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Research article

Association between child maltreatment and prospective and retrospective memory in adolescents: The mediatory effect of neuroticism

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ABSTRACT

The purpose of this study was to examine the relationship between child maltreatment and prospective and retrospective memory in children/adolescents by investigating the mediating role of neuroticism. In total, 662 children/adolescents aged 10–16 years were recruited from a middle school in China, and they completed questionnaires comprising the Childhood Trauma Questionnaire, Prospective and Retrospective Memory Questionnaire, and the Neuroticism subscale of the NEO Five-Factor Inventory. The severity of maltreatment was positively associated with the severity of impairment of memory (prospective and retrospective considered together) in children/adolescents. Children/adolescents exposed to maltreatment tended to display higher levels of neuroticism. Neuroticism partially mediated the association between child maltreatment and memory in all the subjects. The results of multigroup analyses showed neuroticism fully mediated the relationship between child maltreatment and memory for boys, in which the effect size of indirect effect was 0.52, and partially mediated the association for girls with 0.44 effect size of indirect effect. Early intervention aimed to reduce neuroticism might contribute to a better prognosis in children/adolescences with poor memory function.

1. Introduction

Child maltreatment has increasingly become a public concern in China in the past decade. Child maltreatment includes physical, emotional, and sexual mistreatment or neglect that is perpetrated by parents or caregivers and results in actual or potential harm to the child. According to a World Health Organization report, rates of childhood physical abuse range from 25% to 50%, and sexual abuse rates in men and women are 10% and 20%, respectively. Compared to high-income countries, low- or middle-income countries have higher rates of physical neglect, and lower rates of sexual abuse, especially China (Viola et al., 2016). A review also suggested that the rate of reported child sexual abuse in China was relatively low compared to the rates in Western countries (Liao, Lee, Roberts-Lewis, Hong, & Jiao, 2011). Concerning child physical abuse in China, a meta-analysis of 47 studies found that any physical abuse prior to 18 years of age was estimated to be 36.6%, with

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a tremendous variability rate ranging from 4.1% to 88.04% (Ji & Finkelhor, 2015). Meanwhile, Feng, Chang, Chang, Fetzer, and Wang (2015). indicated that 91% of Taiwanese adolescents aged 12–18 years have experienced at least one form of maltreatment, including physical abuse (61.4%), emotional abuse (69.2%), neglect (54.6%), and sexual abuse (19.8%).

Early stressful life events such as abuse and neglect have a host of negative outcomes (Hammen, 2005). Poor physical health has been reported in some individuals who have suffered maltreatment during childhood (Fang et al., 2015; Hillis et al., 2016). Child maltreatment has been shown to have a detrimental effect on psychological health, resulting in anxiety (Hovens, Giltay, van Hemert, & Penninx, 2016) and depression (Infurna et al., 2016). It increases the risk of suicidality (Puzia, Kraines, Liu, & Kleiman, 2014), affective instability (Teicher, Ohashi, Lowen, Polcari, & Fitzmaurice, 2015), variation in personality traits (Johnson, Cohen, Brown, Smailes, & Bernstein, 1999), and affects brain structure and function (De Bellis, Woolley, & Hooper, 2013). A review focusing on the effects of child maltreatment on children and adults found an association between childhood maltreatment exposure and volume reduction in the prefrontal cortex (PFC) (Hart & Rubia, 2012). Given the role of the PFC in working memory and executive function (Miller & Cohen, 2001), PFC abnormalities following child maltreatment may contribute to working memory deficit and executive dysfunction. However, relatively little is known about the effects of early maltreatment exposure on cognitive function, particularly memory (i.e., prospective memory (PM) and retrospective memory (RM)).

PM refers to the cognitive ability to remember to carry out planned actions in the future and is thought to play a critical role in individuals' everyday tasks (e.g., remembering to finish homework, taking medication on time, or meeting friends). PM impairment has been found to threaten individuals' independence and health (Au et al., 2013) and affect brain development across various populations such as children or adolescents with schizophrenia (Kumar, Nizamie, & Jahan, 2008) or acquired traumatic brain injury (McCauley et al., 2010). RM refers to the memory of events or actions that have occurred in the past and pertains to information that should be remembered. Consequently, PM is explicit and not entirely separate from RM. Several studies have revealed that RM is positively related to PM performance during development (Wang, Kliegel, Liu, & Yang, 2008; Yang, Chan, & Shum, 2011), particularly in childhood and adolescence. Therefore, we integrated PM and RM into one type of memory in this study.

Robey, Buckingham-Howes, Salmeron, Black, and Riggins (2014) have demonstrated robust correlations between PM and cognitive ability, and particularly that involves executive functions and RM, and brain structure during adolescence. In addition to that, a neuroimaging study revealed that working memory and executive functions were significantly correlated with prefrontal lobe resources (Johnson et al., 2008), and evidence from brain-imaging studies have highlighted strong links between PM and activity in these prefrontal regions (Simons, Scholvinck, Gilbert, Frith, & Burgess, 2006). Considering that PM, working memory, and executive function share similar resources, and previously presented evidence indicates that maltreated participants exhibited working memory and/or executive function impairment (Irigaray et al., 2013; Li et al., 2013), we predicted that child maltreatment could lead to PM deficit.

The relationship between early maltreatment experiences and memory has been explored. Hedges and Woon (2011) found that stressors experienced during childhood affects cognitive functioning. However, a majority of the previous studies examining the effects of child maltreatment on memory have included psychiatric patients (i.e., schizophrenic patients; Ordemann, Opper, & Davalos, 2014) or older adults who had reported childhood abuse retrospectively. A few studies, particularly those involving teenagers, have included individuals without psychosis. Further, a few studies have examined potential pathways via which child maltreatment could lead to child/adolescent memory failure or cognitive dysfunction. Cheatham, Larkina, Bauer, Toth, and Cicchetti (2010) found that the effect of child maltreatment on cognitive functioning in children was mediated by their resilience. Personality, as a consequence of heredity × environment interactions, is related to inborn neurobiological mechanisms and is prone to change in the course of development (e.g., adolescence) and environmental factors (Lenkiewicz, Srebnicki, & Brynska, 2016). Neuroticism, one of the Big Five personality traits, has received considerable attention in the previous literature and has been identified as a dimension of personality that is more closely associated with health and cognitive outcomes (Brand, Young, Laier, Wolfling, & Potenza, 2016; Holz et al., 2016; Lenkiewicz et al., 2016; Muscatello et al., 2016). It is shown to account for variance in outcomes of events involving abuse (Grant & Langan-Fox, 2006). It is important to take into account the individual differences in prevalent personality traits, including neuroticism for understanding memory failure in a broad and comprehensive sense. To our knowledge, however, there are no published studies examining the role of personality, especially neuroticism, in the relationship between child maltreatment and memory dysfunction.

Prior studies have demonstrated that child maltreatment was positively associated with high scores in neuroticism (Mc & Hevey, 2014). Individuals who display high neuroticism have been found to be more susceptible to the negative impacts of traumatic events (Chung, Easthope, Chung, & Clark-Carter, 1999). In addition to that, Wilhelm, Witthoeft, and Schipolowski (2010) suggested that higher neuroticism was related to cognitive dysfunction, because inappropriate worries—a significant characteristic of neuroticism—could give rise to an excessive evaluation of problems, which could result in increasing reports of cognition impairment. Neuroticism has also been consistently associated with subjective memory impairment or memory dysfunction (Hanninen et al., 1994; Pearman & Storandt, 2004; Robinson & Tamir, 2005). All the above-mentioned studies have found that neuroticism is a significant predictor of cognitive dysfunction. Taking these two findings together, it seems that the link between child maltreatment and cognitive dysfunction is partially mediated by neuroticism. Previous studies have suggested the mediating effect of neuroticism on the relationship between child maltreatment and trauma-related psychopathology, such as depression (Hovens et al., 2016), alcohol dependence (Schwandt, Heilig, Hommer, George, & Ramchandani, 2013), dissociation, and posttraumatic stress disorder (PTSD) (Bremner, Shobe, & Kihlstrom, 2000). These