) (3) difficulties inherent to parenting a child with ADHD may increase the probability that physical punishment will be used (Becker & McCloskey, 2002). An assumption following the first pathway is that, because stress is likely to be an outcome of multiple types of ACEs, the types of adversities experienced may be less important than the severity or scope of the experiences over time (McLaughlin, Sheridan, & Lambert, 2014). The second pathway, however, suggests that distinct types of environmental experiences have particular effects on learning and, thus, underlines the importance of distinguishing among varieties of ACEs (McLaughlin, Sheridan, & Lambert, 2014). The third pathway speaks to the increased prevalence of one type of abuse that would most likely result from frustration and inability to cope with a child's behavioral problems (i.e., physical as opposed to sexual abuse). Because we are uncertain which pathway is most likely, we argue that it is important to consider the independent contribution of multiple types of ACEs.

In exploring the relationship between adverse childhood experiences and ADHD there is some justification for analyzing the data separately for women and men. As children, boys are diagnosed with attention deficit/hyperactivity disorder (ADHD) more often than girls (Centers for Disease Control and Prevention, 2008). While research suggests that this trend continues into adulthood (Kessler et al., 2006), a more compelling reason, perhaps, for studying women and men separately, is gender differences in the symptomology, neurobiology, and developmental course of ADHD that have been identified (Nussbaum, 2012). For example, there is research showing that women diagnosed with ADHD in childhood are more likely than their male counterparts to continue to have symptoms in adulthood (Agnew-Blais, Seidman, & Buka, 2013). There is also some evidence that the prevalence of retrospectively reported ACEs varies according to gender, especially a history of sexual abuse, which appears to be more commonly indicated by women (Centers for Disease Control and Prevention, 2010; MacMillan, Tanaka, Duku, Vaillancourt, & Boyle, 2013). Gender-specific pathways linking ACEs to negative health outcomes have also been proposed (Tietjen & Peterlin, 2011), again pointing to the need to consider men and women separately. The goal of our current study is to use a population-based survey of Canadian adults to investigate the gender-specific association between three adverse childhood experiences—physical abuse, sexual abuse, and witnessing domestic violence—and ADHD.

## Methods

The cross-sectional 2012 Canadian Community Health Survey-Mental Health (CCHS-MH) data was used for this study. The survey includes questions related to the health, social, and economic factors that may influence mental health (Statistics Canada, 2013). The CCHS-MH assessed a representative sample of adults aged 15 and older residing in the 10 Canadian provinces.

## Sample

A three-stage design was used to randomly select the CCHS-MH's sample of respondents. In the first step, geographical locations were selected. Next, households within the geographical locations were selected. Within each household, only one eligible individual was selected to complete the survey (Statistics Canada, 2013). The household-level response rate was 79.8%. Within these 29,088 households, 25,113 individuals provided a completed questionnaire (i.e., person-level response rate = 86.3%). Nationally, this produced an overall combined response rate of 68.9%. For more details on the data set, please see Statistics Canada (2013). The sample for the current study was restricted to respondents over the age of 18 and with complete information on ACEs and/or ADHD as well as the control variables, age and gender. The sub-sample that remained after these exclusions consisted of 10,496 men and 12,877 women.

## Measures

### *Attention deficit hyperactive disorder (ADHD)*

Respondents were asked if they had "conditions diagnosed by a health professional that are expected to last or have already lasted 6 months"; attention deficit disorder was one item on the list of health conditions. Because the classification of ADD is no longer used, we assume that those responding positively to this question were either diagnosed with ADD

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