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Is chronic stress in childhood abuse victims linked to structural brain changes?

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As medical students who recently completed our psychiatric and paediatric placements, we read Lim *et al.*'s (2017) study with avid interest. The study showed that youth exposed to abuse, compared with healthy controls, display certain structural brain changes that may underlie their psychopathology. This cohort was chosen for their lack of psychiatric comorbidities and previous drug and medication use. Specifically, changes were found in the parietal, temporal, occipital, cerebellar and orbitofrontal cortex–insular regions. The brain abnormalities observed were attributed to stress responses caused by chronic childhood maltreatment. Other studies have supported this hypothesis also by highlighting the changes in stress-susceptible brain areas in abuse groups (McCrory *et al.*, 2011; Hart and Rubia, 2012; Nemeroff, 2016).

Whilst the anatomical changes have been defined, the neurobiological mechanisms involved in childhood abuse are still unclear. The literature suggests that the levels and regulation of cortisol differ in youth exposed to chronic trauma *v.* those not. Prolonged hyperactivity of the hypothalamic–pituitary axis can lead to its adaptation and subsequent blunting of cortisol levels. It has been argued that this may contribute towards the brain's structural adaptation (Trickett *et al.*, 2010). However, many studies which compared baseline cortisol levels between youth exposed to trauma and those not, found contradictory results. Three different studies showed inconclusive differences –positive, negative or none – in the concentration of cortisol between the two groups (Ciccheti and Rogosch, 2001; Pfeffer *et al.*, 2007; Cicchetti *et al.*, 2010). This could be due to the varying ages at the time of exposure to maltreatment, which has been shown to affect the molecular alterations in the prefrontal cortex, hippocampus, amygdala and the basolateral and central regions of the brain (Caldji *et al.*, 2003; Kolb and Gibb, 2014). In addition, these studies all followed different inclusion and exclusion criteria, which may act as confounders for cortisol levels.

The impact of childhood abuse on psychiatric wellbeing is substantial and has been demonstrated by numerous studies in the past (Currie and Spatz Widom, 2010; Al Odhayani *et al.*, 2013). In 2017, 58 000 children in the UK required protection due to abuse. These numbers cannot be ignored and neither can our lack of understanding regarding causation. Due to the work of the studies mentioned thus far, we now have more solid evidence of the damage possible. Despite this, our understanding of the psychiatric implications remains far from optimal. It is imperative that we work to gain a greater understanding of the neurobiological mechanisms involved in victims of child abuse. This is the way forward for the development of more effective treatments and, more importantly, possible preventative interventions for such individuals. This can help stem the development of psychiatric illnesses in these patients or at the very least stop the progression to refractory disease.

Conflict of interest. None.

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