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Associations between abuse/neglect and ADHD from childhood to young adulthood: A prospective nationally-representative twin study

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ABSTRACT

Child maltreatment has consistently been found to be associated with attention deficit/hyperactivity disorder (ADHD). However, the robustness of this association and the direction of the link between maltreatment and ADHD remain unclear. We used data from the Environmental Risk (E-Risk) Longitudinal Twin Study, a cohort of 2232 British twins, to investigate the associations between exposure to abuse/neglect and ADHD in childhood and in young adulthood, and to test their robustness and specificity. We also aimed to test longitudinal associations between abuse/neglect and ADHD from childhood to young adulthood, controlling for confounders. Results indicated strong associations between abuse/neglect and ADHD in childhood and also in young adulthood. In childhood, the association was concentrated among children with comorbid conduct disorder. Longitudinal analyses showed that childhood ADHD predicted abuse/neglect in later years. This association was again concentrated among individuals with comorbid conduct disorder. Abuse/neglect in childhood was not associated with later ADHD in young adulthood after adjusting for childhood ADHD. Our study does not provide support of a causal link between child abuse/neglect and adult ADHD but highlights the possibility of a long-term effect of disruptive behaviors on the risk for experiencing abuse/neglect. These findings emphasize the need for clinicians treating people with ADHD, especially those with comorbid conduct disorder, to be aware of their increased risk for experiencing abuse/neglect. Interventions aimed at reducing risks of abuse/neglect should also focus on the environment of individuals with disruptive behaviors.

1. Introduction

Childhood maltreatment including abuse (physical, emotional and sexual) and neglect (physical and emotional) can affect between 2.5–32% of children worldwide (Afifi et al., 2014; Gilbert et al., 2009; Radford et al., 2011; Radford, Corral, Bradley, & Fisher,

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2013) and is an important risk factor for the development of internalising and externalising psychopathology in adolescence and adulthood (Gilbert et al., 2009; Jaffee, Caspi, Moffitt, & Taylor, 2004; Kessler et al., 2010; Shonkoff, Garner, The committee on psychosocial aspects of child and family health, Committee on early childhood, adoption, and dependent care, & Section on developmental and behavioral pediatrics, 2012). Being a victim of maltreatment at a young age is related to symptoms of psychiatric disorders (e.g., depression, anxiety, and post-traumatic stress disorder) in later years, as well as to alcohol and cannabis abuse, antisocial behavior and conduct disorder (Afifi et al., 2014; Cecil, Viding, Barker, Guiney, & McCrory, 2014; Fisher et al., 2010; Gilbert et al., 2009; Newbury et al., 2018; Widom, DuMont, & Czaja, 2007; Widom, White, Czaja, & Marmorstein, 2007). However, many challenges remain for establishing causal relationships between child maltreatment and mental health problems. We focused on clarifying the nature of the association between child maltreatment and attention deficit/hyperactivity disorder (ADHD).

ADHD is characterized by a persistent pattern of inattention and/or hyperactivity-impulsivity that interferes with functioning and development (Diagnostic and Statistical Manual of Mental Disorders, 5th edition; [DSM-5]; American Psychiatric Association (APA), 2013). It is one of the most common neurodevelopmental disorders in childhood, with an estimated prevalence of 3.4% (Polanczyk, Salum, Sugaya, Caye, & Rohde, 2015). Childhood ADHD has been associated with poor functional outcomes (Larson, Russ, Kahn, & Halfon, 2011) and comorbid psychiatric disorders including oppositional defiant, conduct and learning disorders (Jensen & Steinhausen, 2015; Thapar & Cooper, 2016; Thapar, Cooper, Eyre, & Langley, 2013). ADHD is highly heritable in childhood with genetic factors explaining 60–90% of the variance (Faraone & Mick, 2010; Larsson, Chang, D'Onofrio, & Lichtenstein, 2014; Thapar & Cooper, 2016; Thapar et al., 2013).

Once considered only a childhood disorder, ADHD is now recognized to persist and also emerge in adulthood (Agnew-Blais et al., 2016; Caye et al., 2016; Faraone, Biederman, & Mick, 2006; Moffitt et al., 2015). The estimated prevalence of adult ADHD ranges between 2.5% and 5% (Franke et al., 2012; Simon, Czobor, Bálint, Mészáros, & Bitter, 2009). Similar to children with ADHD, adults affected by ADHD experience poor functional outcomes (Barkley & Murphy, 2010; Erskine et al., 2016). Comorbid disorders among adults with ADHD include anxiety disorders, depression, substance use disorders, antisocial and other personality disorders (Erskine et al., 2016; Klassen, Katzman, & Chokka, 2010). Studies have indicated that the heritability in adulthood is lower than in childhood, accounting for approximately 30–41% of the variance of adult ADHD (Agnew-Blais et al., 2016; Franke et al., 2012).

Various forms of maltreatment have been associated with ADHD in children samples (Briscoe-Smith & Hinshaw, 2006; Dinkler et al., 2017; Endo, Sugiyama, & Someya, 2006; Gul & Gurkan, 2016; Hadianfard, 2014; Ouyang, Fang, Mercy, Perou, & Grosse, 2008; Sari Gokten, Saday Duman, Soylu, & Uzun, 2016). Similar findings were observed in adult samples: associations between retrospective reports of child maltreatment and adult ADHD have been reported (Capusan et al., 2016; Fuller-Thomson & Lewis, 2015; Fuller-Thomson, Mehta, & Valeo, 2014; Rucklidge, Brown, Crawford, & Kaplan, 2006; Sanderud, Murphy, & Elkit, 2016; Singer, Humphreys, & Lee, 2016; Sugaya et al., 2012). Altogether, these studies indicate that maltreatment occurring prior to young adulthood is more common among people with ADHD compared to non-ADHD groups, and higher levels of ADHD symptoms are observed among individuals who were exposed to child maltreatment compared to non-exposed individuals. Yet, no study thus far has examined the association between ADHD and maltreatment in adolescent years separately from childhood. Adolescence is a time of major emotional, physical, social and neurodevelopmental change, suggesting that victimization during this period could have important implications for development (Fisher et al., 2015). Moreover, as adolescents spend an increasing proportion of their time outside the home environment, they are likely to experience a greater variety of types of victimization which could be associated to their ADHD symptoms. Most importantly, however, the robustness of this association (both in childhood and in young adulthood) and the direction of the link between maltreatment and ADHD have yet to be tested.

One study based on a large population-based sample of adult twins reported an association between child maltreatment and adult ADHD symptoms among monozygotic (MZ) twin pairs discordant for maltreatment (Capusan et al., 2016). The discordant MZ twin design tests whether twins exposed to maltreatment have more ADHD symptoms compared to their genetically-identical twin who was not exposed to maltreatment. Since the twins in this study grew up together, familial confounding factors were also controlled. Findings indicated that the association between ADHD and maltreatment within the MZ group was significant. Because of the stringent control for potential confounders, this study concluded that the association between child maltreatment and adult ADHD is partly causal. However, the validity of retrospective reports of childhood maltreatment has been questioned in light of possible misclassification and bias (Reuben et al., 2016). In addition, it is necessary to consider temporal priority between the exposure and the outcome, requiring prospective population-based samples of children followed into adult years (Fuller-Thomson & Lewis, 2015). This is required because ADHD can be the result of maltreatment in childhood but can also be an early risk factor for experiencing maltreatment and other forms of violence victimization. Behavioral characteristics associated with ADHD, including being impulsive, making careless mistakes and interrupting or intruding on others, may evoke negative responses from the environment and produce or increase conflicts (Gul & Gurkan, 2016; Ouyang et al., 2008; Rucklidge et al., 2006; Sari Gokten et al., 2016).

In the present study, we used prospectively-collected measures from a longitudinal cohort study of twins to examine the association between exposure to abuse/neglect (including physical and sexual abuse, emotional abuse and neglect, and physical neglect) in childhood and adolescence, with ADHD up to age 12 and at age 18. First, we examined the associations between abuse/neglect and ADHD diagnoses in childhood and in young adulthood separately. We tested the robustness of these associations by also analysing ADHD symptom scales and by controlling for potential confounders. We also explored the specificity of these associations by looking at bullying and domestic violence. We further examined whether the association was concentrated specifically among ADHD participants with comorbid conduct disorder. In addition, we investigated twins' differences in abuse/neglect and ADHD to control for familial confounding. Second, we investigated the longitudinal associations between abuse/neglect and ADHD from childhood into young adulthood.

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