SSRG International Journal of Medical Science
ISSN: 2393–9117 / https://doi.org/10.14445/23939117/IJMS-V12I4P101

Volume 12 Issue 4, 1-5, Jul-Aug 2025

Review Article

Effect of Responsive Care on the Cortisol Levels in Foster Children

Ahaana Jain

United World College of Southeast Asia, Singapore.

Corresponding Author : jain47958@gapps.uwcsea.edu.sg

Received: 01 June 2025 Revised: 03 July 2025 Accepted: 18 July 2025 Published: 05 August 2025

Abstract *- Foster children often encounter exacerbated psychological difficulties due to early unfavorable experiences, making their mental wellbeing a grave concern. These children are at heightened risk for emotional and behavioral challenges, which can extend into adolescence and adulthood. These unpleasant experiences often lead to enhanced rates of mental dysregulation, anxiety, and behavioral challenges as compared to children raised in biologically intact families. A vital biological mechanism affected by chronic stress in foster children is the hypothalamic-pituitary-adrenal (HPA) axis, which controls the production of cortisol, the body's prime stress hormone. Foster children often exhibit dysregulated cortisol levels indicative of chronic stress. This abnormal regulation of the cortisol hormone can impair the immune system, emotional regulation, and physical growth. This article highlights the effect of responsive care on the cortisol levels of foster children. Interestingly, constant and receptive caregiving has been shown to mitigate these effects by inducing healthier cortisol patterns and offering a steady, nurturing environment that facilitates emotional control. Responsive care fosters secure attachments, enhances emotional resilience, and supports neurobiological development in brain regions involved in stress regulation. Thus, addressing HPA axis regulation through supportive caregiving is crucial for diminishing stress-linked health risks and augmenting the overall wellbeing of foster children.*

Keywords *- HPA axis, Mental health, PTSD, Stress.*

1. Introduction

Foster children go through adversity when they are younger, which can harm their physiological and psychological state. It can also harm their ability to regulate stress because of its impact on the hypothalamic-pituitary-adrenal (HPA) axis (Reilly & Gunnar, 2019). The HPA axis manages stress by controlling cortisol production when maintaining the body's constant internal environment. Cortisol is a hormone that controls metabolism, immune function and memory formation to help respond to stress. Many foster children experience chronic stress or adverse childhood experiences (ACEs), causing the HPA axis to be repeatedly activated, and cortisol production can then become uncontrolled and harm foster children's well-being (Murphy et al., 2022). A hypersecretion of cortisol can cause anxiety and damage memory, and a hyposecretion of cortisol can worsen the response to stress. This instability in cortisol levels can also harm immune function, making foster children more vulnerable to health issues, and affect other processes like growth and sleep patterns (Fisher et al., 2011). It can also cause learning and social difficulties that can stick with them as they grow up. Without steady caregiving, foster children might struggle to cope, further hurting their stress response (Fisher & Stoolmiller, 2008). The following sections will go into how stress from trauma and the HPA axis affect foster children's brain development, emotions and immune health (Knezevic et al., 2023). This article will focus on interventions that help foster children overcome these challenges, especially responsive care, to help foster children grow and improve their quality of life (Blakeslee et al., 2023). While current research shows how responsive care can improve cortisol levels in foster children, there is still a clear research gap surrounding its long-term effects and how they may vary based on individual characteristics and placement history.

2. Foster Children and their Mental State

Foster children often go through difficult experiences that can harm their mental health, including trauma, trouble forming relationships, and not getting the support they need through responsive care. These challenges can affect them both now and later in life as they grow up.

2.1. Trauma and its Impact on Mental Health

According to Erin P. Hambrick, 50-80% of foster children often meet criteria for mental health issues like PTSD (post-traumatic stress disorder), anxiety, and depression due to early experiences of abuse, neglect, and placement instability (Hambrick et al., 2016). As the brain doesn't fully develop until around age 25, trauma can have a serious impact on emotional development in foster children, as it causes increased activity in the region of the brain that processes emotions (the amygdala). Emotional dysregulation - 'patterns of emotional experience or expression that interfere with goal-directed activity' (Thompson, 2019) - may arise due to this.

2.2. Attachment Issues and Relationship Challenges

Difficulty in forming attachments likely comes from frequent moves and unstable caregiving, which may lead to attachment issues and struggles in building trust. These relationship challenges may harm the mental state of foster children due to a potential rising fear of abandonment, increasing their inability to form positive relationships. Attachment disorders can have key impacts on the mental health and brain development of foster children.

2.3. Barriers to Support and Long-Term Consequences

Many foster children face challenges that cause mental health issues, and due to their lack of access to mental health services, these issues can persist into adulthood, affecting their long-term well-being. Some of the barriers to support include instability in living arrangements and the stigma surrounding foster care, which can discourage foster kids from looking for help. Additionally, instability and trauma can have many long-term consequences, including low self-esteem and long-term mental health issues.

3. HPA Axis Regulation in Foster Children

3.1. Overview of the HPA Axis and Its Role in Stress Regulation

The HPA axis (hypothalamic-pituitary-adrenal axis) is a system of organs and hormones that helps the body respond to stress and maintain homeostasis (the maintenance of a constant internal environment). The organs that make up the HPA axis include the hypothalamus, the pituitary gland, and the adrenal glands. These organs are essential in stress regulation as the hypothalamus releases corticotropin-releasing hormone (CRH), which signals the pituitary gland to release adrenocorticotropic hormone (ACTH) into the bloodstream. ACTH then triggers the release of glucocorticoids (e.g. cortisol) by the adrenal glands, which in turn help the body cope with stress. (Herman et al., 2016) The body uses a negative feedback loop to regulate cortisol levels. For example, when cortisol levels rise, the hypothalamus stops producing CRH, bringing the stress response to an end.

3.2. Impact of Early Adversity on HPA Axis Development

Foster children face early adversity, causing the HPA axis to be activated repeatedly, leading to a hypersecretion of cortisol, which may then harm foster children's ability to control their emotions and actions (Bernard et al., 2010). Additionally, stress can harm the cortisol feedback loop, causing excessive or blunted stress responses, and damage key parts of the brain in controlling stress, like the amygdala, hippocampus, and prefrontal cortex.

3.3. Genetic and Epigenetic Factors in HPA Axis Sensitivity

Genetic and epigenetic factors can affect the sensitivity of the HPA axis, impacting how the body responds to stress, e.g. genetic predisposition and GR (glucocorticoid receptor) gene expression (Herman et al., 2016). However, foster children can be more prone to epigenetic changes compared to regular kids. This is because epigenetic changes are caused by environmental factors like stress or trauma. These epigenetic changes can change gene expression, making the body more sensitive to stress (Bick et al., 2012).

3.4. Consequences of HPA Axis Dysregulation in Foster Children

HPA axis dysregulation in foster children can increase cortisol levels in the body. This may lead to many health consequences, such as immune system dysfunction, inflammation, and autoimmune conditions. HPA Axis dysregulation can lead to physical and long-term health consequences. High cortisol levels can increase the risk of heart disease and stroke, raise blood sugar levels (potentially causing type 2 diabetes), psychiatric disorders and more. The physical consequences can include Cushing syndrome (causing weight gain, a rounded face, and more), skin changes (including thin skin, easily bruised skin, and ulcers), and muscle weakness in arms and thighs (Whitworth et al., 2005). These risks can have a consequential impact on the lives of foster children.

4. Cortisol levels in foster children as compared to normal children

Foster children often experience dysregulated cortisol levels compared to normal children because of trauma, maltreatment, and disorganised care. Normal children have a more well-regulated cortisol system because of stable environments. When faced with a stressful situation, foster children show higher cortisol levels reflecting an overactive or dysregulated stress response system, aiding long-term health issues such as anxiety, depression, or immune system dysfunction. Chronic dysregulated cortisol (too low or too high) can harm development, while stable cortisol levels support healthy development. But these problems can be combated through interventions such as affective touch, which help normalize cortisol and improve health.

4.1. Morning Cortisol Levels

One of the key differences is the lower morning cortisol levels in foster children compared to others. Usually, cortisol levels naturally peak in the morning to help facilitate alertness and prepare the body for the day. However, foster children often show lower morning cortisol, showing an inactive stress response. Normal children have a usual rise in morning cortisol levels, which is an important part of a healthy circadian rhythm (Bruce et al., 2009). The cortisol awakening response (CAR) is the rapid increase in cortisol that happens in the first few minutes after waking up in the morning. This response is part of the diurnal cortisol pattern and shows how the body's stress system acts after sleep. Foster children may show lower CAR, showing an underactive stress system or chronic stress. In contrast, typical children show a stronger CAR, showing more normal regulation in the morning (van der Vegt et al., 2009).

4.2. Diurnal Cortisol Levels

Foster children may have unusual cortisol rhythms, with less of a daily drop in cortisol in the afternoon compared to others. This may cause them to have higher

average cortisol levels throughout the day, showing chronic/ongoing stress, while typical children have a typical cortisol rhythm with a large fall from morning to evening (Fisher et al., 2011). These cortisol levels in foster children may have significant effects on their well-being, as continuous high cortisol levels can cause harm, damaging things like immune function, mood regulation, and growth.

5. Effect of responsive Care on the Cortisol Levels in Foster Children

Responsive care is consistent and sensitive caregiving that helps to meet foster children's emotional and physical needs. As mentioned previously, foster children face many difficult situations, including trauma, neglect, or frequent placement changes, which make it challenging to form bonds and feel secure. Children raised in institutionalized settings, e.g. orphanages, may experience even greater cortisol dysregulation because of less individualized care that may be provided for some children placed in foster care (McLaughlin et al., 2015). Interventions such as affective touch–e.g skin-to-skin contact–and kind parenting can help normalize cortisol levels and improve stress regulation and therefore resilience in foster children (Reindl et al., 2022). Through responsive care, foster children can begin to build trust and shape relationships with caregivers, reducing stress and helping to improve emotional stability. Responsive care helps create a stable foundation for healthy attachments for foster children by providing warmth and reassurance. When discussing cortisol levels, this security is key for stress regulation, as those who feel safer are often less likely to experience chronic stress responses, aiding in balancing cortisol levels in foster children. However, on the other hand, neglectful or emotionally detached caregiving increased anxiety and thus cortisol levels in foster children. Stability in foster placements offers continuity and predictability, hence being increasingly important when caring for foster children (Asif et al., 2024).

5.1. Neurobiological Effects of Responsive Care on Brain Development

Responsive caregiving can also have numerous positive impacts on the neurobiological development of foster children. Areas in the brain related to stress regulation include the amygdala, hippocampus, and prefrontal cortex. Those who receive responsive care see more usual patterns of brain activity, including reduced hyperactivity in the amygdala (which processes emotions, especially fear, anxiety, and rage), improved function of the prefrontal cortex (which helps regulate social and emotional behaviour) and larger hippocampal volumes (a key part of the feedback loop for stress regulation). These neurobiological effects have significant impacts that contribute to long-term emotional resilience (Gee & Cohodes, 2023).

5.2. Effects of Responsive Care on Daily Cortisol Patterns

Furthermore, responsive care helps normalize daily cortisol patterns. As mentioned above, cortisol generally follows a diurnal pattern with levels peaking in the morning to increase alertness and slowly decreasing throughout the day. However, foster children who don't get responsive care may show lower morning cortisol and cortisol awakening response (CAR) (Szenczy et al., 2021). They may also have unexpected drops during the day, representing chronic stress. But those who do get consistent care show the expected cortisol patterns, highlighting their better-regulated stress responses.

5.3. Cultural Differences in Responsive Care and Stress Regulation

Different cultures have different meanings of responsive care, showing how there are different ways to manage stress in different areas. Some cultures prefer physical touch, like holding or stroking, while others emphasize communication and independence. These different caregiving styles affect how foster children develop varying stress regulation approaches (Bornstein, 2013).

Studies show that foster children in cultures with more physical touch have lower cortisol levels, as touch is important in calming the nervous system (Nikolaeva et al., 2024). However, in cultures that hold opposing priorities, stress regulation in foster children may depend more on reassurance and routine. However, despite these differences, the main factor is consistency. Whether through touch or verbal comfort, making children feel safe and supported is key.

5.4. The Role of Play and Social Interaction in Stress Reduction

An important part of any child's development and stress regulation is play. Play and social interaction allow foster children to process emotions, practice problem-solving, and build relationships. Play is a key means of stress relief in foster children as they struggle with trust and emotional expression because of past trauma or neglect.

Social interaction with caregivers, such as cooperative games or playing pretend, strengthens their relationship and creates opportunities for emotional expression in an environment that is safe for foster children. According to the National Institute of Health (NIH), Play-based interventions can reduce cortisol levels and improve emotional well-being in foster children (Francis et al., 2022).

5.5. How Early Responsive Care Influences Long-Term Emotional Resilience

Beyond childhood, responsive caregiving can have effects that influence emotional resilience into adolescence and even adulthood. Foster children who receive consistent emotional support during their early years develop stronger systems to cope with stress. This reduces the risk of them facing anxiety or depression later in life (Negussie, 2019).

Foster children who experience nurturing, responsive care are generally much more likely to form healthy and strong relationships, succeed academically, and have stable mental health in the future. Neural pathways (connections between brain regions that transmit signals for emotional

regulation) can be strengthened through early responsive caregiving. These pathways involved in emotional processing help individuals deal with challenges they may face as they grow up. On the other hand, children who do not receive responsive care when they are young can develop weaker connections, increasing the chances of them struggling when forming stronger relationships (The Childhood Immunization Schedule and Safety: Stakeholder Concerns, Scientific Evidence, and Future Studies, 2013).

5.6. Challenges Foster Parents Face in Providing Responsive Care

Responsive caregiving can come with challenges for foster parents. For example, they may feel tired when taking care of foster children with past trauma. Due to the difficult situations they've faced in the past, foster children may have emotional and behavioural challenges, like aggression or attachment issues (Teculeasa et al., 2022).

Without support, foster parents may struggle when trying to provide care for foster children to regulate their stress. Frequent placement changes can complicate the process as caregivers may not have enough time to build trust and form responsive routines, thus harming foster children's abilities to form relationships rather than helping them grow. Addressing these challenges is important to improve responsive care through training, mental health support for foster parents, policies that help create stable placements, and more (Negussie, 2019).

5.7. Ways to Improve Responsive Care in the Foster System

Improving responsive care in the foster system requires multiple approaches, including training to educate foster parents about attachment and stress regulation techniques. Furthermore, financial and emotional support for foster families can help to reduce caregiver burnout and provide more consistent homes (Fisher & Stoolmiller, 2008).

Technology has a very important role in improving responsive care. For example, telehealth services can give foster parents access to therapy and support to help them take care of behavioural challenges. Foster parents can share their experiences and learn from one another through online support groups and other resources (Coon et al., 2022).

6. Conclusion

Foster children go through a lot, causing stress, which can cause uncontrolled cortisol levels and harm their well-being. The long-term consequences of disruptions in the HPA axis due to this stress can make it harder for them to manage and cope, even as they grow. With therapy and stable caregivers, and other such interventions, their emotional stability and stress response can improve. These intervention methods can help reverse the effects of ACEs and create a supportive atmosphere for foster children, improving their chances of a healthy future.

7. Future Perspectives

Future research can focus on longitudinal studies (studies where people are followed over time to monitor their health) to help us understand how cortisol levels and other biomarkers show the effects of responsive care (Piazza et al., 2010). While current research highlights the role of HPA axis regulation in stress, more comprehensive and controlled studies are important to heighten understanding. In addition, differences in individual genetic and epigenetic factors can change findings, showing the need for more personalised research (Goetz & Schork, 2018). By bringing attention to these limitations, future research can make it clearer how targeted interventions can improve emotional, cognitive, and physical well-being in foster children.

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