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A bioecocultural approach to supporting adolescent mothers and their young children in conflict-affected contexts

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Abstract

An estimated 12 million girls aged 15–19 years, and 777,000 girls younger than 15 give birth globally each year. Contexts of war and displacement increase the likelihood of early marriage and childbearing. Given the developmentally sensitive periods of early childhood and adolescence, adolescent motherhood in conflict-affected contexts may put a family at risk intergenerationally. We propose that the specifics of normative neuroendocrine development during adolescence, including increased sensitivity to stress, pose additional risks to adolescent girls and their young children in the face of war and displacement, with potential lifelong consequences for health and development. This paper proposes a developmental, dual-generational framework for research and policies to better understand and address the needs of adolescent mothers and their small children. We draw from the literature on developmental stress physiology, adolescent parenthood in contexts of war and displacement internationally, and developmental cultural neurobiology. We also identify culturally meaningful sources of resilience and provide a review of the existing literature on interventions supporting adolescent mothers and their offspring. We aim to honor Edward Zigler's groundbreaking life and career by integrating basic developmental science with applied intervention and policy.

Keywords: adolescent mothers, adolescent pregnancy, conflict, culture, humanitarian, intervention, low- and middle-income countries, resilience, stress

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Following in the footsteps of Edward Zigler, who had such a dramatic impact on US family and child policy, there has been a substantial increase in researchers and practitioners who are applying a human developmental science focus across non-WEIRD (Western, Educated, Industrialized, Rich, and Democratic; Henrich, Heine, & Norenzayan, 2010) contexts, especially low- and middle-income countries (LMIC) and conflict-affected contexts. Developmental frameworks have been applied to the question of how global financial crises affect child and youth development (Lundberg & Wuermli, 2012), to address early childhood development globally (Britto, Engle, & Super, 2013; Britto et al., 2017a), to inform indicator frameworks (such as the Organisation for Economic Co-operation and Development (OECD)'s Program for International Student Assessment (PISA), PISA for Development Global Competence Framework, and the United Nations Sustainable Development Goals), and to advance the field of human developmental intervention research in LMIC (Wuermli, Tubbs, Petersen, & Aber, 2015).

Developmental frameworks, including bioecological, developmental niche, bioecocultural, and resilience frameworks (Bronfenbrenner & Morris, 2006; Garmezzy & Masten, 1986;

Super & Harkness, 1986; Weisner, 2002; Whiting, 1980; Worthman, 2010), facilitate efforts to trace how conditions of war and displacement interact with the mechanisms and processes underlying development at various levels of the human ecosystem. Although the pervasive adverse impacts of conflict exposure cannot be denied, coexisting resilience and promotive and protective factors offer potential levers for effective intervention (Cicchetti, 2010; Luthar & Zigler, 1991; Masten & Wright, 2010; Rutter, 2013). For example, a systematic review of studies investigating the effects of war and armed conflict on young children's development found that the family environment and parental mental health and functioning moderated the effects of exposure to conflict and child outcomes (Slone & Mann, 2016). A number of studies have identified a range of social ecological factors that shape the meaning given to exposure to war events and mental health, including education, the social class of the community, individual coping mechanisms and meaning making, attachment relationships and caregiver health, family and social resources and support, and cultural and community norms and attitudes (Betancourt & Khan, 2008; Kohrt et al., 2010). Global trends emphasize the importance of further investigating the mechanisms and processes underlying the effects of war and displacement on the development of children and youths and the potential intergenerational transmission of trauma and adversity.

Adolescent mothers may be at particularly high risk in contexts of war and displacement (Dillon & Cherry, 2014; Urindwanayo & Richter, 2020). Globally, approximately 12 million girls aged 15–19 years, and 777,000 girls younger than 15

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give birth every year (WHO, 2020). In populations affected by conflict and displacement, adolescent girls have an increased likelihood of becoming mothers due to loss of family members, poverty, lack of security or alternative opportunity, gender-based violence, and poor access to health, including sexual and reproductive health (SRH), and education resources (UNFPA, 2018). As this paper will demonstrate, the strong evidence for developmental sensitivity during early childhood and adolescence provides reason to suspect that adolescent motherhood in contexts of war and displacement may be of particular concern as it can place a family at double jeopardy intergenerationally.

In this paper we present a developmental, intergenerational research framework to understand and support the development of adolescent mothers and their children affected by war and displacement. Our framework is informed by and integrates several disparate literatures: (a) the development of stress physiology in the developmentally sensitive windows of early life (prenatal and infancy) and adolescence; (b) the experiences of early parenthood and being an adolescent mother in international contexts of war and displacement; and (c) developmental cultural neurobiology. Based on these findings, we also investigate contextually meaningful sources of resilience that may serve as targets for intervention. In the tradition of Edward Zigler's groundbreaking life and career, we aim to integrate basic developmental science with applied intervention and policy.

We argue that, due to typical neuroendocrine developmental patterns, adolescent mothers are likely to show a more pronounced stress response in reaction to stressors than adult women. Furthermore, as an important period for the development of social-relational skills, war and displacement may disrupt important sources for social support, with significant effects on coping and parenting. Therefore, conflict and displacement may exert particularly disruptive effects on this group's development. In addition to interruptions to schooling and normal life activities, the stress of conflict and displacement influences the development of brain regions associated with cognitive and emotional regulatory functioning, learning, and mental health. Such neurological mechanisms can lead to poorer physical and mental health and functioning among adolescent mothers, with implications for parenting of the next generation. Through neuroendocrine channels, maternal stress affects the development of the fetus in ways that may have lasting effects on the child's physical and mental health and development. Moreover, early care shapes the development of the infant's stress physiology and is associated with health and wellbeing in later life. Although we know that the specifics of early neurobiological development render adolescents more sensitive to stress, we do not yet know the specifics of how adolescents' stress physiology affects their offspring prenatally or their effectiveness as parents.

Effective interventions will need to target sources of strength, resilience, and protection for both generations, and to provide the specific supports adolescents need given their particular stage of development, while also supporting them in their role as caregivers. They will also require an understanding of neurobiological and stress physiological functioning to be expected from adolescents living in chronically and severely stressful contexts. Furthermore, an in-depth understanding of the sociocultural context will be required to better understand how such circumstances affect adolescents' biopsychosocial functioning, and how interventions should be designed to appropriately support them, in particular in their role as mothers. How people make meaning of their lived experiences will shape both the development of their neurobiology and stress

physiology, as well as how their bodies respond to these experiences. Drawing from the burgeoning field of cultural developmental neuroscience, we begin to unpack the interdependencies and interpenetration of culture and biology in ontogeny.

We commence by providing an introduction to stress physiology and its development, and illustrate how experiencing severely stressful events during the developmentally sensitive period of adolescence could have detrimental effects for the adolescent and – in the case of adolescent pregnancy and motherhood – for their offspring. We then discuss potential targets for intervention by reviewing the literature on factors contributing to resilience during adolescence, specifically for adolescent mothers experiencing war and displacement, and reflect on the interdependence and interpenetration of culture and biology. We conclude with an overview of the evidence on programs for adolescent mothers, emphasizing the importance of integrating intervention approaches to support the development of adolescent mothers as well as their children in a fully dual-generation approach with particular consideration given to the sociocultural environment.

War, displacement, stress physiology, and adolescent development

Refugees and other forcibly displaced populations constitute one of the largest current global crises. In 2019, there were an estimated 71 million forcibly displaced people globally, of whom 41 million were internally displaced, 26 million were refugees and 3.5 million were asylum seekers (UNHCR, 2019). Over half of refugees were under 18 years old – a much higher proportion than the one in seven overall migrants who are under 18 (UNHCR, 2019). Displacement ensuing from war and other disasters (including public health disasters such as the current Covid-19 pandemic) can negatively impact child and youth development and learning through manifold mechanisms. Direct exposure to trauma and stressful experiences, loss of caregivers or family members, the reduced capacity of adults to provide a stable and nurturing environment, the lack of quality educational and learning opportunities, poverty, and uncertainty about the future can each independently and in interaction undermine children's healthy development and learning (Murphy, Rodrigues, Costigan, & Annan, 2017; Waddoups, Yoshikawa, & Strouf, 2019; Yoshikawa, Wuermli, & Aber, 2018; Yoshikawa et al., 2020).

While it is well established that early childhood development creates the foundation for lifelong health and development, adolescence is now widely recognized as a second sensitive period in brain development, involving dramatic changes in neuroendocrine functioning (Blakemore & Mills, 2014; Crone & Dahl, 2012; Dahl & Gunnar, 2009). Adolescent pregnancy and motherhood often lead to disruptions in education and major shifts in social roles and expectations, with potentially dramatic implications for development. Furthermore, the World Health Organization reports higher perinatal complications and maternal mortality, and a 50% greater risk of stillbirths and infant deaths within the first weeks of life among adolescents and their infants, as compared with adult mothers and their children (WHO, 2014). Some of these increased risks to adolescent mothers and their infants can be attributed to confounding factors related to poverty and disadvantage, such as poorer prenatal care or more births outside of adequately equipped health clinics (Elster, 1984). However, studies that control for these factors still find significantly increased risks of adverse pregnancy and birth-related outcomes among adolescent mothers (Conde-Agudelo, Belizan, &

Lammers, 2005; Fraser, Brockert, & Ward, 1995). For instance, a study of primiparous mothers found that adolescent mothers tended to have less social support around child care and higher levels of stress, and showed less responsiveness to their infants and punished them more than their adult counterparts (Garcia Coll, Vohr, Hoffman, & Oh, 1986).

A substantial proportion of this increased risk to adolescent mothers and their children may stem from stress, conveyed prenatally through neuroendocrine mechanisms and postnatally prominently through the mother's capacity to provide nurturing care. Specific typical developmental changes in the adolescent brain make adolescents more susceptible to stressful experiences. Traumatic life events like war and the enduring adversity that refugees and the displaced are likely to experience have severe implications for adolescents' development, and as such are likely to affect their offspring both prenatally and postnatally. Given the prevalence of, and risks associated with, adolescent motherhood in many parts of the world (particularly in contexts of conflict and displacement) and the extensive developmental plasticity of both adolescents and infants, greater understanding of the underlying mechanisms driving the development and adjustment of the two generations needs to be prioritized.

Stress physiology

Here we briefly review stress physiology, its changes during adolescent development, and the effects of exposure to chronic stressors on stress physiology. Stress physiology refers to the concerted interplay of multiple systems responding to and recovering from a threat or challenge. The stress response involves central nervous system (CNS) coordination of, and intricate molecular signaling pathways between, the sympathetic (epinephrine/neurepinephrine) and parasympathetic branches of the autonomic nervous system (ANS), the hypothalamic–pituitary–adrenal (HPA) axis system (e.g., cortisol), the immune system, and the metabolic system (Lupien, McEwen, Gunnar, & Heim, 2009). A central aspect of mounting a response to an acute stressor, challenge, or threat involves an acceleration of energy metabolism in order to support the physiological ability to run from or fight the imminent threat. Metabolic processes shift toward pathways that increase levels of glucose and oxygen, the circulatory system directs these resources toward large muscles and the brain (supporting heightened attention to the source of danger and preparedness for defensive responding), and physiological processes not essential for action (such as digestion and the immune system) are suppressed.

Given the potency of its responses, this intricate network of systems maintains feedback loops that immediately signal a reversal of processes, for instance, to stop the release of glucocorticoids (e.g., cortisol). Binding of glucocorticoids to glucocorticoid and mineralocorticoid receptors in the hippocampus triggers a signaling cascade to down-regulate the stress response. Similarly, pro-inflammatory responses are triggered in order to heal “potential injuries.” Pro-inflammatory signals (e.g., NF- κ B, IL-6, CRP) are also almost simultaneously accompanied by anti-inflammatory signals to prevent the immune system from attacking healthy cells in the body. When stressors or challenges are of fairly brief duration (e.g., running away from a lion, taking an exam), these systems are astoundingly effective at enabling a person to achieve high performance: the body flexibly adjusts to meet the immediate demands and effectively recovers thereafter. Disruptions to the regulatory dynamics among systems involved in the stress response, however, can have lifelong consequences

for physical and mental health and functioning (McEwen & Wingfield, 2007).

Contexts of chronic stress

Persistent activation of the stress response can lead to alterations in how the various systems interact, leading to sustained activity levels and thus “imbalances” such as unusually high or low tonic (basal, resting) and phasic (acute responses) activation. Whereas normative, healthy functioning of stress physiology necessitates allostasis, or the ability to respond flexibly to changing conditions, the demand that chronic stressors place on bodily systems and resources can result in allostatic load, or a loss of flexibility evidenced by persistently exaggerated or diminished physiological activity (McEwen, 2017; McEwen & Wingfield, 2003). For example, the HPA axis may produce high (hyperactive) or low (hypoactive) basal levels of cortisol, flat diurnal patterns that fail to show the typical decrease over the day, and/or hypo- or hyper-responsiveness to acute challenges, which may then contribute to chronic and/or systemic inflammation (McEwen & Wingfield, 2003; Miller et al., 2009). Such disruptions to normative profiles of multi-system stress physiology have been linked to problematic cognitive and behavioral functioning (Lupien, Maheu, Tu, Fiocco, & Schramek, 2007; Lupien et al., 2009; Nederhof, Marceau, Shirtcliff, Hastings, & Oldehinkel, 2015) and physical and mental health outcomes, including stunted growth, depression, obesity, type II diabetes, and cardiovascular disease (Juster, McEwen, & Lupien, 2010; Juster et al., 2011).

Many of these observable effects on cognition, behavior, and mental health may result from the effects of stress physiology on the CNS structure and function involved in threat perception and fear, memory consolidation and retrieval, and cognitive processing and regulation. For example, chronically elevated glucocorticoid levels, such as cortisol, can affect the development and activity of the amygdala (Mitra, Jadhav, McEwen, Vyas, & Chattarji, 2005), hippocampus (Anacker et al., 2011), and the prefrontal cortex (PFC) (Arnsten, 2009). Cumulatively, therefore, these biomarkers serve as both (a) reflections of the wear and tear on the body and brain of persistent activation of the multi-system stress response and (b) mechanisms by which contexts of chronic adversity undermine health and wellbeing. Studies have demonstrated that exposure to poverty and violence, which characterize the life contexts of individuals and families in regions of conflict and displacement, can trigger chronic physiological stress (Chen & Miller, 2012; Evans & Kim, 2013), with effects on brain function (Weissman, Conger, Robins, Hastings, & Guyer, 2018), neuroendocrine regulation (Ursache, Noble, & Blair, 2015), and patterns of DNA methylation (Kertes et al., 2016; Kohrt et al., 2016; Lam et al., 2012). More positively, studies have also indicated a substantial amount of plasticity in stress physiology systems and potentially even reversibility of some stress-induced changes in the previously mentioned parts of the brain, namely the amygdala, hippocampus, and PFC (McEwen & Magarinos, 2001). For example, intervention studies to improve parental caregiving in families identified as maltreating have shown that children's HPA (Cicchetti, Rogosch, Toth, & Sturge-Apple, 2011) and ANS (Hastings et al., 2019) regulation is improved.

Adolescent stress physiology

Adolescence has been recognized as a second developmental period of rapid neurobiological maturation and reorganization,

with heightened plasticity of neural structure and function (Fuhrmann, Knoll, & Blakemore, 2015). This period is triggered by the pubertal transition and the rapid increase in circulating adrenal and gonadal hormones that occur as part of adrenarche and gonadarche, typically in late childhood to pre-adolescent years (Andersen & Teicher, 2008; Byrne et al., 2017). These circulating hormones influence the maturation of circuits connecting prefrontal and limbic regions, thereby contributing to stress regulation, as well as other hallmarks of adolescence such as social reorientation, risk-taking behavior, reward sensitivity, and emotional reactivity and regulation (Schriber & Guyer, 2016).

Compared with younger children and adults, adolescents evince heightened acute stress and emotional reactivity (Dahl & Gunnar, 2009). Specifically, adolescents show a comparatively exaggerated amygdala response to threatening stimuli (Hare et al., 2008) and stronger HPA axis responses to socially evaluative challenges (Gunnar, Wewerka, Frenn, Long, & Griggs, 2009; Stroud et al., 2009). Evidence that this may be potentiated by pubertal maturation stems from findings such as the earlier onset of puberty predicting stronger HPA responses (Natsuaki et al., 2009), gonadal hormones affecting HPA axis activity (Viau, 2002), and pubertal maturation and testosterone levels being more strongly predictive of subcortical brain development than chronological age (Wierenga et al., 2018).

The adolescent brain undergoes maturational changes beyond the neurobiological changes linked with puberty. Prefrontal myelination, synaptogenesis, and synaptic pruning continue throughout adolescence, as does maturation of the neural circuits affecting executive function and self-regulation, social cognition, and other competencies (Casey, Getz, & Galvan, 2008). However, PFC maturation is slower and lasts longer than subcortical, HPA axis, and pubertal maturation, such that – for much of adolescence – prefrontal down-regulatory capacities may be suboptimal for managing youths' heightened stress physiology. With all of these changes, adolescence is a period of heightened susceptibility to the effects of stress on neurobiological development, with potential for programming effects with lasting consequences, similar to the very early years of development (Malter Cohen, Tottenham, & Casey, 2013; McCormick, Mathews, Thomas, & Waters, 2010).

Adolescent development and stressful life circumstances

Adolescence is a time of major transitions: physical, cognitive, emotional, and social. Puberty is marked by substantial hormonal shifts and processes, resulting in marked changes from child-like physical appearance to adult-like characteristics. With these physiological changes come social expectations of behaviors and responsibilities (Petersen, 1988). Many cultures practice rituals pertaining to the transition to adulthood, though the timing as well as the content and scope of these rituals differ. In many countries, the onset of menarche is associated with a range of restrictions to what a girl can and cannot do. For example, menstruation can interfere with schooling in places where women are housebound during this period, and is a major reason for school drop-out (Sommer, 2010).

In many parts of the world, adolescence has been characterized as a time of identity development, burgeoning interest in romantic relationships, growing importance of peers, and a desire to explore meaning in life. This time of heightened awareness and exposure to new social settings and situations brings both risks and opportunities. Evidence points toward the possibility that adolescence is a sensitive period for social and cultural

development, highlighting how changes in structure and organization of the brain may underlie sociocultural development (Blakemore & Mills, 2014; Choudhury, 2009). However, adolescence as a period is, in and of itself, a cultural construct deserving of culturally valid investigations, and may have very different implications in different parts of the world (Worthman & Trang, 2018). Of course these realities need to be considered when using biopsychosocial frameworks to investigate the particulars of this stage of development (Choudhury, 2009).

Regardless of culturally rooted changes in roles and expectations, pubertal processes lead to a variety of neurobiological, cognitive, emotional, and social shifts that can present both risks and opportunities (Steinberg, 2005). Adolescence is a time when many mental health problems first begin to surface or become exacerbated. The source is likely a confluence of genetic factors, early exposure to stress and adversity prenatally and/or postnatally, and current events and circumstances. At the same time, however, these shifts or changes in processing capacity and responsiveness, including heightened sensitivity to rewards, render adolescents inherently more curious, exploratory, and creative in supportive environments. Adolescents often try to seek the meaning of life and explore their identity, position, and function in their communities and beyond (Côté, 2009; Eisenberg, Morris, McDaniel, & Spinrad, 2009).

War, displacement, and transition to motherhood during adolescence

War and displacement, as well as the protracted sequelae often experienced by refugees, represent sources of stress above and beyond those more often studied, such as poverty. There is evidence showing elevated rates of mental health problems among refugee youth compared with nonrefugee peers (Betancourt et al., 2013; Sirin & Rogers-Sirin, 2015); for example, experiences of conflict and violence during adolescence are associated with increases in anxiety (Kohrt et al., 2012). However, commonly, other risk factors for mental health problems follow war and displacement, and studies have shown gender differences in both responses to risk factors (e.g., stressful life events) as well as protective factors (e.g., social support). For example, a study in Nepal found higher rates of anxiety in females in response to stressful life events; for males, this association was moderated by social support (Kohrt & Worthman, 2009). Interruptions to and lack of quality educational opportunities can further undermine positive development post-displacement (Burde, Kapit, Wahl, Guven, & Skarpeteig, 2016).

Early pregnancy is likely to trigger additional major events and transitions, depending on the context, including transitioning into adult roles and responsibilities such as primary caregiver, home keeper, and spouse. Adolescent mothers' still-developing capacity to self-regulate and manage stressful situations could make them more susceptible to the stress of parenting, affecting their ability to provide responsive and sensitive care and stimulation to their child. However, aside from the general stresses that any woman at any age might experience when transitioning to motherhood, adolescent motherhood may not be a particularly stressful life event where early marriage is normative and deeply ingrained in the culture and, as such, desired by all parties involved (Lancaster & Hamburg, 2008).

To better understand the developmental consequences of early marriage and childbearing across cultures and contexts requires a bioecocultural lens (Worthman, 2010). Globally, it is estimated that 12 million girls under the age of 18 are married every year

(UNICEF, 2019). Commonly, marriage traditions are culturally potent and politically sensitive. The question of whether early marriage and motherhood is perceived as unduly stressful needs to be explored within the sociocultural context. In contexts where adolescent motherhood carries stigma, or where laws mandate school leaving and other social shifts when pregnant, girls are likely to experience more stress (social exclusion, bullying). Too often, early marriage and motherhood conflicts with universal education goals and changes opportunities and life-course trajectories.

Studies focusing on adolescent pregnancy in refugee camps have found a general lack of appropriate SRH and family planning services available to adolescent girls, alongside high rates of gender-based violence and poverty-driven transactional sex typical of camp settings (Asnong et al., 2018; Urindwanayo & Richter, 2020). Researchers working with Rohingya refugees in Cox's Bazar, Bangladesh, conducted in-depth interviews and focus group discussions with female and male adolescents and young adults, program managers, service providers, and members of the host communities, asking about their perceptions of marriage practices pre- and post-displacement (Melnikas, Ainul, Ehsan, Haque, & Amin, 2020). The findings indicated a strong cultural preference for early marriage (before 18 years of age), linked to beliefs about optimal fertility windows and readiness for marriage. These preferences were equally expressed by adolescent girls, both married and unmarried. While this preference existed before displacement, Myanmar military forces prevented underage marriages unless the family had the means to pay a bribe. Early marriages are now more common because such barriers seem to have been lifted (Melnikas et al., 2020). However, education may alter attitudes and therefore cultural norms. Across four South Asian nations in the period 1991–2011, secondary education attainment reduced the odds of getting married for girls age 17 years and younger in Bangladesh, Nepal, and India, but only for girls under the age of 14 in Pakistan (Raj, McDougal, Silverman, & Rusch, 2014).

Even in the event that adolescent motherhood is considered culturally normative or is not considered stressful, the stress and trauma of conflict and displacement during adolescence could be transmitted to the next generation – prenatally through molecular mechanisms related to stress physiology and postnatally predominantly through caregiving. We argue that a stress physiology perspective may allow us to learn more about the developmental origins and factors perpetuating known epidemiological, demographic, and socioeconomic challenges, including intergenerational transmission of poverty and noncommunicable disease prevalence globally.

Intergenerational transmission of stress physiology

Exposure to severe levels of stress early in life has been linked to disparities in health and wellbeing at the societal level (Charil, Laplante, Vaillancourt, & King, 2010; Shonkoff, 2012), accounting for a significant proportion of the noncommunicable disease burden globally (Nyirenda, 2006). Studies have identified links between exposure to stress in utero and in the first few years of life to poorer cognitive performance, impulsive behavior, aggression, and poor self-regulation (Bell & Deater-Deckard, 2007; Juster et al., 2010; Lupien et al., 2009).

Conceived and gestated during crises

Studies of natural experiments have documented the long-term effects of exposure in utero to different types of stressors and

how these outcomes differ depending on the age of the fetus at exposure. While the exact vector of stress transmission often cannot be identified (e.g., stress hormones, infection and inflammation, psychosocial, nutrition), studies of natural disasters, pandemics, and war-related famines demonstrate that exposure in utero to severe maternal stress has persistent effects on lifelong health, wellbeing, and other socioeconomic outcomes, and that the specific outcomes differ depending on when during gestation exposure occurred (Almond, 2006; King & Laplante, 2015; Lumey et al., 2007). Furthermore, the effects have been identified in DNA methylation patterns (Cao-Lei et al., 2014), potentially indicative of fetal programming effects.

Born and raised during crises

Many of these studies do not account for continuity in adversity and risk experienced after birth, and there is an ongoing debate about short- versus long-term effects of prenatal exposure to stress (DiPietro, 2012). Crises – including wars or the current Covid-19 pandemic – are often accompanied and followed by myriad other risk factors. These can include separation from or loss of caregivers and family networks, displacement and/or severe restrictions on movement, increases in domestic and societal tensions and violence, deep economic recession and unemployment associated with food insecurity and loss of home, and poor healthcare – just to mention a few (Yoshikawa et al., 2020).

Infants are dependent on caregivers to provide nurture, which includes the provision of protection and security, as well as sensitive, responsive, and stimulating care (Britto et al., 2017a). The quality of these early relationships is extraordinarily important for lifelong health, development, and learning. However, studies investigating maternal mental health and wellbeing after birth among young mothers have found substantial continuity in self-report measures of anxiety, stress, and depressive symptoms from pregnancy to 2 years post-partum (DiPietro, Costigan, & Sipsma, 2008; Pesonen, Räikkönen, Strandberg, & Järvenpää, 2005).

Postnatally, stress can be transmitted to the infant through multiple channels. On the physiological side, cortisol levels in human breast milk have been linked to infant negative affectivity (Grey, Davis, Sandman, & Glynn, 2013). Stress and mental health have been shown to be transmitted through more overt and observable caregiving behaviors (responsiveness, sensitivity, stimulation), as well as through less visible channels, such as contagion of physiological states, and potentially a mix between overt behaviors and physiological signaling (Debiec & Sullivan, 2014; Mills-Koonce et al., 2009; Waters, West, & Mendes, 2014).

In contexts of war and displacement, the caregiver–infant relationship serves as an important source of resilience, with higher quality caregiver–child interactions buffering external sources of risk and adversity (Gunnar & Quevedo, 2008; Murphy et al., 2017). These caregiver effects have been demonstrated in experimental studies using interventions (Bakermans-Kranenburg, Van Ijzendoorn, Mesman, Alink, & Juffer, 2008; Nelson et al., 2007). Furthermore, in many cultures, parenting does not take place in an isolated nuclear setting, but within an extended family network that can be a source of support and thus resilience. Positive or negative, such mechanisms lead to an intergenerational transmission of physiological and behavioral characteristics linked to learning and development, and later life physical and mental health.

Supporting Adolescent Mothers and Building a Foundation for Healthy Development and Learning of Present and Future Generations

Because adolescence demarcates a protracted period of neural maturation that persists into the third decade of life, it also offers an opportunity for interventions to “reverse” the vestiges of earlier life stress and redirect the developmental trajectory for the better. When considering how interventions may best support adolescent mothers affected by war and displacement and their children, one first needs to understand sources of resilience, or protective and promotive factors, in the specific context. Resilience is defined as positive adaptation and development despite exposure to substantial risk and/or adversity (Garmezy & Masten, 1986; Luthar, 1993; Luthar & Zigler, 1991; Masten, 2019). Of particular interest are factors that are malleable – in other words, factors that can be targets of interventions.

Sources of resilience in adolescent mothers

Studies in the USA and other wealthy countries have found that, counter to the assumption that adolescent mothers’ lives are overwhelmed by negative factors and that their children may show correspondingly overwhelmingly negative outcomes, the life-course outcomes of both adolescent mothers and their children are highly variable. Important sources of resilience include both contextual and individual factors that predict (a) better parenting during the early years or (b) better child behavioral or cognitive outcomes in early childhood. Among the contextual factors, social support from a variety of sources appears to buffer the developing child from the negative effects of adversity (Sroufe, Egeland, Carlson, & Collins, 2005). Such support for adolescent mothers often comes from the parents of the mother (Apfel & Seitz, 1991) and is accentuated in later benefits for both mothers and children when the resource levels of the parents are higher, as is the case in Sweden and the USA (Ekéus, Christensson, & Hjern, 2004; Furstenberg Jr, Brooks-Gunn, & Morgan, 1987). Support from a partner is also associated with better indicators of early parenting (Huang & Lee, 2008). Natural mentors of adolescent mothers can also provide a positive influence (Hurd & Zimmerman, 2010). Access to stable housing is predictive of better early child development among children of adolescent mothers (Leadbeater & Way, 2001). Individual-level factors associated with better outcomes for the children of adolescent mothers include higher educational aspirations and ambitions of the mother, and autonomy and agency in acting on those ambitions (Furstenberg Jr et al., 1987; Leadbeater & Way, 2001).

Studies of resilience in adolescent mothers in LMIC and conflict-affected contexts are few and far between. We generally know that older age, higher education, and more income-earning opportunities of mothers predict higher investments in children’s development, lower levels of domestic violence, and better access to SRH services (Aizer, 2010; Beegle, Frankenberg, & Thomas, 2001; Kabeer, 1997; Richards et al., 2013). While age is not malleable, education and livelihood opportunities, knowledge about SRH, and social support and networks are, and these are likely to provide much needed resources for adolescent mothers. A substantial body of research has investigated resilience in adolescents affected by war and displacement more generally (Betancourt & Khan, 2008; Masten & Narayan, 2012; Tol, Song, & Jordans, 2013). However, specific sources of resilience will vary depending on culture and other contextual specifics.

Culture, resilience, and stress physiology

Resilience needs to be investigated as a complex dynamic system embedded within the “bioecocultural micro-niche” (Worthman, 2010). Both what is seen as resilience and what supports that resilience may vary across cultures (Tol et al., 2013), and a substantial body of literature has explored resilience across diverse cultures and contexts, including in children and families affected by war and displacement (Panter-Brick & Eggerman, 2012; Theron, Liebenberg, & Ungar, 2015; Tol et al., 2013). Culture is a lens through which we experience and make meaning of events around us. A pregnant woman’s appraisal of an event, for instance a natural disaster, can be linked to methylation patterns in her child 13 years later (Cao-Lei et al., 2015). It extends from this that culturally salient factors and processes of resilience would be reflected in biological processes, specifically processes associated with stress physiology.

The link between culture and the embodiment of experiences (e.g. trauma) is not a new discovery; however, earlier work was dominated by biological and medical anthropology (Worthman, 2019; Worthman & Costello, 2009). There is a growing understanding of the relations between culture and biology and how they dynamically interact to shape lifelong health and wellbeing (Worthman & Costello, 2009). Recent works have increasingly integrated culture, neuroscience, and genomics in the study of physical/mental health and behavioral development (Causadias, Telzer, & Gonzales, 2018; Chiao, Li, Seligman, & Turner, 2016; Worthman, 2019). Applying this framework to resilience – if war and displacement are reflected in hyper- or hypo-reactivity of the HPA axis or the sympathetic nervous system, or high levels of chronic inflammation – then resilience should show a reversal or readjustment of these systems and their functioning.

The use of specific biomarkers of stress physiology can thus inform our hypotheses of culturally specific sources of resilience. These associations can further be confirmed with rigorous experimental intervention studies incorporating a range of relevant biomarkers. Intervention studies have demonstrated the usefulness of incorporating biological measures of stress in order to better understand how and why interventions effect change (Bakermans-Kranenburg et al., 2008; Cicchetti & Gunnar, 2008; Cicchetti et al., 2011; Hastings et al., 2019). Biological markers can also help us understand cross-cultural differences in somatization, or physiological manifestations of mental health problems, and further disentangle the physical and psychological contributions to observed psychiatric disorders and overall mental and behavioral functioning (Kohrt et al., 2005). In summary, investigating the particular factors of risk and resilience for adolescent mothers and their young children in contexts of war and displacement will require a deep investigation of cultural and contextual characteristics and how these characteristics moderate the embodiment of the stress and trauma they have endured, and often continue to experience.

Integration of evidence from Adolescent programming in LMIC and early childhood programs in conflict-affected contexts

Have program models for adolescent mothers been successful in bolstering these sources of resilience and thereby reducing risk? Unfortunately, the two primary literatures in humanitarian and post-conflict settings that may be useful – on early childhood development and later child and youth development – generally ignore the population of adolescent mothers. A systematic review

of interventions to improve the mental health of pregnant adolescents and adolescent parents identified zero studies in LMIC, let alone conflict-affected contexts (Laurenzi et al., 2020). To our knowledge there are only two evaluations of programs to support adolescent mothers from LMIC – one experimental and one nonexperimental. The Meseret Hiwott program, implemented in the rural Amhara region of Ethiopia, combined group discussions facilitated by mentor community women for adolescent married mothers with separate groups for their husbands, with the goals of increasing voluntary counseling and testing (VCT) for HIV, as well as awareness of and skills related to SRH, family planning, motherhood, gender and power dynamics, and financial literacy. A parallel program was developed for husbands of any age (not just those of the participating mothers), with groups discussing a parallel set of topics and male mentors from each village facilitating those groups. In a nonexperimental comparison across levels of participation in the groups, participating mothers reported increased family planning behaviors, HIV VCT, and accompaniment to health clinics by their spouses (Erulkar & Tamrat, 2014). A recent randomized controlled trial of home visiting services to low-income adolescent mothers in urban Brazil found positive effects on both parent–child stimulation and mothers' wellbeing (Fatori et al., 2020).

Interventions for children and youths exposed to armed conflict have been successful in improving mental health outcomes, though again they have not focused on adolescent mothers. The bulk of successful programs have been small-group interventions targeting mental health outcomes such as post-traumatic stress disorder (PTSD), internalizing symptoms such as depression and anxiety, and externalizing and conduct problems. Interventions ranged from psychoeducation with an emphasis on coping, arts-based expression of trauma, and cognitive behavioral therapy principles. Most have been implemented in schools (Jordans, Pigott, & Tol, 2016; Yoshikawa et al., 2018), which may limit the extent to which adolescent mothers have access to such programs if pregnancy precipitates early termination of schooling. Of note, while 40% of the evaluations reported adaptations of programs “imported” from another country, very few of these described the adaptation in detail beyond translation (Jordans et al., 2016). This suggests a critical need to examine processes of cultural adaptation at deeper levels than translation and back-translation of intervention manuals and training materials.

Interventions targeting girls' education, labor market and livelihoods skills, SRH, psychosocial wellbeing, and violence prevention for adolescents in LMIC not specific to conflict or displacement show promise. There is now a strong evidence base on the effectiveness of livelihoods and training programs for adolescent girls from a number of LMIC (Adoho, Chakravarty, Korkoyah, Lundberg, & Tasneem, 2014; Singla et al., 2019). Livelihoods training programs with stronger positive impacts on employment and income for young people are more likely to combine a focus on technical training in occupations with local demand, practical on-the-job internships, and the addition of social skills (“soft skills”) training for success (Singla et al., 2019).

Mental health and life skills programs, overlapping with social–emotional learning programs as they are conceptualized in rich countries, have been found to be effective in a recent meta-analysis that included 50 controlled trials in LMIC (Barry, Clarke, Jenkins, & Patel, 2013). Overall, these programs were found to reduce the symptoms of depression, anxiety, and PTSD. Programs with positive impacts were likely to focus on a

combination of stress management, interpersonal skills, and improving parent–child communication and interaction (although in these cases the parent was the parent of a youth, not the youth as a parent). Here, too, it is important to understand local idioms of distress and mental health and to ascertain the cultural validity of more commonly used assessment tools (Hinton, Kredlow, Bui, Pollack, & Hofmann, 2012).

A systematic review of SRH interventions for young people in humanitarian and LMIC contexts found that several appear to be effective, including education on SRH, gender-based violence, contraception use, and behavioral training targeting assertiveness, communication, and problem-solving skills (Desrosiers et al., 2020). Another systematic review of reviews of evaluated violence-reduction programs for young women and girls aged 10–24 found that successful programs were more likely to include focus on skills, peer network support, education, and community engagement (Yount, Krause, & Miedema, 2017).

Broader emphasis on cash transfers and education may also be relevant. A systematic review of interventions to prevent adolescent childbearing in LMIC found that cash transfers to incentivize school attendance and other programs that encourage school enrollment and attendance for adolescent girls can reduce adolescent childbearing (McQueston, Silverman, & Glassman, 2013). A subsequent national randomized control trial in Kenya found that exposure to a cash transfer program resulted in reductions in early pregnancy (Handa et al., 2015). Other promising approaches include interventions for men to transform inequitable gender attitudes, with some promising results from the Democratic Republic of Congo (Vaillant et al., 2020).

Successful programs to improve adolescent mental health and livelihoods and reduce gender-based violence in LMIC thus suggest several principles that might be considered in programs for adolescent mothers. These include emphases on peer support, community mentorship and engagement, the inclusion of life skills and coping into livelihoods training, and recognition of the larger household dynamics experienced by youth at home. Each of these are also implicated in the basic literature on resilience among adolescent mothers previously reviewed (Furstenberg Jr et al., 1987; Huang & Lee, 2008; Hurd & Zimmerman, 2010).

Overall, despite the extensive evidence base about Early Childhood Development (ECD) interventions in LMIC (Britto et al., 2017b), there are few rigorous studies of such programs in humanitarian contexts. Murphy, Yoshikawa, and Wuermli (2018) identified only four completed early childhood intervention evaluation studies in LMIC that met their inclusion criteria (in particular, inclusion of control or comparison groups, and focused on parenting, caregiving, stimulation, and/or early learning programs) (Murphy et al., 2018). Three of these (in Liberia, Northern Uganda, and Bosnia) targeted caregiver–child dyads with a combination of activities addressing caregiver psychosocial support and wellbeing, early child development information, and positive parenting approaches (play, reduced harsh discipline, stimulation etc.). Only one (Northern Uganda) targeted caregivers of children under the age of 3 years, and found positive effects on caregiver self-reported wellbeing, involvement, and availability of play materials. Examples of contextually and culturally grounded ECD programs that have proven effective and sustainable at national scale include the *Te Whāriki* in New Zealand, which incorporated Maori cultural principles into a national preschool curriculum, and the *Modalidad Propia* of the Colombian *De Cero a Siempre* policy, which allows for the incorporation of locally developed program content, implementation, and

budgeting on part of indigenous populations within a national child development policy (Lee, Carr, Soutar, & Mitch, 2013; Motta & Yoshikawa, 2018).

Conclusions: The Promise of Dual-generation Programming for Adolescent Mothers and their Young Children

As Allen, Seitz, and Apfel (2007) pointed out in a prior tribute volume to Edward Zigler, from an intervention perspective, adolescent mothers in many places fall through the cracks in programming, even in wealthy countries such as the USA. Given the virtually complete absence of rigorous impact evaluations of programs for adolescent mothers and their children, what directions may be promising in conflict or disaster-affected contexts?

The interventions just reviewed from LMIC provide principles for youth programming – that is, single-generation programming. For adolescent mothers and their families, in particular, the developmental potential of taking a dual-generation approach to intervention may be high, given the potential benefits for two generations of intervening with the mother (Wuermli & Yoshikawa, 2016). Some of the successful interventions for adolescent mothers and their children in rich countries took a dual-generation focus. The Yale Child Welfare Project incorporated parenting and social support for young low-income mothers with high-quality child care. In a quasi-experimental evaluation, Seitz, Rosenbaum, and Apfel (1985) showed that the program increased school attainment and earnings among mothers, reduced subsequent childbearing (increasing sibling spacing), and reduced their children's behavior problems and improved their achievement. Intriguingly, there were some sibling diffusion effects such that later-born siblings of the adolescent mothers' target infants also benefited (Seitz & Apfel, 1994). In a separate evaluation, access to education for adolescent mothers was found to reduce subsequent childbearing (Seitz & Apfel, 1993). By facilitating naturally occurring support processes among peer networks of adolescent mothers, opportunities for returns to school after interruptions, and supporting their parenting and child care responsibilities, it appears possible to produce long-term impacts on both academic and social competence outcomes – an integrated approach that Zigler long called for (Zigler & Seitz, 1980). Although scaling such interventions has been a challenge, from a policy perspective, the UK implemented a national education policy explicitly aimed at reintegrating young mothers into schooling as part of its policies to address social exclusion (Hosie & Selman, 2006).

To our knowledge, dual-generation interventions for adolescent mothers that integrate foci on peer support, continued education, parenting support, and (if needed) child care support have rarely, if ever, been evaluated in low-income or conflict-affected country contexts. Yet each of these principles has an evidence base. For example, peer support is facilitated in many programs for adolescent girls and women, with some evidence of the positive impacts of such programs on outcomes such as reduced gender-based violence (Yount et al., 2017). Educational attendance and enrollment appear to be associated with lower adolescent pregnancy (Yakubu & Salisu, 2018), suggesting that interventions to boost girls' education may benefit adolescent mothers as well. Further, parenting programs with a focus on nurturing care and responsive stimulation appear to be effective for mothers in LMIC (Knerr, Gardner, & Cluver, 2013) but, as noted previously, very few have focused on conflict-affected or displaced populations.

Beyond the two generations of adolescent mother and child, there is a third generation that is quite influential in the lives of adolescent mothers – their own parents' generation. This is particularly the case in cultures where childrearing does not happen in a nuclear family setting, but within multi-generational extended family households. The influence of in-laws on young mothers' development can be immense, but quite culturally and historically dynamic. For example, a recent study showed that, with urbanization and the implementation of the one-child policy, the traditionally patrilineal patterns of grandparent care of infant grandchildren in urban China had shifted to a matrilineal pattern (Zhang et al., 2019). Interventions that include some emphasis on the role of grandparents, if present, in adolescent mothers' lives may be a promising future direction. In some countries, "skip-generation" families – grandparents raising their grandchildren without the biological parents present (due to migration, urban violence or loss, for example) – are highly prevalent (e.g., in the northern triangle countries of El Salvador, Honduras, and Guatemala (Duryea, 2016; Sheppard & Sear, 2016)).

Given the multiple and cumulative risks associated with adolescent motherhood for two generations, it may be that multi-component interventions addressing different and complementary pathways of risk are required. This has been termed the "cumulative protection" model for programming (Yoshikawa, 1994). Indeed, the Yale Child Welfare Project arguably targeted mothers' education and parenting as well as children's development directly through quality child care – an approach that has recently shown positive effects when integrated with the US Head Start program (Chase-Lansdale et al., 2019). Such multi-component programs have been suggested as effective for adolescent girls in LMIC generally, but they have not been tested in conflict- or disaster-affected populations. Given Edward Zigler's call for multi-component interventions focused on strengthening both child learning environments such as early care and education and family health, mental health, and nutrition support (Yoshikawa & Zigler, 2000; Zigler & Muenchow, 1992), this direction for research in situations of conflict and displacement is more than ripe for exploration, from research, practice, and policy perspectives.

As mentioned previously, adolescent mothers often fall through the cracks in programming. In some cases, programs may intentionally exclude adolescent mothers. It is commonly understood that programs often fail to reach the most vulnerable and in need, and adolescent mothers in LMIC and contexts of war and displacement tend to be among the most vulnerable. There have, however, been efforts to extend reach to the most vulnerable girls. One such example is Girl Roster™, which is a tool to better understand the local context and ensure that programs reach their intended beneficiaries. Inclusive program implementation will be critical in ensuring maximum impact as the agency and potential contributions of these mothers themselves to programming is often overlooked. One peer sex education program in the UK integrated adolescent mothers into the delivery of SRH messages in school contexts (Kidger, 2006). Ambition, aspirations, and agency are frequently identified as protective factors in both the qualitative and quantitative literature on adolescent mothers, and could be facilitated in youth-led intervention models (Speer, 2008). Youth-led approaches combined with in-depth eco-cultural investigations of social norms and local idioms of distress and resilience, juxtaposed with standardized measures and physiological manifestations of mental health and functioning, yield

potential for substantial and meaningful impacts on the lives of families and communities (Worthman & Costello, 2009).

In this paper we have endeavored to present a developmental framework for how adolescent motherhood may affect developmental outcomes for both adolescents and their young children experiencing war and displacement across the diversity of LMIC. We have further outlined directions for two- and three-generation interventions, and begun to outline a multi-dimensional research agenda that incorporates culture and biology to better understand contextually relevant risks and resilience, and if and how interventions effect change by juxtaposing local idioms of distress and resilience and markers of stress physiological functioning. Rooted in a bioecocultural framework, we believe that the legacy of Edward Zigler can be extended far beyond the USA to integrate basic and applied developmental science to maximize developmental potential across generations.

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References

- Adoho, F., Chakravarty, S., Korkoyah, D. T., Lundberg, M., & Tasneem, A. (2014). *The impact of an adolescent girls employment program: The EPAG project in Liberia*. Washington, DC: World Bank.
- Aizer, A. (2010). The gender wage gap and domestic violence. *American Economic Review*, *100*, 1847–1859. doi:10.1257/aer.100.4.1847
- Allen, J. P., Seitz, V., & Apfel, N. H. (2007). The sexually mature teen as a whole person: New directions in prevention and intervention for teen pregnancy and parenthood. In J. L. Aber, S. J. Bishop-Joseph, S. Jones, K. T. McLearn & D. Phillips (Eds.), *Child development and social policy: Knowledge for action* (pp. 185–199). Washington, DC: American Psychological Association.
- Almond, D. (2006). Is the 1918 influenza pandemic over? Long-term effects of in utero influenza exposure in the post-1940 US population. *Journal of Political Economy*, *114*, 672–712. doi:10.1086/507154
- Anacker, C., Zunszain, P. A., Cattaneo, A., Carvalho, L. A., Garabedian, M. J., Thuret, S., ... Pariante, C. M. (2011). Antidepressants increase human hippocampal neurogenesis by activating the glucocorticoid receptor. *Molecular Psychiatry*, *16*(7), 738–750. doi:10.1038/mp.2011.26
- Andersen, S. L., & Teicher, M. H. (2008). Stress, sensitive periods and maturational events in adolescent depression. *Trends in Neurosciences*, *31*, 183–191. doi:10.1016/j.tins.2008.01.004
- Apfel, N. H., & Seitz, V. (1991). Four models of adolescent mother-grandmother relationships in black inner-city families. *Family Relations*, *40*, 421–429. doi:10.2307/584899
- Arnsten, A. F. (2009). Stress signalling pathways that impair prefrontal cortex structure and function. *Nature Reviews Neuroscience*, *10*, 410–422. doi:10.1038/nrn2648
- Asnong, C., Fellmeth, G., Plugge, E., San Wai, N., Pimanpanarak, M., Paw, M. K., ... McGready, R. (2018). Adolescents' perceptions and experiences of pregnancy in refugee and migrant communities on the Thailand-Myanmar border: A qualitative study. *BMC Reproductive Health*, *15*, 83. doi:10.1186/s12978-018-0522-7
- Bakermans-Kranenburg, M. J., Van Ijzendoorn, M. H., Mesman, J., Alink, L. R., & Juffer, F. (2008). Effects of an attachment-based intervention on daily cortisol moderated by dopamine receptor D4: A randomized control trial on 1- to 3-year-olds screened for externalizing behavior. *Development and Psychopathology*, *20*, 805–820. doi:10.1017/s0954579408000382
- Barry, M. M., Clarke, A. M., Jenkins, R., & Patel, V. (2013). A systematic review of the effectiveness of mental health promotion interventions for young people in low and middle income countries. *BMC Public Health*, *13*, 835. doi:10.1186/1471-2458-13-835
- Beegle, K., Frankenberg, E., & Thomas, D. (2001). Bargaining power within couples and use of prenatal and delivery care in Indonesia. *Studies in Family Planning*, *32*, 130–146. doi:10.1111/j.1728-4465.2001.00130.x
- Bell, M. A., & Deater-Deckard, K. (2007). Biological systems and the development of self-regulation: Integrating behavior, genetics, and psychophysiology. *Journal of Developmental and Behavioral Pediatrics*, *28*, 409–420. <http://dx.doi.org/10.1097/DBP.0b013e3181131fc7>
- Betancourt, T. S., Borisova, L., Williams, T. P., Meyers-Ohki, S. E., Rubin-Smith, J. E., Annan, J., & Kohrt, B. A. (2013). Psychosocial adjustment and mental health in former child soldiers: Systematic review of the literature and recommendations for future research. *Journal of Child Psychology and Psychiatry*, *54*, 17–36. doi:10.1111/j.1469-7610.2012.02620.x
- Betancourt, T. S., & Khan, K. T. (2008). The mental health of children affected by armed conflict: Protective processes and pathways to resilience. *International Review of Psychiatry*, *20*, 317–328. doi:10.1080/09540260802090363
- Blakemore, S. J., & Mills, K. L. (2014). Is adolescence a sensitive period for sociocultural processing? *Annual Review of Psychology*, *65*, 187–207. doi:10.1146/annurev-psych-010213-115202
- Britto, P. R., Engle, P. L., & Super, C. M. (2013). *Handbook of early childhood development research and its impact on global policy*. Oxford: Oxford University Press.
- Britto, P. R., Lye, S. J., Proulx, K., Yousafzai, A. K., Matthews, S. G., Vaivada, T., ... Bhutta, Z. A. (2017b). Nurturing care: Promoting early childhood development. *The Lancet*, *389*, 91–102. doi:10.1016/S0140-6736(16)31390-3
- Britto, P. R., Lye, S. J., Proulx, K., Yousafzai, A. K., Matthews, S. G., Vaivada, T., ... Fernald, L. C. (2017a). Nurturing care: promoting early childhood development. *The Lancet*, *389*, 91–102.
- Bronfenbrenner, U., & Morris, P. A. (2006). The bioecological model of human development. In W. Damon & R. M. Lerner (Eds.), *Handbook of child psychology: Theoretical models of human development* (6th ed., Vol. 1, pp. 793–828). Hoboken, NJ: Wiley.
- Burde, D., Kapit, A., Wahl, R. L., Guven, O., & Skarpeteig, M. I. (2016). Education in emergencies: A review of theory and research. *Review of Educational Research*, *87*, 619–658. doi:10.3102/0034654316671594
- Byrne, M. L., Whittle, S., Vijayakumar, N., Dennison, M., Simmons, J. G., & Allen, N. B. (2017). A systematic review of adrenarche as a sensitive period in neurobiological development and mental health. *Developmental Cognitive Neuroscience*, *25*, 12–28. doi:10.1016/j.dcn.2016.12.004
- Cao-Lei, L., Elgbeili, G., Massart, R., Laplante, D. P., Szyf, M., & King, S. (2015). Pregnant women's cognitive appraisal of a natural disaster affects DNA methylation in their children 13 years later: Project Ice Storm. *Translational Psychiatry*, *5*, e515. doi:10.1038/tp.2015.13
- Cao-Lei, L., Massart, R., Suderman, M. J., Machnes, Z., Elgbeili, G., Laplante, D. P., ... King, S. (2014). DNA methylation signatures triggered by prenatal maternal stress exposure to a natural disaster: Project Ice Storm. *PLoS One*, *9*, e107653. doi:10.1371/journal.pone.0107653
- Casey, B. J., Getz, S., & Galvan, A. (2008). The adolescent brain. *Developmental Review*, *28*, 62–77. doi:10.1016/j.dr.2007.08.003
- Causadias, J. M., Telzer, E. H., & Gonzales, N. A. (2018). *The handbook of culture and biology*. Hoboken, NJ: Wiley.
- Charil, A., Laplante, D. P., Vaillancourt, C., & King, S. (2010). Prenatal stress and brain development. *Brain Research Reviews*, *65*, 56–79. doi:10.1016/j.brainresrev.2010.06.002
- Chase-Lansdale, P. L., Sabol, T. J., Sommer, T. E., Chor, E., Cooperman, A. W., Brooks-Gunn, J., ... Morris, A. (2019). Effects of a two-generation human capital program on low-income parents' education, employment, and psychological wellbeing. *Journal of Family Psychology*, *33*, 433. doi:10.1037/fam0000517
- Chen, E., & Miller, G. E. (2012). Socioeconomic status and health: Mediating and moderating factors. *Annual Review of Clinical Psychology*, *9*, 723–749. doi:10.1146/annurev-clinpsy-050212-185634
- Chiao, J. Y., Li, S.-C., Seligman, R., & Turner, R. (2016). *The Oxford handbook of cultural neuroscience*. Oxford: Oxford University Press.
- Choudhury, S. (2009). Culturing the adolescent brain: What can neuroscience learn from anthropology? *Social Cognitive and Affective Neuroscience*, *5*, 159–167. doi:10.1093/scan/nsp030

- Cicchetti, D. (2010). Resilience under conditions of extreme stress: A multilevel perspective. *World Psychiatry*, 9, 145–154. doi:10.1002/j.2051-5545.2010.tb00297.x
- Cicchetti, D., & Gunnar, M. R. (2008). Integrating biological measures into the design and evaluation of preventive interventions. *Development and Psychopathology*, 20, 737–743. doi:10.1017/S0954579408000357
- Cicchetti, D., Rogosch, F. A., Toth, S. L., & Sturge-Apple, M. L. (2011). Normalizing the development of cortisol regulation in maltreated infants through preventive interventions. *Development and Psychopathology*, 23, 789–800. doi:10.1017/s0954579411000307
- Conde-Agudelo, A., Belizan, J. M., & Lammers, C. (2005). Maternal-perinatal morbidity and mortality associated with adolescent pregnancy in Latin America: Cross-sectional study. *American Journal of Obstetrics and Gynecology*, 192, 342–349. doi:10.1016/j.ajog.2004.10.593
- Côté, J. E. (2009). Identity formation and self-development in adolescence. In R. M. Lerner, & L. Steinberg (Eds.), *Handbook of adolescent psychology* (Vol. 1, pp. 266–304). Hoboken, NJ: Wiley.
- Crone, E. A., & Dahl, R. E. (2012). Understanding adolescence as a period of social-affective engagement and goal flexibility. *Nature Reviews Neuroscience*, 13, 636. doi:10.1038/nrn3313
- Dahl, R. E., & Gunnar, M. R. (2009). Heightened stress responsiveness and emotional reactivity during pubertal maturation: Implications for psychopathology. *Development and Psychopathology*, 21, 1–6. doi:10.1017/S0954579409000017
- Debiec, J., & Sullivan, R. M. (2014). Intergenerational transmission of emotional trauma through amygdala-dependent mother-to-infant transfer of specific fear. *Proceedings of the National Academy of Sciences*, 111, 12222–12227. doi:10.1073/pnas.1316740111
- Desrosiers, A., Betancourt, T., Kergoat, Y., Servilli, C., Say, L., & Kobeissi, L. (2020). A systematic review of sexual and reproductive health interventions for young people in humanitarian and lower-and-middle-income country settings. *BMC Public Health*, 20, 1–21. doi:10.1186/s12889-020-08818-y
- Dillon, M. E., & Cherry, A. L. (2014). *An international perspective on adolescent pregnancy*. New York, NY: Springer.
- DiPietro, J. A. (2012). Maternal stress in pregnancy: Considerations for fetal development. *Journal of Adolescent Health*, 51, S3–S8. <http://dx.doi.org/10.1016/j.jadohealth.2012.04.008>
- Dipietro, J. A., Costigan, K. A., & Sipsma, H. L. (2008). Continuity in self-report measures of maternal anxiety, stress, and depressive symptoms from pregnancy through two years postpartum. *Journal of Psychosomatic Obstetrics & Gynecology*, 29, 115–124. doi:10.1080/01674820701701546
- Duryea, S. (2016). Redefining families: Realities and perspectives. Retrieved from <https://blogs.iadb.org/desarrollo-infantil/en/family/> (accessed June 21 2020).
- Eisenberg, N., Morris, A. S., McDaniel, B., & Spinrad, T. L. (2009). Moral cognitions and prosocial responding in adolescence. In R. M. Lerner, & L. Steinberg (Eds.), *Handbook of adolescent psychology* (Vol. 1, pp. 229–265). Hoboken, NJ: Wiley.
- Ekéus, C., Christensson, K., & Hjern, A. (2004). Unintentional and violent injuries among pre-school children of teenage mothers in Sweden: A national cohort study. *Journal of Epidemiology & Community Health*, 58, 680–685. <http://dx.doi.org/10.1136/jech.2003.015255>
- Elster, A. B. (1984). The effect of maternal age, parity, and prenatal care on perinatal outcome in adolescent mothers. *American Journal of Obstetrics and Gynecology*, 149, 845–847. doi:10.1016/0002-9378(84)90602-1
- Erulkar, A., & Tamrat, T. (2014). Evaluation of a reproductive health program to support married adolescent girls in rural Ethiopia. *African Journal of Reproductive Health*, 18, 68–76.
- Evans, G. W., & Kim, P. (2013). Childhood poverty, chronic stress, self-regulation, and coping. *Child Development Perspectives*, 7, 43–48. doi:10.1111/cdep.12013
- Fatori, D., Argeu, A., Brentani, H., Chiesa, A., Fraccolli, L., Matijasevich, A., ... Polanczyk, G. (2020). Maternal parenting electronic diary in the context of a home visit intervention for adolescent mothers in an urban deprived area of São Paulo, Brazil: Randomized controlled trial. *JMIR mHealth and uHealth*, 8, e13686. doi:10.2196/13686
- Fraser, A. M., Brockert, J. E., & Ward, R. H. (1995). Association of young maternal age with adverse reproductive outcomes. *New England Journal of Medicine*, 332, 1113–1117. doi:10.1056/nejm199504273321701
- Fuhrmann, D., Knoll, L. J., & Blakemore, S. J. (2015). Adolescence as a sensitive period of brain development. *Trends in Cognitive Science*, 19, 558–556. doi:10.1016/j.tics.2015.07.008
- Furstenberg Jr, F. F., Brooks-Gunn, J., & Morgan, S. P. (1987). *Adolescent mothers in later life*. Cambridge: Cambridge University Press.
- Garcia Coll, C., Vohr, B. R., Hoffman, J., & Oh, W. (1986). Maternal and environmental factors affecting developmental outcome of infants of adolescent mothers. *Journal of Developmental and Behavioral Pediatrics*, 7, 230–236. doi:10.1097/00004703-198608000-00003
- Garmezy, N., & Masten, A. S. (1986). Stress, competence, and resilience: Common frontiers for therapist and psychopathologist. *Behavior Therapy*, 17, 500–521. doi:10.1016/S0005-7894(86)80091-0
- Grey, K. R., Davis, E. P., Sandman, C. A., & Glynn, L. M. (2013). Human milk cortisol is associated with infant temperament. *Psychoneuroendocrinology*, 38, 1178–1185. doi:10.1016/j.psyneuen.2012.11.002
- Gunnar, M. R., & Quevedo, K. M. (2008). Early care experiences and HPA axis regulation in children: A mechanism for later trauma vulnerability. *Progress in Brain Research*, 167, 137–149. doi:10.1016/s0079-6123(07)67010-1
- Gunnar, M. R., Wewerka, S., Frenn, K., Long, J. D., & Griggs, C. (2009). Developmental changes in hypothalamus-pituitary-adrenal activity over the transition to adolescence: Normative changes and associations with puberty. *Development and Psychopathology*, 21, 69–85. doi:10.1017/S0954579409000054
- Handa, S., Peterman, A., Huang, C., Halpern, C., Pettifor, A., & Thirumurthy, H. (2015). Impact of the Kenya cash transfer for orphans and vulnerable children on early pregnancy and marriage of adolescent girls. *Social Science & Medicine*, 141, 36–45.
- Hare, T. A., Tottenham, N., Galvan, A., Voss, H. U., Glover, G. H., & Casey, B. J. (2008). Biological substrates of emotional reactivity and regulation in adolescence during an emotional go-nogo task. *Biological Psychiatry*, 63, 927–934. doi:10.1016/j.biopsych.2008.03.015
- Hastings, P. D., Kahle, S., Fleming, C., Lohr, M. J., Katz, L. F., & Oxford, M. L. (2019). An intervention that increases parental sensitivity in families referred to Child Protective Services also changes toddlers' parasympathetic regulation. *Developmental Science*, 22, e12725. doi:10.1111/desc.12725
- Henrich, J., Heine, S. J., & Norenzayan, A. (2010). Most people are not WEIRD. *Nature*, 466(7302), 29. doi:10.1038/466029a
- Hinton, D. E., Kredlow, M. A., Bui, E., Pollack, M. H., & Hofmann, S. G. (2012). Treatment change of somatic symptoms and cultural syndromes among Cambodian refugees with PTSD. *Depression and Anxiety*, 29, 148–155. doi:10.1002/da.20905
- Hosie, A., & Selman, P. (2006). Teenage pregnancy and social exclusion: An exploration of disengagement and reengagement from the education system. In H. Holgate, R. Evans & F. K. Yuen (Eds.), *Teenage pregnancy and parenthood: Global perspectives, issues and interventions* (pp. 72–88). New York, NY: Routledge.
- Huang, C.-C., & Lee, I. (2008). The first-three years of parenting: Evidence from the fragile families and child well-being study. *Children and Youth Services Review*, 30, 1447–1457.
- Hurd, N. M., & Zimmerman, M. A. (2010). Natural mentoring relationships among adolescent mothers: A study of resilience. *Journal of Research on Adolescence*, 20, 789–809. doi:10.1111/j.1532-7795.2010.00660.x
- Jordans, M. J., Pigott, H., & Tol, W. A. (2016). Interventions for children affected by armed conflict: A systematic review of mental health and psychosocial support in low-and middle-income countries. *Current Psychiatry Reports*, 18, 9. doi:10.1007/s11920-015-0648-z
- Juster, R. P., McEwen, B. S., & Lupien, S. J. (2010). Allostatic load biomarkers of chronic stress and impact on health and cognition. *Neuroscience and Biobehavioral Reviews*, 35, 2–16. doi:10.1016/j.neubiorev.2009.10.002
- Juster, R. P., Sindi, S., Marin, M. F., Perna, A., Hashemi, A., Pruessner, J. C., & Lupien, S. J. (2011). A clinical allostatic load index is associated with burnout symptoms and hypocortisolemic profiles in healthy workers. *Psychoneuroendocrinology*, 36, 797–805. doi:10.1016/j.psyneuen.2010.11.001
- Kabeer, N. (1997). Women, wages and intra-household power relations in urban Bangladesh. *Development and Change*, 28, 261–302. doi:10.1111/1467-7660.00043
- Kertes, D. A., Kamin, H. S., Hughes, D. A., Rodney, N. C., Bhatt, S., & Mulligan, C. J. (2016). Prenatal maternal stress predicts methylation of

- genes regulating the hypothalamic–pituitary–adrenocortical system in mothers and newborns in the Democratic Republic of Congo. *Child Development*, 87, 61–72. doi:10.1111/cdev.12487
- Kidger, J. (2006). Sisters doing it for themselves: Young mothers as peer educators in school-based sex education. In H. Holgate, R. Evans & F. K. Yuen (Eds.), *Teenage pregnancy and parenthood: Global perspectives, issues and interventions* (pp. 106–121). New York, NY: Routledge.
- King, S., & Laplante, D. P. (2015). Using natural disasters to study prenatal maternal stress in humans. *Advances in Neurobiology*, 10, 285–313. doi:10.1007/978-1-4939-1372-5_14
- Knerr, W., Gardner, F., & Cluver, L. (2013). Improving positive parenting skills and reducing harsh and abusive parenting in low- and middle-income countries: A systematic review. *Prevention Science*, 14, 352–363. doi:10.1007/s11121-012-0314-1
- Kohrt, B. A., Hruschka, D. J., Worthman, C. M., Kunz, R. D., Baldwin, J. L., Upadhaya, N., ... Tol, W. A. (2012). Political violence and mental health in Nepal: Prospective study. *The British Journal of Psychiatry*, 201, 268–275. doi:10.1192/bjp.bp.111.096222
- Kohrt, B. A., Jordans, M. J., Tol, W. A., Perera, E., Karki, R., Koirala, S., & Upadhaya, N. (2010). Social ecology of child soldiers: Child, family, and community determinants of mental health, psychosocial well-being, and reintegration in Nepal. *Transcultural Psychiatry*, 47, 727–753. doi:10.1177/1363461510381290
- Kohrt, B. A., Kunz, R. D., Baldwin, J. L., Koirala, N. R., Sharma, V. D., & Nepal, M. K. (2005). “Somatization” and “comorbidity”: A study of jhum-jhum and depression in rural Nepal. *Ethos*, 33, 125–147. doi:10.1525/eth.2005.33.1.125
- Kohrt, B. A., & Worthman, C. M. (2009). Gender and anxiety in Nepal: The role of social support, stressful life events, and structural violence. *CNS Neuroscience & Therapeutics*, 15, 237–248.
- Kohrt, B. A., Worthman, C. M., Adhikari, R. P., Luitel, N. P., Arevalo, J. M., Ma, J., ... Cole, S. W. (2016). Psychological resilience and the gene regulatory impact of posttraumatic stress in Nepali child soldiers. *Proceedings of the National Academy of Sciences*, 113, 8156–8161. doi:10.1073/pnas.1601301113
- Lam, L. L., Emberly, E., Fraser, H. B., Neumann, S. M., Chen, E., Miller, G. E., & Kobor, M. S. (2012). Factors underlying variable DNA methylation in a human community cohort. *Proceedings of the National Academy of Sciences*, 109, (Suppl 2), 17253–17260. doi:10.1073/pnas.1121249109
- Lancaster, J. B., & Hamburg, B. A. (2008). The biosocial dimensions of school-age pregnancy and parenthood: An introduction. In J. B. Lancaster & B. A. Hamburg (Eds.), *School-age pregnancy and parenthood: Biosocial dimensions* (pp. 3–13). New Brunswick, NJ: Transaction Publishers.
- Laurenzi, C. A., Gordon, S., Abrahams, N., du Toit, S., Bradshaw, M., Brand, A., ... Servili, C. (2020). Psychosocial interventions targeting mental health in pregnant adolescents and adolescent parents: A systematic review. *Reproductive Health*, 17, 1–15. doi:10.1186/s12978-020-00913-y
- Leadbeater, B. J. R., & Way, N. (2001). *Growing up fast: Transitions to early adulthood of inner-city adolescent mothers*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Lee, W., Carr, M., Soutar, B., & Mitch, L. (2013). *Understanding the Te Whāriki approach: Early years education in practice*. New York, NY: Routledge.
- Lumey, L. H., Stein, A. D., Kahn, H. S., van der Pal-de Bruin, K. M., Blauw, G. J., Zybert, P. A., & Susser, E. S. (2007). Cohort profile: the Dutch Hunger Winter families study. *International Journal of Epidemiology*, 36, 1196–1204. doi:10.1093/ije/dym126
- Lundberg, M., & Wuermli, A. J. (eds.). (2012). *Children and youth in crisis: Protecting and promoting human development in times of economic shocks*. Washington, DC: World Bank.
- Lupien, S. J., Maheu, F., Tu, M., Fiocco, A., & Schramek, T. E. (2007). The effects of stress and stress hormones on human cognition: Implications for the field of brain and cognition. *Brain and Cognition*, 65, 209–237. doi:10.1016/j.bandc.2007.02.007
- Lupien, S. J., McEwen, B. S., Gunnar, M. R., & Heim, C. (2009). Effects of stress throughout the lifespan on the brain, behaviour and cognition. *Nature Reviews Neuroscience*, 10, 434–445. doi:10.1038/nrn2639
- Luthar, S. S. (1993). Methodological and conceptual issues in research on childhood resilience. *Journal of Child Psychology and Psychiatry*, 34, 441–453. doi:10.1111/j.1469-7610.1993.tb01030.x
- Luthar, S. S., & Zigler, E. (1991). Vulnerability and competence: A review of research on resilience in childhood. *American Journal of Orthopsychiatry*, 61, 6–22. doi:10.1037/h0079218
- Malter Cohen, M., Tottenham, N., & Casey, B. J. (2013). Translational developmental studies of stress on brain and behavior: Implications for adolescent mental health and illness? *Neuroscience*, 249, 53–62. doi:10.1016/j.neuroscience.2013.01.023
- Masten, A. S. (2019). Resilience from a developmental systems perspective. *World Psychiatry*, 18, 101. doi:10.1002/wps.20591
- Masten, A. S., & Narayan, A. J. (2012). Child development in the context of disaster, war, and terrorism: Pathways of risk and resilience. *Annual Review of Psychology*, 63, 227–257. doi:10.1146/annurev-psych-120710-100356
- Masten, A. S., & Wright, M. O. D. (2010). Resilience over the lifespan: Developmental perspectives on resistance, recovery, and transformation. In A. S. Masten & M. O. D. Wright (Eds.), *Handbook of adult resilience* (pp. 213–237). New York, NY: Guilford Press.
- McCormick, C. M., Mathews, I. Z., Thomas, C., & Waters, P. (2010). Investigations of HPA function and the enduring consequences of stressors in adolescence in animal models. *Brain and Cognition*, 72, 73–85. doi:10.1016/j.bandc.2009.06.003
- McEwen, B. S. (2017). Allostasis and the epigenetics of brain and body health over the life course: The brain on stress. *Journal of the American Medical Association Psychiatry*, 74, 551–552.
- McEwen, B. S., & Magarinos, A. M. (2001). Stress and hippocampal plasticity: Implications for the pathophysiology of affective disorders. *Human Psychopharmacology*, 16, S7–S19. doi:10.1002/hup.266
- McEwen, B. S., & Wingfield, J. C. (2003). The concept of allostasis in biology and biomedicine. *Hormones and Behavior*, 43, 2–15. doi:10.1016/s0018-506x(02)00024-7
- McEwen, B. S., & Wingfield, J. C. (2007). Allostasis and allostatic load. In G. Fink (Ed.), *Encyclopedia of stress* (2nd ed., pp. 135–141). New York, NY: Academic Press.
- McQueston, K., Silverman, R., & Glassman, A. (2013). The efficacy of interventions to reduce adolescent childbearing in low-and middle-income countries: A systematic review. *Studies in Family Planning*, 44, 369–388. doi:10.1111/j.1728-4465.2013.00365.x
- Melnikas, A. J., Ainul, S., Ehsan, I., Haque, E., & Amin, S. (2020). Child marriage practices among the Rohingya in Bangladesh. *Conflict and Health*, 14, 1–12. doi:10.1186/s13031-020-00274-0
- Miller, G. E., Chen, E., Fok, A. K., Walker, H., Lim, A., Nicholls, E. F., ... Kobor, M. S. (2009). Low early-life social class leaves a biological residue manifested by decreased glucocorticoid and increased proinflammatory signaling. *Proceedings of the National Academy of Sciences*, 106, 14716–14721. doi:10.1073/pnas.0902971106
- Mills-Koonce, W. R., Propper, C., Gariepy, J. L., Barnett, M., Moore, G. A., Calkins, S., & Cox, M. J. (2009). Psychophysiological correlates of parenting behavior in mothers of young children. *Developmental Psychobiology*, 51, 650–661. doi:10.1002/dev.20400
- Mitra, R., Jadhav, S., McEwen, B. S., Vyas, A., & Chattarji, S. (2005). Stress duration modulates the spatiotemporal patterns of spine formation in the basolateral amygdala. *Proceedings of the National Academy of Sciences of the United States of America*, 102(26), 9371–9376. doi:10.1073/pnas.0504011102
- Motta, A., & Yoshikawa, H. (2018). Progress toward Sustainable Development Goal 4 in a culturally diverse world: The experience of *Modalidad Propia* in Colombia. In S. Verma & A. C. Petersen (Eds.), *Developmental science and sustainable development goals for children and youth* (pp. 59–75). Cham: Springer International.
- Murphy, K. M., Rodrigues, K., Costigan, J., & Annan, J. (2017). Raising children in conflict: An integrative model of parenting in war. *Peace and Conflict: Journal of Peace Psychology*, 23, 46. doi:10.1037/pac0000195
- Murphy, K. M., Yoshikawa, H., & Wuermli, A. J. (2018). Implementation research for early childhood development programming in humanitarian contexts. *Annals of the New York Academy of Sciences*, 1419, 90–101. doi:10.1111/nyas.13691
- Natsuaki, M. N., Klimes-Dougan, B., Ge, X., Shirtcliff, E. A., Hastings, P. D., & Zahn-Waxler, C. (2009). Early pubertal maturation and internalizing problems in adolescence: Sex differences in the role of cortisol reactivity to

- interpersonal stress. *Journal of Clinical Child & Adolescent Psychology*, 38, 513–524. doi:10.1080/15374410902976320
- Nederhof, E., Marceau, K., Shirtcliff, E. A., Hastings, P. D., & Oldehinkel, A. J. (2015). Autonomic and adrenocortical interactions predict mental health in late adolescence: The TRAILS Study. *Journal of Abnormal Child Psychology*, 43, 847–861. doi:10.1007/s10802-014-9958-6
- Nelson, C. A., 3rd, Zeanah, C. H., Fox, N. A., Marshall, P. J., Smyke, A. T., & Guthrie, D. (2007). Cognitive recovery in socially deprived young children: the Bucharest Early Intervention Project. *Science*, 318, 1937–1940. doi:10.1126/science.1143921
- Nyirenda, M. (2006). Prenatal glucocorticoid exposure and physiological programming of adult disease. *Expert Review of Endocrinology*, 1, 391–402. doi:10.1586/17446651.1.3.391
- Panther-Brick, C., & Eggerman, M. (2012). Understanding culture, resilience, and mental health: The production of hope. In M. Ungar (Ed.), *The social ecology of resilience: A handbook of theory and practice* (pp. 369–386). New York, NY: Springer Science+Business Media.
- Pesonen, A.-K., Räikkönen, K., Strandberg, T. E., & Järvenpää, A.-L. (2005). Continuity of maternal stress from the pre- to the postnatal period: associations with infant's positive, negative and overall temperamental reactivity. *Infant Behavior and Development*, 28, 36–47. <http://dx.doi.org/10.1016/j.infbeh.2004.09.001>
- Petersen, A. C. (1988). Adolescent development. *Annual Review of Psychology*, 39, 583–607. <http://dx.doi.org/10.1146/annurev.ps.39.020188.003055>
- Raj, A., McDougal, L., Silverman, J. G., & Rusch, M. L. (2014). Cross-sectional time series analysis of associations between education and girl child marriage in Bangladesh, India, Nepal and Pakistan, 1991–2011. *PLoS One*, 9, e106210. doi:10.1371/journal.pone.0106210
- Richards, E., Theobald, S., George, A., Kim, J. C., Rudert, C., Jehan, K., & Tolhurst, R. (2013). Going beyond the surface: Gendered intra-household bargaining as a social determinant of child health and nutrition in low and middle income countries. *Social Science & Medicine*, 95, 24–33. <http://dx.doi.org/10.1016/j.socscimed.2012.06.015>
- Rutter, M. (2013). Annual Research Review: Resilience - clinical implications. *Journal of Child Psychology and Psychiatry*, 54, 474–487. doi:10.1111/j.1469-7610.2012.02615.x
- Schriber, R. A., & Guyer, A. E. (2016). Adolescent neurobiological susceptibility to social context. *Developmental Cognitive Neuroscience*, 19, 1–18. doi:10.1016/j.dcn.2015.12.009
- Seitz, V., & Apfel, N. H. (1993). Adolescent mothers and repeated childbearing: Effects of a school-based intervention program. *American Journal of Orthopsychiatry*, 63, 572–581.
- Seitz, V., & Apfel, N. H. (1994). Parent-focused intervention: Diffusion effects on siblings. *Child Development*, 65, 677–683. doi:10.1111/j.1467-8624.1994.tb00776.x
- Seitz, V., Rosenbaum, L. K., & Apfel, N. H. (1985). Effects of family support intervention: A ten-year follow-up. *Child Development*, 56, 376–391. doi:10.2307/1129727
- Sheppard, P., & Sear, R. (2016). Do grandparents compete with or support their grandchildren? In Guatemala, paternal grandmothers may compete, and maternal grandmothers may cooperate. *Royal Society Open Science*, 3, 160069. doi:10.1098/rsos.160069
- Shonkoff, J. P. (2012). Leveraging the biology of adversity to address the roots of disparities in health and development. *Proceedings of the National Academy of Sciences*, 109, (Suppl 2), 17302–17307. doi:10.1073/pnas.1121259109
- Singla, D. R., Waqas, A., Hamdani, S. U., Suleman, N., Zafar, S. W., Saeed, K., ... Rahman, A. (2019). Implementation and effectiveness of adolescent life skills programs in low-and middle-income countries: A critical review and meta-analysis. *Behaviour Research and Therapy*, 130, 103402. doi:10.1016/j.brat.2019.04.010
- Sirin, S. R., & Rogers-Sirin, L. (2015). *The educational and mental health needs of Syrian refugee children. Young children in refugee families*. Washington, DC: Migration Policy Institute.
- Slone, M., & Mann, S. (2016). Effects of war, terrorism and armed conflict on young children: A systematic review. *Child Psychiatry & Human Development*, 47, 950–965. doi:10.1007/s10578-016-0626-7
- Sommer, M. (2010). Where the education system and women's bodies collide: The social and health impact of girls' experiences of menstruation and schooling in Tanzania. *Journal of Adolescence*, 33, 521–529. doi:10.1016/j.adolescence.2009.03.008
- Speer, P. W. (2008). Altering patterns of relationship and participation: Youth organizing as a setting-level intervention. In B. Shinn & H. Yoshikawa (Eds.), *Toward positive youth development: Transforming schools and community programs* (pp. 213–228). Oxford: Oxford University Press.
- Sroufe, L. A., Egeland, B., Carlson, E. A., & Collins, W. A. (2005). *The development of the person: The Minnesota study of risk and adaptation from birth to adulthood*. New York, NY: Guilford Publications.
- Steinberg, L. (2005). Cognitive and affective development in adolescence. *Trends in Cognitive Sciences*, 9, 69–74. <http://dx.doi.org/10.1016/j.tics.2004.12.005>
- Stroud, L. R., Foster, E., Papandonatos, G. D., Handwerger, K., Granger, D. A., Kivlighan, K. T., & Niaura, R. (2009). Stress response and the adolescent transition: Performance versus peer rejection stressors. *Development and Psychopathology*, 21, 47. doi:10.1017/S0954579409000042
- Super, C. M., & Harkness, S. (1986). The developmental niche: A conceptualization at the interface of child and culture. *International Journal of Behavioral Development*, 9, 545–569. doi:10.1177/016502548600900409
- Theron, L., Liebenberg, L., & Ungar, M. (2015). *Youth resilience and culture*. New York, NY: Springer.
- Tol, W. A., Song, S., & Jordans, M. J. (2013a). Annual research review: Resilience and mental health in children and adolescents living in areas of armed conflict – a systematic review of findings in low- and middle-income countries. *Journal of Child Psychology and Psychiatry*, 54, 445–460. doi:10.1111/jcpp.12053
- UNFPA. (2018). New Ebola outbreak hits women and girls hardest in the Democratic Republic of the Congo. Retrieved from <https://www.unfpa.org/news/new-ebola-outbreak-hits-women-and-girls-hardest-democratic-republic-congo> (accessed April 28 2020).
- UNHCR. (2019). Figures at a glance. Retrieved from <https://www.unhcr.org/en-us/figures-at-a-glance.html> (accessed June 22 2020).
- UNICEF. (2019). Fast Facts: 10 facts illustrating why we must #EndChildMarriage. Retrieved from <https://www.unicef.org/eca/press-releases/fast-facts-10-facts-illustrating-why-we-must-endchildmarriage> (accessed June 21 2020).
- Urindwanayo, D., & Richter, S. (2020). Teenage pregnancy in refugee camps: A narrative synthesis. *Journal of International Women's Studies*, 21, 255–270.
- Ursache, A., Noble, K. G., & Blair, C. (2015). Socioeconomic status, subjective social status, and perceived stress: Associations with stress physiology and executive functioning. *Behavioral Medicine*, 41, 145–154. doi:10.1080/08964289.2015.1024604
- Vaillant, J., Koussoubé, E., Roth, D., Pierotti, R., Hossain, M., & Falb, K. L. (2020). Engaging men to transform inequitable gender attitudes and prevent intimate partner violence: A cluster randomised controlled trial in North and South Kivu, Democratic Republic of Congo. *BMJ Global Health*, 5, e002223. <http://dx.doi.org/10.1136/bmjgh-2019-002223>
- Viau, V. (2002). Functional cross-talk between the hypothalamic-pituitary-gonadal and-adrenal axes. *Journal of Neuroendocrinology*, 14, 506–513. doi:10.1046/j.1365-2826.2002.00798.x
- Waddoups, A. B., Yoshikawa, H., & Strouf, K. (2019). Developmental effects of parent-child separation. *Annual Review of Developmental Psychology*, 1, 387–410. doi:10.1146/annurev-devpsych-121318-085142
- Waters, S. F., West, T. V., & Mendes, W. B. (2014). Stress contagion: Physiological covariation between mothers and infants. *Psychological Science*, 25, 934–942. doi:10.1177/0956797613518352
- Weisner, T. S. (2002). Ecocultural understanding of children's developmental pathways. *Human Development*, 45, 275–281. <http://dx.doi.org/10.1159/000064989>
- Weissman, D. G., Conger, R. D., Robins, R. W., Hastings, P. D., & Guyer, A. E. (2018). Income change alters default mode network connectivity for adolescents in poverty. *Developmental Cognitive Neuroscience*, 30, 93–99.
- Whiting, B. B. (1980). Culture and social behavior: A model for the development of social behavior. *Ethos*, 8, 95–116.
- WHO. (2014). Adolescent pregnancy. Fact sheet No. 364. Retrieved from <http://www.who.int/mediacentre/factsheets/fs364/en/> (accessed January 10 2015).
- WHO. (2020). Fact sheet: Adolescent pregnancy. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/adolescent-pregnancy> (accessed June 21 2020).

- Wierenga, L. M., Bos, M. G., Schreuders, E., vd Kamp, F., Peper, J. S., Tamnes, C. K., & Crone, E. A. (2018). Unraveling age, puberty and testosterone effects on sub-cortical brain development across adolescence. *Psychoneuroendocrinology*, *91*, 105–114. doi:10.1016/j.psyneuen.2018.02.034
- Worthman, C. M. (2010). The ecology of human development: evolving models for cultural psychology. *Journal of Cross-Cultural Psychology*, *41*, 546–562. doi:10.1177/0022022110362627
- Worthman, C. M. (2019). Shared and local pathways in suffering and resilience: Keeping the body in mind. *Transcultural Psychiatry*, *56*, 775–785. doi:10.1177/1363461519862700
- Worthman, C. M., & Costello, E. J. (2009). Tracking biocultural pathways in population health: The value of biomarkers. *Annals of Human Biology*, *36*, 281–297. doi:10.1080/03014460902832934
- Worthman, C. M., & Trang, K. (2018). Dynamics of body time, social time and life history at adolescence. *Nature*, *554*, 451–457. doi:10.1038/nature25750
- Wuermli, A. J., Tubbs, C. C., Petersen, A. C., & Aber, J. L. (2015). Children and youth in low- and middle-income countries: Toward an integrated developmental and intervention science. *Child Development Perspectives*, *9*, 61–66. doi:10.1111/cdep.12108
- Wuermli, A. J., & Yoshikawa, H. (2016). Dual-generation approaches to adolescent motherhood and human development in the context of economic downturns and poverty in low- and middle-income countries. In A. C. Petersen, S. H. Koller, F. Motti-Stefanidi, & S. Verma (Eds.), *Positive youth development in global contexts of social and economic change* (pp. 222–246). New York, NY: Routledge.
- Yakubu, I., & Salisu, W. J. (2018). Determinants of adolescent pregnancy in sub-Saharan Africa: A systematic review. *Reproductive Health*, *15*, 15. doi:10.1186/s12978-018-0460-4
- Yoshikawa, H. (1994). Prevention as cumulative protection: Effects of early family support and education on chronic delinquency and its risks. *Psychological Bulletin*, *115*, 28. <http://dx.doi.org/10.1037/0033-2909.115.1.28>
- Yoshikawa, H., Wuermli, A. J., & Aber, J. L. (2018). Mitigating the impact of forced displacement and refugee unauthorized status on youth. In M. M. Suárez-Orozco (Ed.), *Humanitarianism and mass migration: Confronting the world crisis* (pp. 186–206). Oakland, CA: University of California Press.
- Yoshikawa, H., Wuermli, A. J., Britto, P. R., Dreyer, B., Leckman, J. F., Lye, S. J., ... Stein, A. (2020). Effects of the global COVID-19 pandemic on early childhood development: Short- and long-term risks and mitigating program and policy actions. *Journal of Pediatrics*, *223*, 188–193. doi:10.1016/j.jpeds.2020.05.020
- Yoshikawa, H., & Zigler, E. (2000). Mental health in Head Start: New directions for the twenty-first century. *Early Education and Development*, *11*, 247–264. doi:10.1207/s15566935eed1103_2
- Yount, K. M., Krause, K. H., & Miedema, S. S. (2017). Preventing gender-based violence victimization in adolescent girls in lower-income countries: Systematic review of reviews. *Social Science & Medicine*, *192*, 1–13. doi:10.1016/j.socscimed.2017.08.038
- Zhang, C., Fong, V. L., Yoshikawa, H., Way, N., Chen, X., & Lu, Z. (2019). The rise of maternal grandmother child care in urban Chinese families. *Journal of Marriage and Family*, *81*, 1174–1191. doi:10.1111/jomf.12598
- Zigler, E. F., & Muenchow, S. (1992). *Head Start: The inside story of America's most successful educational experiment*. New York, NY: Basic Books.
- Zigler, E., & Seitz, V. (1980). Early childhood intervention programs: A reanalysis. *School Psychology Review*, *9*, 354–368. doi:10.1080/02796015.1980.12086573