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Mitigating HPA axis dysregulation associated with placement changes in foster care

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Summary Maltreated foster children often exhibit alterations in diurnal hypothalamic—pituitary—adrenal (HPA) axis activity that are characterized by lower cortisol levels upon waking and smaller declines in morning-to-evening cortisol levels. Previous research has shown that this dysregulated pattern is associated with high caregiver stress levels over the course of foster care placements. In contrast, therapeutic interventions that emphasize consistent and responsive caregiving have been associated with more regulated cortisol rhythms. In this paper, two related issues were explored: whether placement changes (i.e., moving between foster homes or from a foster home to a permanent placement) were associated with more blunted daily cortisol rhythms and whether a caregiver-based intervention exerted a protective effect in this context. Because the intervention program has components specifically designed to prepare foster children for placement changes and to maintain consistent parenting techniques despite them, a prevention effect on HPA axis dysregulation during placement changes was hypothesized. The results of linear mixed modeling analyses showed that placement changes predicted dysregulation in cortisol rhythms in the regular foster care group but not in the intervention foster care group. These findings are discussed in terms of implications for child welfare policy and practice.

1. Introduction

Placement changes are a common occurrence for foster children (Connell, 2006), who move from one home to another at least once (i.e., initial entry into foster care). In addition, many foster children experience further placement changes: moving between foster homes, entering permanent placements (e.g., reunifications or adoptions), or reentering care after failed permanent placement attempts. As many as two-thirds of all foster placements disrupt within

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the first 2 years (Wulczyn et al., 2003), and close to half of all new foster placements disrupt within the first 6 months (Wulczyn et al., 2007). Given that there are over half a million foster children in the United States in any given year (National Clearinghouse on Child Abuse and Neglect Information, 2005), this is a problem of considerable public health significance.

There is a growing body of research documenting the negative effects of placement changes on foster children. Rubin et al. (2004) found that foster children with multiple placement changes had up to 63% higher risk for behavior problems than foster children who did not experience such instability. Similarly, Newton et al. (2000) found higher rates of internalizing and externalizing behaviors among children with unstable placement histories. Stovall and Dozier (1998) suggested that placement changes negatively impact a child's ability to form attachments with caregivers, an effect that could prove extremely problematic in the long term.

In addition to observing the psychosocial effects of placement instability, researchers have found associations between placement instability and a foster child's brain development. For example, Pears et al. (2008) examined the performance of a group of preschool-aged foster children on neuropsychological tasks involving self-regulation and behavioral control, which are known to activate prefrontal cortical circuitry. They reported a negative association between the number of unique caregivers with whom a child had lived and positive performance on these tasks (i.e., having more caregivers was associated with poorer performance). Similarly, the number of foster caregiver changes has been shown to be negatively correlated with a foster child's performance on neuropsychological tasks measuring executive functioning (Fisher et al., 2006; Lewis et al., 2007).

Given the negative effects of placement instability, reducing placement changes should be a focus of foster care policy and programs. Providing additional social and mental health services for foster children and families might play a role in this area, as might increasing the availability of training and consultation to foster caregivers and reducing the caseloads for child welfare workers. Even with policy changes aimed at reducing placement instability, placement changes will undoubtedly occur in some circumstances. Thus, it is also important to develop strategies for limiting the impact of placement changes—for example, family-based interventions that can be deployed systematically on a wide-scale basis in public sector service settings. In this study, we examined whether one such intervention, previously documented to increase placement stability during and after foster care (Fisher et al., 2009), might also prevent hypothalamic—pituitary—adrenal (HPA) axis dysregulation specifically associated with placement changes in foster care.

1.1. HPA axis dysregulation in foster children

The HPA axis plays a central role in regulating an individual's responses to stressful and arousing events. HPA axis activity, which can be assessed via salivary cortisol levels, is activated in response to real or perceived threat to the physical and social self and in response to uncontrollability and unpredictability (Mason, 1968). HPA axis activation involves a hormonal cascade, beginning with the release of corticotrophin releasing hormone (CRH) in the hypothalamus, which in turn stimulates the secretion of adrenocorticotropin releasing hormone (ACTH) in the anterior pituitary. ACTH in the bloodstream leads to the release of the glucocorticoid hormone, cortisol, by the adrenal cortex. Cortisol regulates its own production via negative feedback at the level of the hippocampus and hypothalamus, slowing and ultimately stopping the release of CRH. Glucocorticoids also act on a number of bodily stress response systems, metabolizing stored energy and stimulating the immune system. In addition, the HPA axis is structurally and functionally connected to a number of other key neural structures involved in the regulation of stress, including the prefrontal cortex and the amygdala, via the presence of glucocorticoid receptors in these regions.

The HPA axis exhibits a diurnal rhythm, with peak cortisol levels around the time of morning waking that decline over the day to reach near zero levels around the onset of nighttime sleep. There is increasing evidence that chronic stress blunts the diurnal pattern of cortisol production, particularly lowering the peak production of cortisol early in the morning (Heim et al., 2000; Roy et al., 2003). Such diurnal cortisol rhythmicity has been associated with high levels of behavioral and emotional problems in childhood (Shirtcliff and Essex, 2008), immunosuppression (Shirtcliff et al., 2009), and increased mortality in adult cancer patients (Sephton et al., 2000).

This blunted diurnal cortisol rhythm has also been associated with severe early life stress—for example, children living in orphanages/institutions in Russia and Romania (Gunnar and Vasquez, 2001) and severely neglected preschoolers entering new foster placements (Bruce et al., 2009). Moreover, among school-aged maltreated children, this dysregulated rhythm was observed in children with high levels of internalizing problems who had experienced severe physical and sexual abuse prior to age 5 years (Cicchetti et al., 2010).

The specific psychobiological mechanisms of diurnal cortisol dysregulation in children following early stress are not thoroughly understood, although a number of hypotheses have been proposed (Gunnar and Vasquez, 2001; Fisher and Gunnar, 2010). This phenomenon might represent decreased neuroendocrine activity associated with a downregulation of the HPA axis, which might be an adaptive response to an early caregiving environment that lacks a responsive caregiver to buffer the infant from stress and negative arousal. Alternatively, it might result from enhanced negative feedback associated with high concentrations of glucocorticoid receptors in the hypothalamus and other brain regions, might be associated with disrupted sleep patterns (Tininenko et al., 2010), or might result from a combination of these and other processes.

1.2. Improved behavioral adjustment and HPA axis regulation via intervention

Although foster children are clearly at high risk for adverse developmental and psychosocial outcomes (Landsverk et al., 2002), only recently has evidence emerged of the potential to systematically reduce this risk through preventive interventions. The interventions that have provided the most robust evidence of effectiveness, via randomized efficacy trials, have typically focused on providing services to support the caregiver—child relationship (Dozier et al., 2002; Fisher et al., 2006).