

**SKILLS
FOR LIFE**

Stress and Brain Development in Early Childhood



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The Inter-American Development Bank (IDB) has mounted a historic effort to assist 26 borrowing member countries in mitigating the economic and social impacts of COVID-19 and lay the groundwork for recovery and sustainable growth. In response to unprecedented closures of early childhood and preschool centers across Latin America and the Caribbean, the IDB joined forces with the Innovation for Poverty Action (IPA) to rapidly generate evidence on how to keep young children learning through remote education at home and how to prepare them for the return to school. Another key partner is the Department of Developmental Studies at North Texas University, which explores current issues in child development psychology.

Introduction

Learning to cope with disappointments and overcoming obstacles is part of growing up. By conquering some challenges, children develop resilience. Such normal stressors may include initiating a new activity or separation from parents during preschool hours. However, when the challenges in early childhood are intensified by important stressors happening outside their own lives, they may start to worry about the safety of themselves and their families. This may cause chronic stress, which interferes with their emotional, cognitive, and social development.

The COVID-19 pandemic has brought such chronic stress to the lives of young children on a scale not seen in modern times. Throughout the world, the lives of young children have been disrupted by being taken out of early childhood care and education, heightened anxieties of parents, increased domestic violence and substance abuse, families' loss of income, losses of loved ones, and fears of a virus that children pick up from television or talk around them. Mental health experts warn that the chronic stress of young children has substantially increased by the COVID-19 pandemic and is reported to worsen over time (Gassman-Pines et al. 2020) as stressors stemming from this crisis have caused sudden and ongoing disruptions in multiple domains of daily life.

Policies put in place to help mitigate the spread of COVID-19 include remote schooling and work, isolation, limited resources, and disruptions to routine

– extensions of the crisis further exacerbating stressors to mental health as the restrictive nature of these policies may hinder the development of socialization, cognition, and socio-emotional processes (Golberstein et al., 2020). Yet, young children have often not been prioritized in policy responses as they are not perceived as victims of the pandemic due to low severe illness and mortality rates. As development during childhood is fundamentally contributive to further growth into adolescence and adulthood, it is imperative that the stressors stemming from this crisis, along with the effects of related restrictions, are identified and effectively addressed.

In developing country contexts, it is especially hard to capture promptly the effects of stressors related to the COVID-19 pandemic on children's cognitive and socioemotional development. In this note, we draw on the literature of the effect of stress on brain development and examine data from a recent survey of households with young children¹ carried out in four Latin American countries to offer suggestions for policy responses. The Latin America data appears consistent with international research, on the effect on children of adverse events, as caregivers report that their children's psychological wellbeing decreased during the pandemic. We suggest that early childhood and education systems play a decisive role in assessing and addressing children's mental health needs. In the absence of forceful policy responses on multiple fronts, the mental health outcomes may become lasting.

1. Caregivers of children aged 1 - 7 years in Colombia, Costa Rica, El Salvador, and Peru were surveyed through a self-administered online instrument between July and September 2020 about their experiences with the emergency distance-early childhood education programs made available by national education systems. The surveys are part of a regional study entitled Distance Learning, Parental Involvement, and Mental Health during the COVID-19 Pandemic, which explores the effects of the COVID-19 pandemic on early childhood development (ECD) and preschool-age children. The sample of 62,837 households covered included 19.1 percent of caregivers of all preschoolers nationwide in Costa Rica and 17.8 percent of all children enrolled in ECD services in the department of Valle del Cauca, Colombia; to 3.5 percent and 9.1 percent in Peru and El Salvador (Näslund-Hadley et al., 2020)

Stressors Stemming from COVID-19 Restrictions

Many environments significant to children's development have been affected by the restrictions put in place because of the pandemic. Stressors related to familial context and interactions, education, socialization, and communication, as well as the availability of resources have been observed to be impacted with disruptions particularly prominent in the home and school contexts. As these domains afford significant developmental tools and opportunities for children, interruptions or destabilizations, such as those caused by the COVID-19 pandemic, may have long-term implications.

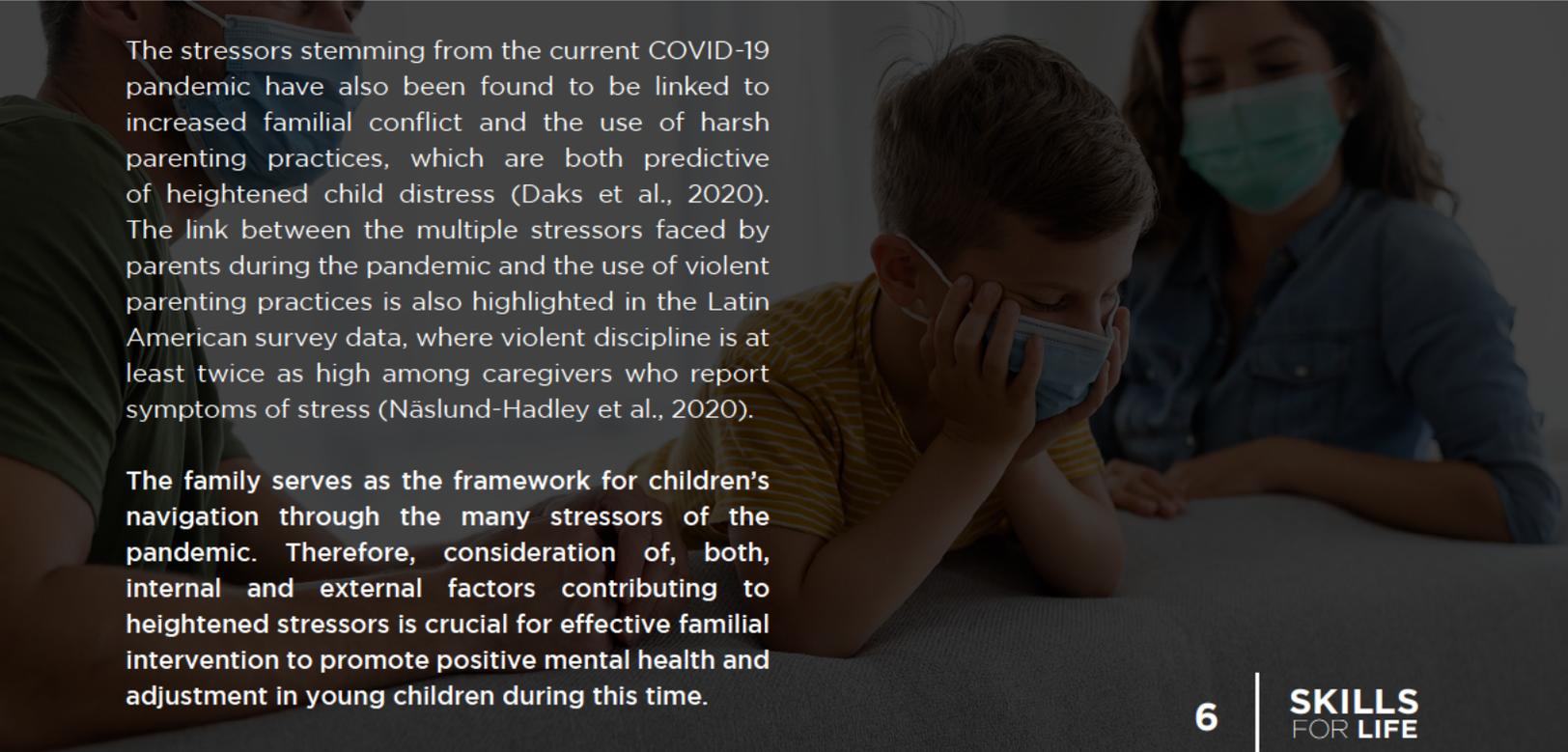


How Stress is Unique to Children

The early childhood period is uniquely essential for cognitive growth and the development of social skills (McCartney & Phillips, 2011), as well as emotional development and regulation (Thompson, 1991). The attainment of developmental goals in these areas is primarily built within specific contexts of the familial and school environment which provide children with unique opportunities for developmental change and growth (McCartney & Phillips, 2011). These opportunities include exploration through exposure to new ideas, experiences, and enhanced social interactions with peers and family members. However, heightened, or prolonged periods of stress during early childhood may hinder the progression of normative developmental trajectories, specifically regarding behavior and cognition (Thompson, 2014). The current crisis has limited the developmental opportunities afforded to children in a wide range of environments, including the family, the ECD center or preschool, and the social interactions in the child's community. It is through the lens of the current crisis that these environments must be evaluated.

The Family

The family environment has an enormous impact on child development. It is the primary context through which children learn about their world, particularly through processes supporting cognition, behavior, and socio-emotional development (Belsky et al., 1984). As a result of the COVID-19 crisis, however, resources that were once available to promote these areas of development may not be as plentiful, nor as accessible. The pandemic and the measures to control it have caused job loss, distance learning and remote work responsibilities, financial hardship, and a reduction in community resources, particularly in terms of social support. In the Latin American survey, we find that 65.1 percent of all households report loss of employment during the pandemic, and the loss is concentrated in households of low socioeconomic status (SES) (Näslund-Hadley et al., 2020). The resulting financial strain in the current crisis is an important environmental factor to examine for child development as low SES had been linked to child stress (Lupien et al., 2000). Salivary markers in young children from low SES households have shown significantly higher cortisol levels as compared to children with high socioeconomic statuses. This implication for intervention is important to consider as children of families in varying socioeconomic communities may require differing or additional resources to mitigate the already present stressors potentially exacerbating distress during the COVID-19 pandemic.



The stressors stemming from the current COVID-19 pandemic have also been found to be linked to increased familial conflict and the use of harsh parenting practices, which are both predictive of heightened child distress (Daks et al., 2020). The link between the multiple stressors faced by parents during the pandemic and the use of violent parenting practices is also highlighted in the Latin American survey data, where violent discipline is at least twice as high among caregivers who report symptoms of stress (Näslund-Hadley et al., 2020).

The family serves as the framework for children's navigation through the many stressors of the pandemic. Therefore, consideration of, both, internal and external factors contributing to heightened stressors is crucial for effective familial intervention to promote positive mental health and adjustment in young children during this time.

ECD and Preschool Services

Development in early childhood is built through the senses of touch, vision, hearing, taste, and smell (Butcher & Plecher, n.d.), which makes distance ECD and preschool services uniquely challenging. As ECD centers and preschools are closed throughout the world, the lack of remote learning resources present in the school and home settings can greatly impact cognitive and academic growth. Consequences resulting from long-term periods away from school not only involve interruptions to academic achievement, but to factors significant to development including self-esteem (Pinquart, 2013; Shiu, 2001) a factor observed to be essential for quality psychosocial development over time (Soenens et al., 2015). The missed opportunities to interact with peers will likely also impact children's socio-emotional development. In Latin America, ECD centers and preschools are closed throughout the region (Rieble-Aubourg & Viteri, 2020). As active learning experiences and opportunities for peer interaction are not currently abundant, it remains a concern that cognitive growth, as related to intellectual stimulation, and psychosocial development during the formative period of early childhood are not being sufficiently afforded during this time.



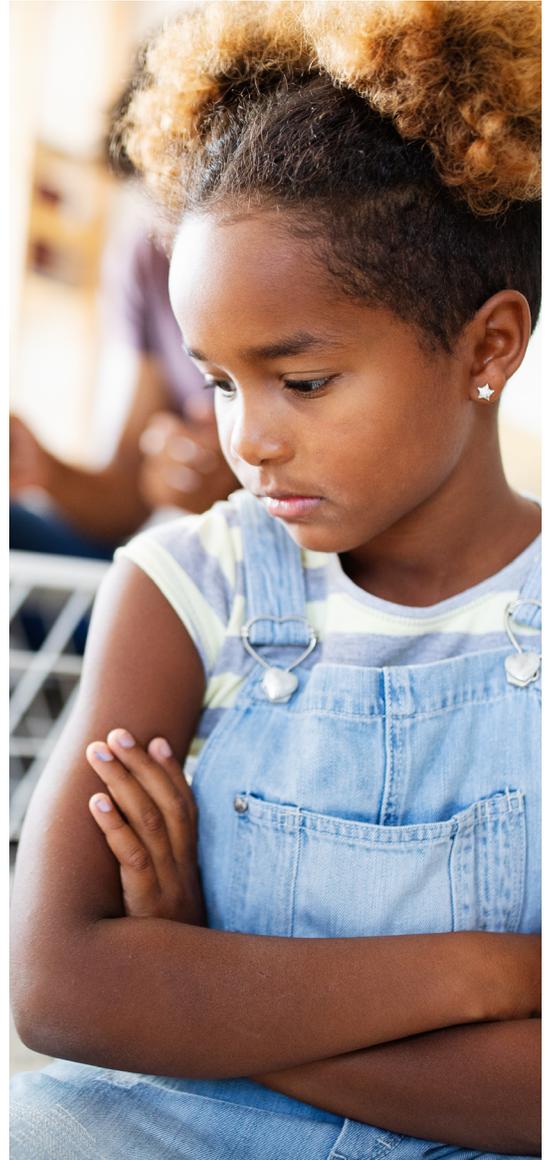
Social Interactions

For a child to develop socially, he or she needs diverse experiences that contribute to a quality synthesis of interactions through which children gain a better understanding of themselves and others (Denham et al., 2002). The attainment of this goal during early childhood is primarily developed within specific contexts of the family, neighborhood, and school environments, which provide children with unique opportunities for psychosocial change and growth. These opportunities include explorative occasions affording information about the self and others through exposure to new ideas and enhanced social experiences with peers and family members (Denhan et al., 2002; Howes & James, 2002). Current COVID-19 mitigation efforts do not allow for typical socialization practices, which leaves much implication for intervention related to distant and remote communication and interaction for young children to alleviate regression in this developmental domain.

Emotional and Regulatory Development

Emotional development is built into the brains' architecture but is a process that needs to be initiated from external sources before becoming internalized (Thompson & Calkins, 1996). Parents and caregivers are the primary influences of emotional regulation and development (Thompson, 1991), modeling regulatory behaviors. The regulatory development process is a dynamic of much developmental significance, which starts when parents comfort, feed, and care for the newborn child. During the preschool years, this regulatory development process continues as children develop the cognitive tools they need to understand their feelings and read and adequately respond to the feelings of others. When children's emotions are met with responsiveness accommodating the need for comfort and healthy navigation of distressful situations, children may be more equipped to internalize the cognitive tools received from those interactions for future coping practices. Conversely, when children grow up without their emotional needs being met, and without anyone to model emotions and regulatory behaviors – e.g., due to domestic violence or mental health challenges of a caregiver – emotional regulation may result in dysfunction (Thompson & Calkins, 1996).

Parental mechanisms for coping are powerful for the development of children's emotional regulatory capabilities (Thompson, 1991; Thompson & Calkins, 1996). In focusing attention on children's psychological and emotional outcomes during this time, it is critical to not isolate these statuses from the home environment, specifically regarding the parent-child dyad. In the current in the current COVID-19 crisis, this process and developmental dynamic present between children and parents hold much significance for young children's coping strategies and corresponding mental health.



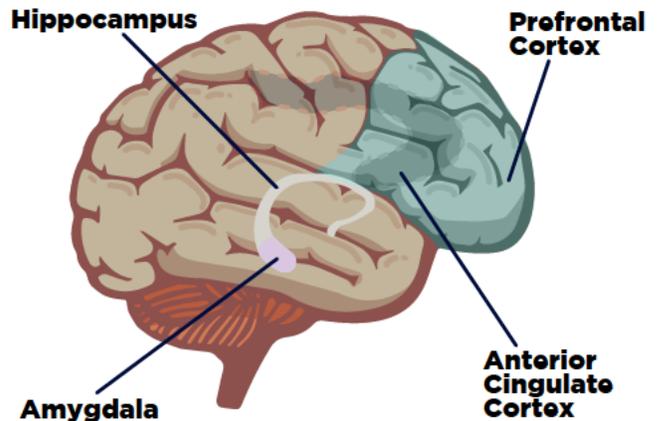
Stress and Brain Development

Prolonged periods of stress can have lasting impacts on the development of a child's brain, including effects on cognitive flexibility and processes of learning and social behavior (Harms et al., 2018). Highly stressful or traumatic experiences in childhood have been linked to neurostructural abnormalities in the corpus callosum (Brietzke et al., 2012), connections between the amygdala and medial prefrontal cortex (Park et al., 2018), as well as a noted decrease in total brain volume (Rinne-Albers et al., 2013). As a result, when examining the impact of heightened stress during long-term periods, such as the COVID-19 pandemic, consideration must be given to potential effects on the neurological development of young children.

Regions of Impact in the Brain and Potential Effects

Stressors and perceived threats are met with two primary stress response systems: the autonomic nervous system, releasing epinephrine and norepinephrine, and the hypothalamic-pituitary-adrenal axis, responsible for stimulating the release of cortisol (Aschbacher et al., 2013; Thompson, 2014). The hormones from the former system impact a variety of physiological reactions including blood supply to the brain. Conversely, cortisol released from the stimulation of the latter system affects certain regions of the brain having a role in emotional regulation and memory (Sciaraffa et al., 2018). These heightened cortisol levels over periods of prolonged stress may negatively impact neurological development. Activity and functioning in the hippocampus and prefrontal cortex are regions impacted by heightened cortisol, which, notably, are areas of the brain with a significant role in cognitive development (Teixeira et al., 2019).

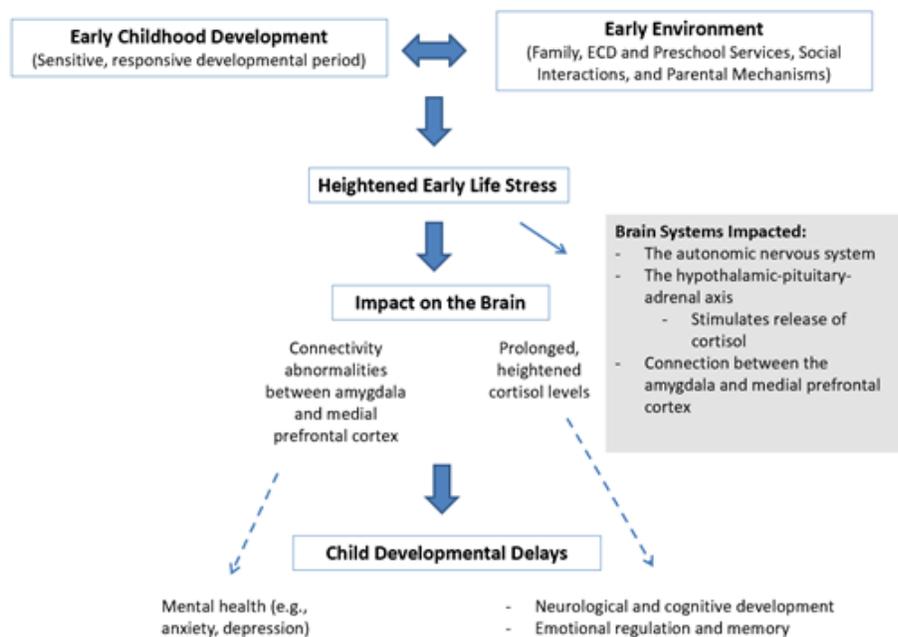
Figure 1. Brain regions related to cognitive and socioemotional development



Other regions having a role in emotion processing and regulation include the amygdala and the medial prefrontal cortex (Figure 1 & 2). Abnormalities with the connectivity between the two may present disorders including those related to mental health, such as anxiety and depression. Research suggests that early childhood exposure to heightened stressors or life events is related to a decrease in the connection between the amygdala and medial prefrontal cortex (Park et al., 2018), highlighting the significance of stress and its impact on the brain.

These findings suggest that prolonged periods of stress have a physiological impact influencing the development of various metabolic functions, emotional regulation, as well as cognition. Brain development during early childhood has sensitive periods where certain regions are more responsive to stimulus and experience (Twardosz, 2012). Consequently, the experience of heightened stressors, particularly early in life, have the potential to disrupt typical developmental trajectories, resulting in outcomes extending beyond childhood.

Figure 2. Interactions between Early Life Stress and Brain Development



Source: Developed by authors.

How stress manifests in a child depends on the type of stress that the child is exposed to. Outcomes vary based on stress having, either an acute (i.e., sudden, eventful) or chronic (i.e., ongoing) onset. Acute stress is a stress that the child suffers from during a short period, and it diminishes once the situation is resolved. Chronic stress is the type of stress that is associated with the increased and prolonged activation of the brain's hypothalamic-pituitary-adrenal axis, which we describe above. In the context of the COVID-19 pandemic and the resulting disruptions to daily life, stressors may be categorized in both domains with sudden lockdowns and implemented local restrictions classified as acute, whereas the ongoing uncertainty and prolonged disruption to routine classified as chronic. As both forms of stress have been present in the current crisis, the intervention must be designed to alleviate stressors not only sudden in nature, but those that are chronic as well.

Impact on Mental Health

Children lack a strong capacity for self-initiated emotional regulatory skills (Thompson, 1991; Thompson & Calkins, 1996), making them less equipped to cope with and adapt to new stressors. As the current crisis has brought forward massive changes and disruptions to children's environments, adjusting to these challenges may be difficult. The findings from the survey of four Latin American countries are consistent with this literature as caregivers report that the COVID-19 pandemic and associated containment efforts have greatly impacted the mental health and well-being of their children (Näslund-Hadley et al., 2020). These reported impacts on children's mental health and wellbeing indicate that their stress systems have been triggered. This type of activation of their hypothalamic-pituitary-adrenal axes, resulting from stressors and trauma occurring early in life, has the potential for long-term alterations (Pervanidou et al., 2020), including anxiety disorders (Dieleman et al., 2015) and harmful impacts on cognition (Thompson, 2014).

Implications for ECD Policy Makers in Latin America and the Caribbean

In the context of the COVID-19 pandemic, the effect brought forth by the stress response system in young children may have lasting mental health outcomes, as early childhood is a sensitive development period with heightened responsiveness to adverse events. Early childhood and education systems can play a critical role in assessing and addressing children's mental health needs.

Multi-Tiered System of Supports Model

Although there is no universally established model for a school-based response to early childhood trauma, some evidence supports the adaptation of a Multi-Tiered System of Supports (MTSS) model (Gee et al., 2020). The MTSS model aims to work with families and the larger school community to provide increasingly intense levels of environmental and trauma support based on the needs of each child, ranging from a first bottom tier to a top fourth tier. The first tier is preventive with all children, regardless of the level of stress experienced, receive measures to mitigate the escalation of negative mental health outcomes. In ECD and preschool settings, interventions can include measures to create a safe school climate and trauma awareness of caregivers. The second through fourth tiers consist of increasingly specialized psychological and mental health support provided within the school and through referrals in response to the level of trauma experienced by the child (Gee et al., 2020). Whenever a young child displays adverse mental health outcomes (Tiers 2 through 4), the response should center around the promotion of protective factors, parental flexibility, and mindfulness.



Parents Can Help Buffer the Impact of Stress

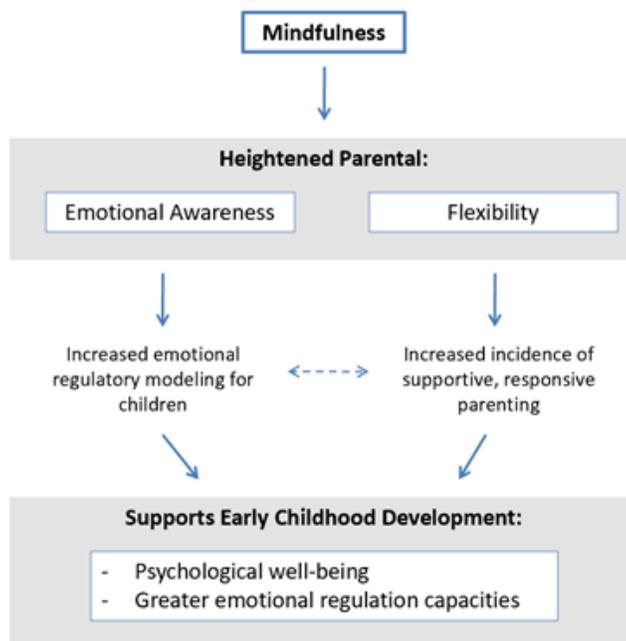
The family may serve as a significant avenue of emotional and psychological support. As common stressors stemming from the pandemic involve feelings of uncertainty, isolation, and psychological distress, parents can serve as the resource through which children can communicate unmet needs, as well as access relevant physical and psychological resources available within the familial unit. Significant to this discussion is that parental support is associated with higher levels of adaptation to stressors in children (Holahan et al., 1995). When parents model coping strategies and feelings of relatedness within the family, this can contribute to more positive emotional regulatory outcomes, which is a factor shown to contribute to heightened adjustment and adaptation (Thompson & Calkins, 1996). Specifically, parental warmth and emotional adjustment have a reciprocal impact, making children display warmth and being more emotionally adjusted (Van Lissa & Keizer, 2020). As a result, it is important to support parents in helping to buffer the impact of this ongoing crisis through the provision of resources including strategies on effective coping, promotion of stability and routine, as well as emotional support as the familial conflict was found to be a predictor of harsher parenting styles, which has been associated with increased distress in children (Daks et al., 2020).

Parental Flexibility and Mindfulness



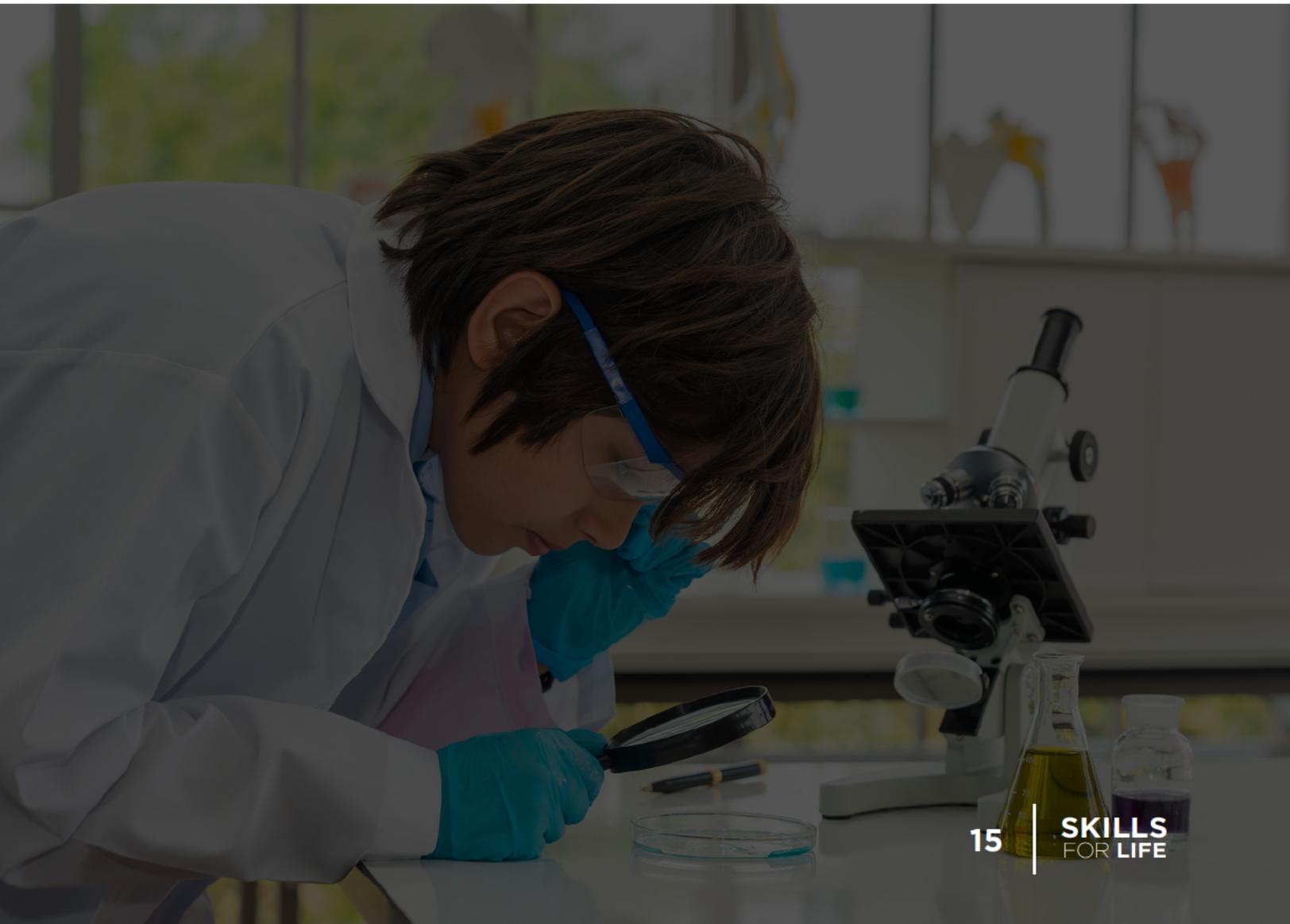
In response to the present challenges of the time, it is significant to note that parental flexibility has been linked with greater cohesiveness within the family, as well as increased implementation of parenting practices more supportive and responsive in nature (Daks et al., 2020). Relatedly, research on parenting practices in the context of heightened parental stress indicate that mindfulness, a practice emphasizing the non-judgmental assessment of personal experience (Brown et al., 2007), is associated with stress reduction and promotion of more positive parent-child interactions (Campbell et al., 2017), including greater emotional regulation capacities, as well as increased psychological flexibility and well-being (Brown et al., 2007; Fledderus et al., 2010; Pepping et al., 2013). Emotional awareness was also reported to be supported with mindful parenting practices (Chaplin et al., 2018), which is a factor significant to healthy emotional regulatory modeling for children (Thompson & Calkins, 1996) (See Figure 3. below).

Figure 3. Interactions between Mindfulness Interventions and Early Childhood Development



Source: Developed by authors.

As the research suggests, supporting the environments influential in young children's development is a beneficial approach in mitigating the impact of stressors caused by the COVID-19 pandemic. Challenges related to disruptions to daily life, prolonged stress, and lack of available resources require adjustment and effective coping strategies from, both, parents and children, to successfully navigate feelings of distress during this time. Also, interventions addressing environmental factors also contributive to the exacerbation of these stressors, such as socioeconomic status, must be prioritized as well to address these challenges comprehensively and promote the preservation of quality early development and mental health in young children during the ongoing COVID-19 pandemic (Thompson & Calkins, 1996).



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21st Century Skills is an initiative led by the InterAmerican Development Bank (IDB) that brings together public and private sector stakeholders. The initiative strengthens learning ecosystems to equip Latin American and Caribbean citizens with transversal skills.

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