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Migration-related trauma and mental health among migrant children emigrating from Mexico and Central America to the United States: Effects on developmental neurobiology and implications for policy

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Abstract

Children make up over half of the world's migrants and refugees and face a multitude of traumatic experiences prior to, during, and following migration. Here, we focus on migrant children emigrating from Mexico and Central America to the United States and review trauma related to migration, as well as its implications for the mental health of migrant and refugee children. We then draw upon the early adversity literature to highlight potential behavioral and neurobiological sequalae of migration-related trauma exposure, focusing on attachment, emotion regulation, and fear learning and extinction as transdiagnostic mechanisms underlying the development of internalizing and externalizing symptomatology following early-life adversity. This review underscores the need for interdisciplinary efforts to both mitigate the effects of trauma faced by migrant and refugee youth emigrating from Mexico and Central America and, of primary importance, to prevent child exposure to trauma in the context of migration. Thus, we conclude by outlining policy recommendations aimed at improving the mental health of migrant and refugee youth.

Keywords

attachment; early-life stress; emotion regulation; fear learning; frontolimbic circuitry; migrant and refugee children; parent–child separation; policy

1 | INTRODUCTION

For many countries, the growing presence of migrant and refugee children and their families constitutes one of the most noticeable changes in the demographic and social landscape. Globally, over half of today's migrants and refugees are under the age of 18 (UNHCR, 2019), and there are over 2.5 million migrant and refugee children living in the United States alone (Levesque, 2021). Many migrant and refugee children experience significant adversity prior to, during, and after immigration (Perreira & Ornelas, 2013), and the

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extant literature examining the psychological and neurobiological correlates of exposure to adversity sheds light on potential behavioral and neurobiological consequences of migration-related experiences for children across development (Blackmore et al., 2020; MacLean et al., 2020).

In the current review, we harness a neurodevelopmental lens to document the deleterious sequelae of migration-related traumatic exposures among children emigrating from Mexico and Central America and highlight key implications for policy change. We begin by reviewing the range of stressful experiences that migrant and refugee children frequently experience before, during, and after migration from their countries of origin, as well as the potential psychological and behavioral effects of these exposures. We next highlight hypothesized effects of migration-related trauma on the structural and functional development of frontolimbic circuitry. With regard to the functional development of frontolimbic circuitry, we specifically focus the present review on formation of attachment relationships with caregivers and the core affective processes of emotion regulation and fear learning and extinction, as these three processes are particularly sensitive to the effects of early-life trauma, are highly relevant to the experiences of migrant and refugee youth, and represent transdiagnostic mechanisms underlying the development of internalizing and externalizing symptomatology following exposure to early-life adversity. Finally, we review policy implications of the hypothesized psychological and neurodevelopmental effects of exposure to migration-related trauma and make several recommendations for researchers, clinicians, and policymakers across disciplines focused on both preventing and mitigating the harmful effects of exposure to trauma for migrant and refugee youth.

Although migration-related adversity affects children worldwide, of note, in order to focus the recommendations that follow the present review on United States policy, when possible, we have chosen to selectively highlight the experiences of migrant and refugee children originating in Mexico and Central America and destined for the United States. In addition, throughout the review, we refer to children migrating from their countries of origin, broadly, as “migrant and refugee children,” as we describe the experiences of children who are both fleeing their home countries due to violence, war, and persecution, in addition to those who are emigrating in search of better opportunities or safer living conditions but who are not formally seeking asylum or refugee status. Also included in this broader category are asylum-seekers, who are forced to flee their home countries because of war, violence, or persecution, but whose request for refugee status has not yet been recognized by an international entity such as the United Nations.

2 | MIGRANT AND REFUGEE CHILDREN’S EXPOSURE TO TRAUMA AND PSYCHOLOGICAL SEQUELAE

2.1 | Trauma exposure prior to migration

Exposure to actual or threatened violence is frequently cited as the impetus for family migration (Borger, 2018; Ornelas & Perreira, 2011; United Nations Development Program [UNDP] in El Salvador, 2005; United Nations High Commissioner for Refugees [UNHCR], 2014), and several studies have documented high rates of trauma exposure prior to migration

(Baily, 2017; Eisenman et al., 2003; Keller et al., 2017), suggesting that migrant and refugee children's environments in their countries of origin are often inherently characterized by threat (Fazel et al., 2012; Tienda & Haskins, 2011). In February 2020, Doctors Without Borders released a report presenting data from patients seen at healthcare posts along a common migration route. Almost 80% of migrants reported exposure to violence in their country of origin as the precipitating factor for their migration and 20% of these individuals reported exposure to sexual violence (Doctors Without Borders, 2020). A 2014 study of unaccompanied minors arriving from Central America found that 58% of minors reported seeking asylum in the United States because "they suffered or faced harms that indicate a potential or actual need for international protection [granted when a person is outside of their home country and unable to return due to risk there and/or their home country being unable or unwilling to protect them]," including gang recruitment, abandonment, and abuse (UNHCR, 2006, 2014). Furthermore, roughly 33% of migrant and refugee children report having witnessed domestic violence and 60% report having witnessed death or serious injury (Baily, 2017).

Extensive literature suggests numerous deleterious consequences of exposure to trauma early in life on psychological well-being throughout the life span (Friis et al., 2002; Gibb et al., 2007; Horowitz et al., 1995; Reading, 2006). Specifically, exposure to traumatic events —such as those frequently experienced by migrant and refugee children prior to migration— places children at increased risk for developing both immediate and long-term psychiatric symptoms (Shonkoff et al., 2012), including posttraumatic stress disorder (PTSD; Dunn et al., 2017; Friis et al., 2002; Gibb et al., 2007; Horowitz et al., 1995; McLaughlin et al., 2010; Norman et al., 2012; Reading, 2006; van Rooij et al., 2020; Widom et al., 2007). Many of the aforementioned pre-migration experiences satisfy Criterion A of the DSM-5's definition of PTSD, meaning that these events are eligible to be considered as the precipitating event for the development of PTSD (American Psychiatric Association, 2013). In fact, migrant and refugee children experience PTSD and other psychiatric conditions at a high rate (Blackmore et al., 2020). A 2019 study found that 17% of Central American youth held with their mothers in a detention center met criteria for PTSD, compared to the United States average of 4.7% meeting criteria for PTSD (MacLean et al., 2019, 2020). Similarly, a 2015 study of Central American migrant and refugee women and children found that over half of the participants queried reported experiencing clinically significant symptoms of anxiety and depression and almost half of the participants reported experiencing clinically significant levels of PTSD (O'Connor et al., 2015).

Pre-immigration poverty has also been found to exacerbate the effect of immigration-related trauma on adolescents' development of PTSD (Perreira & Ornelas, 2013). This finding is in line with segmented assimilation theory, which suggests that both a child's "context of exit" from their country of origin and their "context of reception" in their new home country greatly affect the degree to which migration-related experiences impact children's outcomes (Coll & Magnuson, 1997; Portes & Rumbaut, 2001). This finding is also in line with a large body of research on stress sensitization, which highlights that previous exposure to traumatic events (e.g., pre-migration) can sensitize individuals to experience amplified psychological sequelae of future stressful events (e.g., Wade et al., 2019). Practically, children who experience financial hardship in their countries of origin, or whose families

choose to migrate due to conditions of poverty, may have fewer resources to promote safety during notoriously dangerous border crossings (and thus be more likely to experience more severe traumatic exposures during migration). Further, families emigrating due to conditions of poverty are likely to have fewer economic resources to facilitate resettlement (Negi, 2011; Perreira & Ornelas, 2013). Building upon this literature, further research is needed to investigate how preimmigration factors beyond poverty may place youth at greater risk for trauma-related symptomatology following immigration.

2.2 | Trauma exposure during migration and detention

In addition to trauma exposure prior to migration, migratory experiences themselves are inherently stressful, and minors frequently face exposure to significant trauma during the migration process itself (Dudley et al., 2012; Fazel et al., 2012). A 2011 study sampled the experiences of parents of migrant and refugee children from Central and South America and found that 13% of parents reported experiencing trauma that posed actual or threatened harm to their families, such as physical assault, and 90% of mothers reported fearing for their and their family's safety during migration (Ornelas & Perreira, 2011). Individuals attempting to enter the United States via overland travel at the southern border of the United States report facing significant threats to physical health such as heat stroke; rattlesnakes; long-distance walks without food, water, and shelter; lack of sanitary facilities; and lack of medical care (DeLuca et al., 2010). In addition, families report facing separation from family (reviewed in detail below), trafficking, kidnapping, injury by border control officers, and sexual violence (DeLuca et al., 2010; Mitra & Hodes, 2019; Office of Refugee Resettlement [ORR], Administration for Children & Families [ACF], Department of Health & Human Services [HHS], 2014; Sladkova, 2007). Paralleling these reports, in-depth qualitative studies of migrant families in detention centers in the American southwest have documented families' accounts of witnessing rape, murder, and other violent and sexual crimes against children during the migration journey (O'Connor et al., 2015). Indeed, studies of the effects of migration-related stressors on later functioning have found associations between traumatic exposures experienced during the migration process and psychiatric symptoms across development (Blackmore et al., 2020; Dudley et al., 2012; Fazel et al., 2012). Furthermore, trauma experienced during the migration process itself likely exacerbates the effects of previous trauma exposure on child functioning and psychiatric symptomatology (Fazel et al., 2012).

Children and families who are apprehended and placed in detention facilities face a new set of adversities following border crossing. Children and parents report a hellish environment that is characterized by children's distress, fear, and uncertainty. Detention centers have been reported to provide detainees with insufficient or poor nutrition, hygiene (e.g., no bedding and open toilets in bathrooms), and medical and psychological resources, to have constant light exposure, and to frequently have such cold temperatures that they are often nicknamed "*hieleras*" or "iceboxes" (American Immigration Lawyers Association, 2016; Kanno-Youngs, 2019; Linton et al., 2017). Investigative reports have also found that facilities have failed to address minor detainees' pre-existing medical conditions, such that children's health deteriorates during detention (American Immigration Council et al., 2015). Further, reports of experiences in detention centers have documented the daily physical

and psychological threats inherent to detention, which itself constitutes an exposure to a Criterion A traumatic event (O'Connor et al., 2015). Families are often separated, the details and implications of which are reviewed in further detail below, and parents and children report exposure to sexual assault, threats of deportation and family separation, and taunting, verbal abuse, and intimidation from Immigration and Customs Enforcement (ICE) employees (O'Connor et al., 2015).

Children held in detention centers in the United States experience significant levels of emotional difficulties spanning both internalizing and externalizing domains (Doctors Without Borders, 2020; MacLean et al., 2019, 2020). Data from the few reports available comparing mental health outcomes among migrants who both do and do not experience detention suggest that detention exacerbates symptomatology (Doctors Without Borders, 2020). Notably, the quality of conditions in detention centers may directly affect migrant and refugee children's development of symptomatology following migration-related trauma. A self-report study of psychiatric symptoms in teenage and adult asylum seekers in detention centers in the United States found that asylum seekers reported clinically significant levels of anxiety, depression, and PTSD (Keller et al., 2003); additionally, the severity of symptoms was associated with the length of the detention such that more time in detention was related to worsened symptomatology (Keller et al., 2003). Similarly, a separate study of youth and adults found that being held in detention centers was associated with the development of more new mental health symptoms (Green & Eagar, 2010), and release from detention was associated with improved symptomatology (Keller et al., 2003).

2.2.1 | The role of caregivers during migration—In 2019, 55.6% of individuals apprehended at the United States' southwest border were traveling with family members (U.S. Customs & Border Protection, 2019). Parental attachment relationships are central to nearly every aspect of children's functioning across development (Lieberman & Pawl, 1988). Children's relationships with caregivers form the basis for nearly all developmental competencies, including those that are of increased importance in contexts of ongoing stress, such as emotion regulation (Calkins & Hill, 2007; Tamis-LeMonda et al., 2004; Thompson & Meyer, 2007). Therefore, parental presence or absence during exposure to migration-related stress can substantially mitigate—or exacerbate—the effect of migration-related stress exposure on children's outcomes. For migrant and refugee children who are able to remain with caregivers during their migration journey, caregiver presence can provide a potent buffer from the deleterious effects of exposure to migration-related trauma (Bean et al., 2007; MacLean et al., 2019, 2020). Conversely, migration often involves the threat of forcible separation of children and caregivers (Lutheran Immigration and Refugee Service [LIRS] & The Women's Refugee Commission, 2014) or actual separation in detention centers (Waddoups et al., 2019), typically for at least 72 hours at a time (Linton et al., 2017). Therefore, for many migrant and refugee children separated from their caregivers, migration can represent a major source of caregiving-related adversity and disruption of safety-promoting attachment relationships.

The protective role of caregiver presence during migration-related stress: A growing body of research underscores that parents can buffer children from the negative effects of

stress. Parents provide children with safety and security to promote survival in contexts of danger, and also play a central role in providing external regulation for children's emotions (Eisenberg et al., 1998) that ultimately supports children's transition to reliance on their own intrinsic capacity for self-regulation (Hofer, 1978). Though there is variability in the degree to which parental presence effectively buffers children from the negative effects of stress (Williamson et al., 2017), parental buffering of children's psychobiological reactivity to stress is a primary mechanism by which parental presence may attenuate the effects of migration-related stress. Paralleling findings from animal studies documenting that caregiver presence suppresses corticosterone production and amygdala activation in rodent pups (Moriceau & Sullivan, 2006), in human developmental samples, caregiver presence has been found to be associated with reductions in children's limbic–hypothalamic–pituitary–adrenal (LHPA) axis activation via suppression of cortisol activity (Gunnar & Donzella, 2002; Hostinar et al., 2014). Further, across development, caregivers exert powerful influences on the development of frontolimbic circuitry underlying emotion regulation (see Gee, 2016 for a review). Caregiver presence has been shown to modulate medial prefrontal cortex (mPFC)–amygdala connectivity to dampen amygdala reactivity to emotionally valenced stimuli during childhood (Gee et al., 2014). Of note, the stress-buffering effect of caregiver presence on neural reactivity to stress is most potent in childhood, with caregivers transitioning to a more supportive role during adolescence (Gee et al., 2014). Taken together, these findings suggest that caregiver presence during children's exposure to migration-related stress, particularly earlier in development, may effectively mitigate the effects of this stress exposure on children's psychobiological development, and may therefore be an important source of resilience for migrant and refugee children.

Deleterious effects of forcible separation of families: Conversely, threatened or actual separation from caregivers constitutes a major traumatic exposure that is associated with behavioral and psychological difficulties for children both immediately following and for years following separation (American Psychiatric Association, 2013; MacLean et al., 2019, 2020; Suárez-Orozco et al., 2011). Forcible separation of children and caregivers threatens the immediate physical safety of children, in addition to the long-term physical and mental health of children throughout development via disruption of a parent's ability to buffer children's stress response to migration-related events (Gunnar & Donzella, 2002) and, relatedly, to help children regulate their emotions in stressful conditions.

As family separation prevents children from accessing caregivers as important sources of external buffering of stress reactivity and regulation, children separated from their parents face additional risk for the development of psychiatric symptoms following migration-related trauma. The physical separation of parents and children, particularly in sudden or unexpected circumstances such as forcible removal of children following border crossing, is associated with greater risk for both internalizing and externalizing psychiatric symptoms, psychosocial difficulties, and neurocognitive impairments following the traumatic separation (Baily et al., 2011; Lieberman et al., 2011; Makariev & Shaver, 2010; Shonkoff et al., 2009). Highlighting the potent buffering effect of caregiver presence during exposure to migration-related trauma, notably, relative to children who were detained with their family members, children who experienced forcible separation from a caregiver during migration

exhibited higher rates of emotional difficulties (Bean et al., 2007; MacLean et al., 2019, 2020), which likely have secondary consequences, such as negative effects on academic, social, and emotional development (Lustig et al., 2004).

Although family separation affects youth at all stages of development, infants and young children may be most severely affected by family separation given the increased primacy of caregivers in the lives of young children (Lieberman & Oliver Bucio, 2018; Yoshikawa & Kalil, 2011). Infants, toddlers, and young children rely on caregivers to provide them with protection and comfort, and parents serve as a particularly important external source of emotion regulation for young children who do not yet have the capacity to fully self-regulate (Lieberman et al., 2011). "No touch" policies enforced in detention centers prohibit workers from physically touching children, including consoling an infant or toddler, and thus children are left without any adult comfort (Phillips, 2018). To perceive threat to one's own or a parent's well-being is classified as a Criterion A traumatic event (American Psychiatric Association, 2013), and separation from a caregiver in detention is associated with distress and negative psychological effects for children (Nielsen et al., 2008). Specifically, disruption of attachment relationships between young children and their caregivers has been associated with increased hypervigilance, freezing behaviors, interpersonal difficulties including impaired ability to read and respond to others' emotions, distrust of others, and isolation from others (Lieberman et al., 2011). Further, the disruption of an attachment relationship—always disorienting—can be particularly traumatogenic in the context of generalized situational and caregiving instability (Osofsky, 2018). Further, as early childhood may represent a sensitive period for the establishment of caregivers as both predictable and safe (Gee & Cohodes, in press), exposure to separation from a caregiver during infancy and toddlerhood may undermine the degree to which caregivers are later able to exert stage-specific effects on children's emotion regulation (Callaghan et al., 2019). In summary, given the centrality of parental presence to a young child's ability to regulate their emotions and understand their experiences, caregiver deprivation removes a major external source of support in promoting children's resilience during and following exposure to adversity (MacKenzie et al., 2017)—in other words, "losing a loving and protective parent is the biggest single tragedy that can happen to a child" (Lieberman & Bucio, 2018).

2.3 | Trauma exposure post-migration

2.3.1 | Fear of deportation—The threat of family separation persists following families' release from detention centers and therefore constitutes a chronic traumatic exposure (Chaudry et al., 2010). Seven percent of children in the United States live with one or more undocumented parents (Capps et al., 2016), and, especially for children who were themselves separated from their parents during migration, rumors of deportation raids contribute to maintenance of fear and threatened trauma (Artiga & Ubri, 2017; Henderson & Baily, 2013). A 2017 study of parents in migrant families across the United States found that children's fears of their parents' deportation had increased since the 2016 presidential election in the United States (Artiga & Ubri, 2017). Doctors caring for migrant and refugee children have reported an increase in somatic complaints such as nausea and headaches in pediatric patients following the 2016 presidential election in the United States, and schools have documented a spike in children's attentional difficulties, often pointing to

anxious preoccupation with parents' arrest and deportation as the root of these problems (Artiga & Ubri, 2017). This stress may also differentially affect children of different ages as younger children may be worried about physical separation from their parents, whereas older children may also worry about financial stability and their ability to house and support other family members in the event of parental deportation (Chaudry et al., 2010; Lieberman et al., 2011).

A 2010 report investigating the psychological effects of parental arrest, detention, and deportation on 190 children of undocumented parents across the United States found that children exhibited negative behavioral changes following arrests (Chaudry et al., 2010). The majority of children of arrested parents experienced disruptions to normal eating and sleeping, an increase in crying and reports of feeling afraid, and over one third reported being more anxious, clingy, and angry (Chaudry et al., 2010). Younger children showed greater problems with eating and sleeping, as well as increased excessive crying. Older children were more likely to withdraw socially or exhibit externalizing behaviors. Following parental arrest, many children showed a drop in their academic achievement and an increase in missed days of school. In addition to the significant chronic stress posed by constant threat of deportation, migrant parents may find themselves enduring the ongoing psychological effects of trauma experienced before and during migration (Artiga & Ubri, 2017; Ornelas & Perreira, 2011), which may undermine parents' caregiving capacities (Artiga & Ubri, 2017; Lambert et al., 2014) and contribute to less frequent dyadic interactions (Capps et al., 2005).

2.3.2 | Structural factors placing migrant and refugee youth at risk—Although there is substantial variability in youth adaptation following migration (see Motti-Stefanidi & Masten, 2017 for a review), it is critical to highlight that a number of structural factors place migrant and refugee youth at risk in their new communities in the United States, most notably exposure to structural and cultural racism (Pulido, 2010). Structural and environmental racism places children at higher risk of experiencing trauma (Pulido, 2010) and has dire effects on nearly all aspects of development, including children's physical and mental health (see Shonkoff et al., 2021 for a review; Trent et al., 2019). Of particular relevance to the present review, recent research suggests that structural racism in the form of anti-immigration policies at the national and state level directly impacts mental and physical health outcomes among migrants (Hatzenbuehler et al., 2017) via multiple pathways including decreased service utilization (Toomey et al., 2013). For example, increased anti-Hispanic policies circa 2016 conferred risk for adverse child and adolescent health outcomes (Eskenazi et al., 2019; Leventhal et al., 2018). Many children report experiencing adversity in their transition into educational systems in the United States, in the form of bullying due to their race, immigration status, and national origin, particularly following polarizing political events (Artiga & Ubri, 2017), which is known to have detrimental effects on psychosocial functioning (Bryant-Davis & Ocampo, 2005; Buchanan, 2004). In addition to having a different racial status or national origin than peers, children whose families are marked as "illegal" or as "aliens" may experience additional shame, fear, and ostracization (Abrego, 2011, 2016), factors that have been shown to be transdiagnostic moderators of

the development of mental health problems following exposure to stress such as migration (Beck et al., 2011; Harper & Arias, 2004).

The deleterious effects of exposure to structural and cultural racism, as well as interpersonal discrimination, targeted toward migrant and refugee children, are likely to interact with other structural risk factors to pose even greater risk for children following immigration. Families of undocumented migrants are disproportionately more likely to move into geographical areas affected by high densities of poverty (Chavez, 1998). Like their United States-born counterparts in similar locations, migrants experience higher social and ecological risks to their physical health (Gelatt, 2016; Jaycox et al., 2002; Mendoza, 2009). Compounding these social risk factors is higher exposure to food insecurity, housing instability (Capps et al., 2005), and domestic violence (Moynihan et al., 2008) resulting from the inherent vulnerabilities of migrant or refugee status.

3 | NEURAL CORRELATES OF TRAUMA EXPOSURE FOR MIGRANT AND REFUGEE CHILDREN

In addition to the detrimental consequences of trauma exposure outlined above, exposure to migration-related stress can have long-lasting effects on brain development. The brain has evolved to be highly responsive to stressful and traumatic experiences, which facilitates adaptive behaviors such as perceiving and responding to threat, optimizing behavior to avoid unnecessary difficulty, and adapting to survive in the face of environmental challenges (reviewed in Godoy et al., 2018). Evidence from cellular, animal, and human studies converges to suggest that stressful and traumatic experiences not only impact brain function in domains such as cognition (Brunson et al., 2005; Lupien et al., 2007), emotion processing (Chen et al., 2014; Pattwell & Bath, 2017), and decision-making (Wemm & Wulfert, 2017), but, in fact, play a causal role in altering and shaping brain structure (Borodovitsyna et al., 2018; Magariños et al., 1997; McEwen, 2016; Vyas et al., 2002; Zhong et al., 2017). Though very few studies have specifically investigated the effects of migration on children's neurodevelopment, the existing literature suggests that the traumatic exposures inherent to migration may place migrant and refugee youth at risk for changes in multiple domains of neurodevelopment, including heightened activity of neuroendocrine stress response systems, and differential structural and functional development of brain networks including frontolimbic circuitry, a network of regions implicated in the formation of attachment relationships with caregivers, emotion regulation, and fear learning.

Importantly, experiences of migration are vastly heterogeneous in terms of the nature of adversity that may be experienced, and the literature on childhood adversity suggests that this is paralleled by heterogeneity in outcomes. In line with recent attempts to delineate risk and protective factors in the emergence of mental health problems following immigration (see Eruyar et al., 2018 for a review), we recognize that discrete types and features of trauma exposure may differentially shape the neurobiological consequences of immigration. For example, the age at which trauma exposure occurs is an important factor that may moderate the effects of trauma. Given dynamic changes in frontolimbic circuitry across development (Casey et al., 2017; Gee, Humphreys, et al., 2013; Heller et al., 2016; Swartz et al., 2014;

Wu et al., 2016), the biological state of the developing brain at the time of stress is likely to be a key determinant of trajectories posttrauma (Cohodes et al., 2020; Gee & Casey, 2015; Lupien et al., 2009). Indeed, evidence suggests that trauma occurring at different times during development differentially impacts frontolimbic function and structure (Evans et al., 2016; Pechtel et al., 2014; van Rooij et al., 2020; Zhu et al., 2019).

Another key feature of trauma exposure that may contribute to heterogeneity in neurobiological and psychiatric outcomes is the type of trauma or adversity experienced. Evidence suggests that trauma type (e.g., physical abuse or caregiver deprivation) moderates outcomes (Cohodes et al., 2020; McLaughlin, Sheridan, et al., 2014; Teicher et al., 2016), though research is ongoing regarding the specific mechanisms by which this occurs, as well as the complex interactions between timing and type of adversity. Given this, it is unlikely that youth exposed to migration-related trauma will show uniform effects; however, below, we highlight extant research regarding trauma-related neurobiological changes that may underlie the emergence of mental health disorders in migrant youth.

3.1 | How migration-related trauma “gets under the skin”

Several theories aim to explain exactly how trauma “gets under the skin” and is transformed from sensory input to alterations in neural structures (McEwen, 2012). Prominently, the LHPA axis, a critical component of the body’s stress response mechanism (Loman & Gunnar, 2010; McEwen & Akil, 2020), is responsible for regulating the production of stress hormones. These hormones, known as glucocorticoids, interact with the brain to elevate or reduce an organism’s readiness to confront or flee from threat (reviewed in Herman et al., 2005). Over time, chronic exposure to both low-level and acute stressors can cause dysregulation of the LHPA axis, resulting in prolonged production and chronically elevated levels of glucocorticoids in the brain (McEwen & Magarinos, 1997; McEwen, 2012; Yehuda et al., 2001). Such chronically elevated levels of glucocorticoids have been shown to have long-lasting effects on the human brain (Koss & Gunnar, 2018; McEwen, 2012; Vyas et al., 2016), particularly in limbic regions such as the hippocampus, a region of the brain involved in memory and decision-making, as well as in the amygdala and ventromedial prefrontal cortex (vmPFC), which are key regions comprising frontolimbic circuitry. The high density of glucocorticoid receptors in these regions makes them particularly susceptible to the effects of an overactive LHPA axis (Jacobson & Sapolsky, 1991; McEwen, 2012; McEwen et al., 2016), and, over time, chronically high levels of cortisol may lead to atrophy and even death of hippocampal pyramidal neurons (McEwen et al., 1995; Uno et al., 1989; Woolley et al., 1990), among other morphological changes (McEwen, 2007). Prolonged hyperactivity of the LHPA axis may also disrupt the negative feedback loop that typically regulates glucocorticoid production, such that chronically elevated glucocorticoid levels may predispose individuals toward exhibiting a heightened stress response to future adversity (e.g., Dobrova-Krol et al., 2008; Gunnar et al., 2001; Lupien et al., 2000; Tarullo & Gunnar, 2006). However, there is also evidence that exposure to stress and trauma in childhood may, in some individuals, result in blunted cortisol production in response to acute stress (e.g., Gunnar et al., 2009; Joos et al., 2019; Kircanski et al., 2019; Koss et al., 2016; McLaughlin, Sheridan, et al., 2015; Peckins et al., 2012). One study suggests that these differential patterns of LHPA axis response to acute stress may be moderated by individual-level factors

such as sex (Hackman et al., 2012), but further research is needed to better understand why trauma-exposed individuals may display differential patterns of stress reactivity (e.g., hyporeactivity vs. hyperreactivity; Joos et al., 2019). However, regardless of directionality, there is substantial evidence that trauma exposure recalibrates the LHPA axis, resulting in aberrant patterns of stress reactivity, and correspondingly, brain structure and function.

Parallel research has posited experience-dependent synaptic plasticity as a complementary mechanism to explain dynamic change in neural connectivity (Almeida & Lyons, 2017; Munakata & Pfaffly, 2004). The synapses of neurons that frequently fire together are strengthened, whereas connections that are rarely used are weakened (Lewis, 2017). When experiencing stressful or traumatic events, heavier use of circuitry related to receiving and processing stressful stimuli and detecting potential sources of threat in the environment may result in increased synaptic strength, and ostensibly structural changes in both the tracts connecting brain regions processing traumatic events and the regions themselves (Magalhães et al., 2017; van Hartevelt et al., 2015).

3.2 | The role of frontolimbic circuitry

Although the majority of the existing literature on the cellular and molecular effects of stress comes from animal studies, evidence for the structural and functional effects of stress on the human brain is increasing rapidly, and research to date has highlighted key region-specific effects of stress exposure. As such, one of the primary mechanisms by which stress has been shown to increase risk for both internalizing- and externalizing-related psychopathology is via alterations in the structure and function of frontolimbic circuitry (LeDoux, 2000; Lucassen et al., 2014; Pechtel & Pizzagalli, 2011).

Numerous studies have found converging evidence for the long-lasting effects of stress on frontolimbic circuitry. Typically, the amygdala plays a critical role in activating the LHPA axis (Dunn & Whitener, 1986; Feldman et al., 1995; Redgate & Fahringer, 1973) in response to a threat. The hippocampus and mPFC then work together to regulate glucocorticoid levels (e.g., downregulating glucocorticoid production when the threat has subsided) via negative feedback loops (Milad & Quirk, 2012; Phelps et al., 2004; Stevens et al., 2013). The vmPFC modulates and inhibits fear responses via interconnected neurons projecting to the amygdala (Milad & Quirk, 2012; Phelps et al., 2004; Stevens et al., 2013). Evidence suggests that exposure to chronic stress affects the hippocampus and vmPFC by downregulating their activation, rendering these regions increasingly less able to regulate stress responses to perceived threatening stimuli in the environment (McEwen & Akil, 2020).

Here, we review existing literature on the structural and functional effects of trauma on the brain, with a focus on frontolimbic circuitry. Although, to our knowledge, there are no neuroimaging studies to date investigating the effects of migration-related trauma on the developing brain, we draw upon existing literature on stress and trauma exposure among youth who have experienced a diverse array of traumatic exposures—ranging from parental deprivation to maltreatment to exposure to domestic violence—to elucidate potential effects of exposure to this complex and chronic stressor on neural structure and function. We specifically focus our review of the effects of exposure to adversity on functioning of frontolimbic circuitry on the neurobiological underpinnings of attachment, emotion

regulation, and fear learning and extinction. Although there are numerous additional affective processes that are impacted by exposure to early-life stress (e.g., response inhibition, social information processing), we focus on these three affective processes as they are particularly impacted by exposure to early-life stress, have central relevance to migration-related trauma, and, further, represent transdiagnostic processes that underlie the development of both internalizing and externalizing behaviors.

3.3 | Effects of adversity on frontolimbic structure

Evidence from studies in both rodent and human samples demonstrates that the hippocampus, in particular, is highly susceptible to stress. Human neuroimaging research has provided evidence that exposure to stressful and traumatic experiences, such as abuse, neglect by a caregiver, or exposure to parental psychopathology during childhood (Bremner et al., 1995; Delpech et al., 2016; Lee et al., 2009), is associated with a reduction in hippocampal volume. In addition, animal studies have underscored associations between exposure to stress and neuronal remodeling of the amygdala, specifically a reduction in dendritic spine production and an increase in neurogenesis (reviewed in Roozendaal et al., 2009). Though some human studies have not detected differences in amygdala volume following exposure to stress in childhood (Bremner et al., 1997; Carrion et al., 2001), associations between stress and amygdala enlargement have been reported in several other studies and are consistent with stress-induced amygdalar neurogenesis (Hölzel et al., 2010; McEwen et al., 2016). Prefrontal cortical regions have also been found to be highly susceptible to stress, undergoing neuronal remodeling and reductions in gray matter volume (Cook & Wellman, 2004; Hanson et al., 2012; Liston et al., 2006; McEwen & Morrison, 2013).

Stress also impacts connectivity between these brain regions. Specifically, alterations in white matter tract connectivity have been observed following exposure to early-life stress, indicating potential synaptic remodeling as a result of stress (Bick et al., 2015; Hanson et al., 2013; Howell et al., 2013; Kircanski et al., 2019). These changes have been observed in tracts throughout the brain, including in tracts connecting limbic and prefrontal regions, but the directionality of findings has diverged (i.e., whether stress is associated with an observed increase or decrease in white matter integrity). One explanation for these divergent findings is that different types and timing of stress may exert differential effects on tract development (Cassiers et al., 2018; Gee & Casey, 2015; Sheridan & McLaughlin, 2014). Despite this heterogeneity, structural changes—both in volume and tract integrity—have been associated with increased symptoms of anxiety, depression, and PTSD (Castanheira et al., 2019; de Kloet et al., 2005; Herringa, 2017; Kircanski et al., 2019; Kribakaran et al., 2020; Leuner & Shors, 2013; LeWinn et al., 2014; Merz et al., 2018).

Though the brain is plastic, and can show recovery with time and intervention (Garrett et al., 2019; Humphreys et al., 2018; Nelson et al., 2007), as we have reviewed above, there is substantial evidence for the detrimental effects of exposure to trauma on the structural development of the brain. Further complicating theories of how exposure to stressful and traumatic events may alter brain structure and confer risk for later psychiatric disorders are the hierarchical nature of brain maturation (Casey et al., 2019) and complex

cascade of processes globally shaping development (Andersen, 2003; Masten & Cicchetti, 2010). The cascading nature of development underscores the importance of considering the developmental timing of exposure to a particular traumatic event when hypothesizing about the neurodevelopmental impacts of exposure. Structural brain development undergoes a series of major changes between birth and early adulthood, and disruption in the form of exposure to extreme stress during "sensitive periods" of heightened plasticity may have a disproportionate impact on the brain (Gee, 2020; Gee & Cohodes, 2021; Gee & Casey, 2015; Hensch, 2005; Knudsen, 2004).

3.4 | Effects of adversity on neural function

3.4.1 | Caregiving adversity and implications for frontolimbic circuitry—

There is a biologically preprogrammed need for attachment across species through which infants and children seek to be close to their caregivers for protection and care (Bowlby, 1969). Secure attachment, which is characterized by a child's learned understanding that their caregiver is consistently available, sensitive, and reliably responsive to their needs, promotes the development of self-regulatory capacities, including a healthy, adaptive, neurobiological stress response (Ainsworth et al., 1974; Perry & Pollard, 1998; Spangler & Schieche, 1998). As is reviewed above, migrant and refugee children experience a range of traumatic events that involve the sudden removal of caregivers, and/or which threaten the quality of attachment relationships with caregivers, including forced separation from caregivers at the United States border and threatened deportation of caregivers that is highly unpredictable in nature (Cassidy & Shaver, 2002; Lieberman & Bucio, 2018).

Though there are key differences between the experiences of migrant and refugee children separated from their caregivers in the United States and children exposed to caregiver deprivation in the form of exposure to institutionalized care or foster care due to parental maltreatment or neglect, here we draw on prior literature documenting the effects of these caregiving-related adversities to inform hypotheses about the physiological and neurobiological implications of exposure to traumatic separation in the context of migration. Caregiver deprivation in the form of exposure to institutionalized care alters the development of the hypothalamic–pituitary–adrenal (HPA) axis (Flannery et al., 2017; Gunnar et al., 2001, 2009; McLaughlin et al., 2015), with long-lasting effects that have been observed years following the experience of institutionalized care. A study exploring the effects of early deprivation on HPA axis regulation in the context of parent–child dyadic interactions found that children with a history of institutionalized care exhibited elevated cortisol levels for a longer duration of time following interactions with caregivers, relative to strangers, and more severe attachment-related trauma was associated with higher levels of cortisol at baseline, as well as with more severe cortisol dysregulation (Wismer Fries et al., 2008). In addition, numerous studies have also documented differing diurnal patterns of cortisol production among children separated from their parents in the foster care system, relative to controls (e.g., Dozier et al., 2006; Fisher et al., 2000; Gunnar & Fisher, 2006). In addition, there is evidence for associations between specific types of maltreatment and neglect (e.g., severe physical neglect vs. severe emotional maltreatment) and unique patterns of diurnal cortisol patterns (Bruce et al., 2009). Though the experiences of migrant children diverge from those of children placed in institutionalized or foster care in important ways,

children exposed to caregiver-related adversity involving the absence of a caregiver are likely universally exposed to both a protracted stress response and failure to regulate glucocorticoids back to baseline levels in the context of species-expected interactions with caregivers. Therefore, extrapolating from the experiences of children exposed to these other forms of caregiver-related adversity suggests that caregiver-related trauma experienced by migrant and refugee children poses substantial risk for the persistent dysregulation of children's biological stress response system.

Caregiver deprivation has also been found to be associated with alterations in structural brain development across several modalities. Previous studies have documented altered functional connectivity indexed via electroencephalogram (Stamoulis et al., 2017) and functional magnetic resonance imaging (Nelson et al., 2007), divergent white matter connectivity in tracts including frontolimbic and frontostriatal circuitry (Bick et al., 2015), region-specific volumetric reductions in gray matter in medial prefrontal (mPFC), inferior frontal, and inferior temporal areas, and region-specific volumetric enlargements in the amygdala (Herzberg et al., 2018; Mackes et al., 2020; Mehta et al., 2009; Sheridan et al., 2012; Tottenham et al., 2010), among children exposed to caregiver deprivation. Children with a history of institutionalized care exhibit greater amygdala activation in response to fearful stimuli (Gee et al., 2013; Malter Cohen et al., 2013; Tottenham et al., 2011). Post-institutionalized children also display a more mature profile of frontolimbic connectivity resembling connectivity patterns typically observed in adolescence or adulthood, suggesting that caregiver-related trauma may accelerate maturation within frontolimbic circuitry (Gee et al., 2013). Furthermore, these alterations in frontoamygdala circuitry were associated with a reduction in anxiety symptoms, suggesting an ontogenetic adaptation for children who have experienced parental separation. It is possible that accelerated maturation may preemptively shorten sensitive periods of development in the brain, thereby potentially stunting opportunities for further adaptation and learning (Gee, 2016; Gee, 2020). Though evidence is limited, one neuroimaging study examined the functional brain networks of children separated from their parents due to their parents' migration for political or economic reasons. Children exposed to parental separation in this context exhibited greater normalized characteristic path length and altered node centrality of frontolimbic regions during rest, relative to children who had not been separated from their parents (Zhao et al., 2016). Greater normalized path length is a pattern typically associated with decreased information access efficiency and altered node centrality is associated with poorer cognitive organization, both suggesting suboptimal cognitive functioning. Taken together, these results suggest that migration-related trauma that disrupts the parent–child relationship may have profound impacts on both the structure and function of the developing brain and that frontolimbic circuitry that supports emotion regulation and fear learning may be particularly affected. As previously reviewed, although disruption of parent–child attachment relationships is likely to confer risk for altered development of frontolimbic circuitry across development, early childhood is considered a sensitive period for the development of attachment relationships with caregivers; therefore, exposure to forcible family separation during this time period may be particularly detrimental for young migrant and refugee children. Studies of children exposed to institutionalized care suggest that exposure to caregiver deprivation occurring between 0 and 24 months, in particular, confers

greatest risk for long-term psychological and neurobiological outcomes (Gunnar et al., 2009; McLaughlin et al., 2015; Rutter, 1998).

We note that, in addition to studies examining the neurobiological sequelae of exposure to caregiver deprivation, studies documenting neural correlates of exposure to maltreatment perpetrated by a caregiver (e.g., physical, sexual, and emotional abuse) represent another large body of research examining the effects of caregiver-related stressors. Exposure to maltreatment perpetrated by a caregiver is consistently associated with altered gray matter volume in the amygdala and hippocampus (Edmiston et al., 2011; Hanson, Nacewicz, et al., 2015; McLaughlin et al., 2016; Morey, Haswell, Hooper & De Bellis, 2016). Additionally, the structure of white matter tracts connecting the amygdala with prefrontal regions appears to be altered following exposure to caregiver-perpetrated maltreatment, with evidence for lower structural integrity of the uncinate fasciculus among adults reporting previous exposure to maltreatment during childhood (Hanson, Knodt, et al., 2015). Further, adults reporting exposure to maltreatment during childhood show disruptions in functional connectivity between the PFC and the hippocampus and amygdala, respectively (Herringa et al., 2013; Lambert et al., 2017), as well as alterations in patterns of activation in both the amygdala (Zhu et al., 2019) and hippocampus (Lange et al., 2019). Though children exposed to caregiver-perpetrated maltreatment and forcible separation from caregivers are likely exposed to several common dimensions of stress exposure (e.g., threat, deprivation, unpredictability) that may underpin alterations in neurodevelopment following stress exposure (Cohodes et al., 2020), we note that studies of caregiver deprivation—rather than caregiver perpetration of maltreatment—are likely to be more indicative of predictions about neurobiological impacts of migration-related trauma that involves separation from caregivers given that migrant and refugee children risk separation from caregivers during migration.

In summary, without access to one or more stable, nurturing caregivers, children lack biologically-expected inputs that promote the development of the neural processes driving emotional, cognitive, and social functioning across the life course (Makariev & Shaver, 2010; McLaughlin et al., 2015; Wade et al., 2019). Exposure to caregiver deprivation has been found to be associated with higher levels of amygdala activation in response to threat (e.g., Tottenham et al., 2011), altered patterns of frontolimbic connectivity (e.g., Bick et al., 2015; Gee, Gabard-Durnam, et al., 2013), and accelerated development of frontolimbic circuitry (Gee, Gabard-Durnam, et al., 2013; Miller et al., 2020; Silvers et al., 2016). Further, exposure to caregiver-perpetrated maltreatment has been found to be associated with alterations in both the structure and function of frontolimbic circuitry (e.g., McLaughlin et al., 2016; Zhu et al., 2019). Alterations in structural and functional development of frontolimbic circuitry related to exposure to stressors involving caregivers may undermine children's typical development of self-regulatory capacities and increase risk for the development of both internalizing- and externalizing-related psychopathology, possibly due to alterations in the transdiagnostic processes of emotion regulation and fear learning, reviewed in detail below.

3.4.2 | Hypothesized effects of migration-related trauma on emotion regulation—

Attachment relationships with caregivers also support children's development of emotion regulation, or the ability to manage one's emotional experience using a

combination of strategies that can occur both implicitly through automatic processes and explicitly through controlled processes (Ochsner & Gross, 2005). Across development, parents serve as an important source of external regulation for youth, particularly as connections between prefrontal structures and the amygdala mature to support independent regulation (Gee et al., 2014). Thus, these processes may be undermined by migration-related trauma (López, 2018). Here, we present findings from studies documenting the effects of traumatic experiences related to migration—parental separation, poverty, and exposure to threat and violence—on the development of emotion regulatory processes.

Implicit regulatory strategies such as spontaneous inhibition or fear extinction have been associated with modulation of the amygdala by the vmPFC and ventral anterior cingulate cortex (Maren & Quirk, 2004). Explicit regulation strategies such as reappraisal require cognitive control and are associated with modulation of the amygdala by the ventrolateral prefrontal cortex, dorsolateral prefrontal cortex, and dACC (see review by Buhle et al., 2014). Across normative development, the brain undergoes protracted maturation of the structures involved in emotion regulation, such that functional connectivity between the amygdala and the mPFC matures throughout childhood and adolescence (Gabard-Durnam et al., 2014). Increasing prefrontal involvement in the modulation of subcortical brain areas such as the amygdala is associated with more effective emotion regulation across age (Heller & Casey, 2016; Silvers et al., 2017). From a behavioral standpoint, an individual's capacity for emotion regulation, defined as effective downregulation of emotion arousal, also follows a similar trend with effective regulation of affect developing across time and reaching adult-like capacity in late adolescence (McRae et al., 2012).

Youth with a history of exposure to trauma also exhibit altered activation of brain regions involved in cognitive control. Specifically, adolescents with a history of exposure to maltreatment (e.g., physical and/or sexual abuse) exhibited increased activation of the lPFC when asked to decrease arousal in response to negative stimuli by engaging in reappraisal, relative to adolescents without a history of maltreatment (McLaughlin, Peverill, et al., 2015). One possible interpretation of this pattern of findings is that youth with a history of maltreatment may require greater cognitive effort in order to modulate emotional arousal due to hyperactivation of the amygdala in response to threatening cues. Despite exhibiting different patterns of prefrontal activation during reappraisal, adolescents with and without a history of maltreatment did not differ in the effectiveness of emotion regulation. These findings suggest that, despite previous exposure to adversity, individuals can learn to effectively downregulate their emotional arousal following stress exposure. Relatedly, the ability to recruit regulatory structures of the brain during cognitive emotion regulation techniques such as reappraisal has been found to be associated with lower levels of psychopathology in children with a history of maltreatment (Rodman et al., 2019), suggesting that this neurobiological profile of emotion regulation may be an indicator of adaptive functioning following trauma.

Given that migrant and refugee children's environments are typically characterized by exposure to threat, violence, and adversity (Baily, 2017; Fazel et al., 2012), we speculate that migrant and refugee children—especially young children—may be particularly vulnerable to heightened amygdala reactivity to threatening environmental stimuli, and may therefore

be at risk for altered development of emotion regulatory capacities. However, results of the extant literature investigating associations between stress exposure and the neurobiological bases of emotion regulation suggest that migrant and refugee youth may be able to harness increased prefrontal engagement during emotion regulation in order to effectively regulate negative affect. Existing evidence suggests that emotion regulation is likely to be an important mechanism linking exposure to migration-related trauma with transdiagnostic mental health outcomes (Heleniak et al., 2016; Weissman et al., 2019), also making it an important target for clinical intervention following migration.

3.4.3 | Hypothesized effects of migration-related trauma on fear learning and extinction—There is substantial evidence in the existing literature linking childhood adversity with alterations in neural circuitry underlying fear learning and extinction, which in turn may place migrant and refugee children at risk of developing both internalizing and externalizing psychopathology. Fear learning is a highly adaptive function that allows an organism to predict potentially threatening or aversive events from cues in the environment, increase vigilance, and, ultimately, avoid potential danger. When a previously threatening stimulus no longer signals threat, fear expression typically diminishes gradually, allowing individuals to override the previously learned association and to alter behavior in a manner consistent with a less threatening environment (Graham & Milad, 2011), in a process known as fear extinction. This process of gradual extinction of fear may promote increased exploration of new environments, increased engagement in goal-directed activities, and decreased avoidance of potentially threatening situations. When individuals' fear extinction is hindered—specifically, when fear responses persist after threat has subsided, individuals may experience negative consequences including excessive and unremitting fear, which can ultimately confer risk for the development of psychopathology (Rothbaum & Davis, 2003).

Extensive cross-species research has implicated frontolimbic circuitry in fear learning and extinction (LeDoux, 2000; Paré & Quirk, 2017; Phelps et al., 2004). The amygdala is critically involved in fear learning and fear expression (Davis & Whalen, 2001; Ehrlich et al., 2009; LeDoux, 2007), and bidirectional connections between the amygdala and the vmPFC modulate fear expression (Burgos-Robles et al., 2009; Sotres-Bayon & Quirk, 2010). The hippocampus supplies information about the degree of threat or safety in the environment (Fanselow, 2000; Ji & Maren, 2007; Sotres-Bayon et al., 2012) via projections to the basolateral amygdala (Fanselow & Dong, 2010; Maren, 2001) and vmPFC (Sotres-Bayon et al., 2012). Furthermore, meta-analyses have shown hypoactivation of dorsal anterior cingulate cortex (dACC), mPFC, and lateral prefrontal cortex (lPFC) in response to threat-related stimuli (Patel et al., 2012). Although no studies to date have specifically tested associations between exposure to migration-related trauma during childhood and development of frontolimbic circuitry underlying fear learning and extinction, here we summarize relevant developmental findings that inform our hypotheses about the effects of migration-related trauma on the development of the neurobiological bases of fear learning and extinction.

Exposure to threatening environments may confer risk for generalized, heightened amygdala activation to salient environmental stimuli (e.g., Jenness et al., 2020; McCrory et al., 2011, 2013; McLaughlin et al., 2015; van Marle et al., 2009), and greater activation has

been associated with more severe stress exposure (McLaughlin, Sheridan, et al., 2015). Exposure to maltreatment, violence, or neglect may increase vigilance to emotional stimuli in the environment, which can manifest as increased amygdala activation, in order to promote survival (Tottenham et al., 2011; Tottenham & Sheridan, 2010). In line with this theory, adults with PTSD show heightened amygdala and insula responsivity to fear-related cues, often associated with symptom severity, but hypoactivation of regions implicated in top-down control of the amygdala, particularly in the mPFC (Etkin & Wager, 2007; Hayes et al., 2012; Patel et al., 2012). This hypoactivation has been found in individuals with both normative and clinical levels of anxiety (Rauch et al., 2000) and externalizing psychopathology (Marsh et al., 2008) and is thought to lead to impairments in prefrontally mediated fear extinction in adulthood (Maroun & Richter-Levin, 2003; Milad et al., 2009; Miracle et al., 2006), as well as weaker vmPFC regulation of the amygdala's response to an unconditioned stimulus (Correll et al., 2005). Lower regulation of amygdala reactivity is related to diminished fear extinction, and can result in excessive and unremitting fear, a key characteristic of anxiety disorders (Indovina et al., 2011). Furthermore, increased hippocampal activation to emotional faces has also been reported in children with histories of maltreatment or neglect (Maheu et al., 2010; van Rooij et al., 2020) and, broadly, individuals with PTSD exhibit impaired hippocampal reactivity to negative stimuli (for a review, see Maren et al., 2013).

In addition to altered patterns of fear reactivity, exposure to trauma has also been shown to affect fear learning and extinction (Gamwell et al., 2015; Jovanovic et al., 2012; McLaughlin et al., 2016; Weissman et al., 2019). Relative to their non-trauma-exposed counterparts, youth exposed to trauma have been found to exhibit blunted skin conductance response (SCR) to threat cues and have failed to exhibit differential SCR to threat and safety cues (McLaughlin et al., 2016). Further, this failure to discriminate between threat and safety cues during fear conditioning was found to mediate the association between exposure to maltreatment and youth externalizing-related psychopathology, suggesting that disruptions in typical fear learning processes may be an important etiological mechanism by which trauma confers risk for development of transdiagnostic symptomatology. In addition, highlighting the importance of taking a dimensional approach to examining changes in fear and safety learning following trauma exposure, a recent study examining fear learning in young children with exposure to traumatic events characterized by either threat or deprivation found that exposure to threat, but not deprivation, was associated with alterations in fear learning across development (Machlin et al., 2019; Zhu et al., 2019).

Alterations in fear learning following trauma exposure are also evident at the neural level; emerging evidence suggests that children with a history of caregiver deprivation engage a broader, more distributed array of brain regions during aversive learning. Specifically, relative to their counterparts not exposed to caregiver deprivation, children with a history of early caregiving adversity exhibit stronger amygdala–prefrontal and prefrontal–hippocampal connectivity during fear conditioning (Silvers et al., 2016). The extant literature comparing differences in fear learning between trauma- and non-trauma-exposed individuals also suggests that this pattern of findings is conserved across development. Similar to youth with PTSD, adults with PTSD exhibit an overgeneralized fear response to both threat and safety cues, as well as impaired safety learning (see Jovanovic et al., 2012 for a review). This

literature further highlights that disruptions in fear learning following trauma exposure may represent a salient pathway by which exposure to trauma confers risk for the development of trauma-related psychopathology.

These findings of altered learning processes related to fear and safety are consistent with broader evidence of alterations in frontolimbic circuitry following childhood adversity. Longitudinal evidence suggests that individuals with a history of maltreatment in childhood exhibit reduced resting state connectivity between the amygdala, vmPFC, and hippocampus, which may, in turn, lead to increased internalizing symptoms by adolescence (Herringa et al., 2013). In addition to elevated amygdala reactivity following childhood adversity (Maheu et al., 2010; McCrory et al., 2013; Tottenham et al., 2011), vmPFC activation is altered. However, notably, the effects of adversity on vmPFC activation may depend on whether brain function is assessed during adulthood or during development. Studies in adults that rely on retrospective report have shown that childhood adversity is associated with “decreased” vmPFC activation (Stevens et al., 2016; van Harmelen et al., 2014). Conversely, studies conducted with adolescents who reported experiencing early-life stress found an association between trauma exposure and “increased” vmPFC activation on response inhibition tasks (Carrion et al., 2008; Mueller et al., 2010). These retrospective studies may suggest a developmental shift from hypo- to hyperactivation of the vmPFC following stressful life experiences, though longitudinal studies are needed to disentangle the timing and directionality of this effect. Growing evidence also indicates that childhood adversity may alter the timing of frontolimbic maturation, leading to an acceleration of circuitry development (Colich et al., 2017; Gee, Gabard-Durnam, et al., 2013; Herzberg et al., 2021; Miller et al., 2020; Silvers et al., 2016). Accelerated development may serve an adaptive function, for example, by facilitating the detection of threat in a harsh environment or when a stable caregiver is absent (Gee et al., 2013). However, there are likely to be long-term consequences of such alterations in neurodevelopmental timing.

Overgeneralization of fear, overactive fear circuitry, and a diminished ability to inhibit fear responses are hallmark symptoms of PTSD (Thome et al., 2018) and, more generally, of both internalizing- and externalizing-related symptomatology. Identification of the neural mechanisms underlying fear learning and extinction has been crucial for understanding how these processes may go awry to increase risk for trauma-related psychopathology (McCrory & Viding, 2015). As one example of this line of work, elevated amygdala reactivity in children who have experienced trauma has been found to predict future anxiety (Monk et al., 2008), depression (Thomas, 2001), and PTSD symptoms (Admon et al., 2009; McLaughlin, Busso, et al., 2014), suggesting that trauma exposure may contribute to heightened risk for psychopathology by increasing neural reactivity to emotional information. Future research is needed to further elucidate the specific mechanisms by which alterations in these core fear-related processes contribute to risk for the development of psychopathology following trauma.

4 | POLICY IMPLICATIONS

Thus far, we have reviewed the psychological and neurobiological sequelae of exposure to traumatic experiences inherent to migration. This review underscores the critical need

for interdisciplinary efforts in policy work to both address the effects of trauma faced by migrant and refugee youth and, importantly, to prevent child exposure to trauma in the context of migration (Gee & Cohodes, 2019; Paris et al., 2018). In the following section, we outline policy recommendations that individuals and organizations across sectors—academia, government, community organizations, and healthcare institutions—can implement and use to guide future development, reform, and dissemination of policies aimed to improve the lives of migrant and refugee youth and prevent exposure to migration-related trauma. Specifically, we focus on policy implications as they pertain to (1) comprehensive and effective implementation of mental health care, (2) support services and practices that address chronic stressors throughout the period of resettlement, and (3) the prevention of migration-related trauma through an abolitionist lens. Further, we highlight examples of relevant national and international policies and programs that aim to target several of the critical needs highlighted in the present review. Undoubtedly, there are caveats inherent to drawing upon international examples due to vast differences among health and social service infrastructure, as well as immigration policies, across countries. However, despite these limitations, looking to programs and policies that have effectively improved well-being among migrant and refugee youth in other countries has the potential to promote new and expanded efforts in the United States.

4.1 | Implementation and dissemination of mental health services

The complex traumas inflicted on migrant and refugee youth necessitate the provision of trauma-informed and developmentally-sensitive care (Rojas-Flores et al., 2017) by mental health providers who practice cultural humility. Practicing cultural humility requires that providers recognize the ways in which structural factors (e.g., lack of access to everyday needs) in addition to cultural elements influence migrant and refugee children (Fisher-Borne et al., 2015). There are several treatment options that have been shown to be effective for migrant and refugee youth who have experienced trauma (e.g., Abdi, 2018a; Benson et al., 2018; for a review, see Ellis et al., 2013). Despite these options for intervention, only a fraction of migrant and refugee youth in need of mental health services receive any form of support, screening, or therapy throughout their lives (e.g., Betancourt et al., 2015; Ellis et al., 2010; Fazel et al., 2012). Thus, policies that ensure effective implementation of interventions while simultaneously addressing barriers to mental health care are of high priority. Here, we outline three recommendations based on our review of the proposed link between migration-related trauma and adverse psychological and neurobiological outcomes.

4.1.1 | Recommendation #1: Migrant and refugee youth—and their caregivers—require unrestricted access to quality mental health care at every stage of their journey—

Migrant youth have often experienced significant trauma prior to their migration, which may render individuals vulnerable to the later effects of migration-related trauma (Vervliet et al., 2014). Additionally, confinement in detention centers, an inherently inhumane practice (García Hernández, 2017), and exposure to the deplorable conditions in these detention centers (Kanno-Youngs, 2019), may exacerbate previous exposure to trauma. Furthermore, individuals often experience sexual, physical, and verbal abuse in detention (Gonzales, 2019). Early interventions for migrant youth following migration are essential to mitigate the possibility of deeper impacts of post-migration conditions on mental health,

such as the worsening of PTSD or depressive symptoms, or the onset of new mental health conditions (Baily, 2017). These interventions must be trauma focused, developmentally appropriate, and provided in a culturally sensitive manner, which requires, among other core features, that services are in children's native languages either via direct provision by a fluent provider or via an interpreter (Torres Fernández et al., 2015a).

Mental health services must also be extended to parents and caregivers of migrant and refugee children. A rich literature underscores the effects of parental psychopathology on youth functioning, treatment responsiveness, and mental health outcomes, broadly (see Beardslee et al., 2011 for a review), and in the context of trauma exposure (Hagan et al., 2017; Leen-Feldner et al., 2013; Scheeringa & Zeanah, 2001). Highlighting one mechanism by which parental trauma-related psychopathology may exacerbate the psychological sequelae of exposure to trauma for their dependent children, parents and caregivers play a critical role in buffering youth from stress, and emerging evidence suggests that parental psychopathology may undermine parental buffering of stress (e.g., via diminished or maladaptive emotion socialization; Cohodes et al., 2017; Cohodes et al., 2021). Current theory posits that these effects may be particularly pronounced when youth and parents are dyadically exposed to shared trauma during early childhood (Scheeringa & Zeanah, 2001).

A core challenge in ensuring that migrant and refugee youth—and their caregivers—receive quality mental health care is the lack of sufficient services and providers nationwide, especially in areas with high concentrations of migrant and refugee families. To address this challenge, clinics, hospitals, and community organizations providing care can employ different models to scale up their mental health services for migrant and refugee communities. Task-sharing or task-shifting is one such model recommended by the World Health Organization that has been highly effective among migrant and refugee communities in low-, middle-, and high-income countries (Javadi et al., 2017; Thornicroft & Tansella, 2013; WHO, 2010). In a task-sharing model, community members, who often speak the refugee youth's native language but are not trained mental health professionals, receive focused training in specific tasks from experts (e.g., mental health assessments) that are part of the treatment process and then carry out these tasks under the supervision of trained professionals. Implementing this evidence-based model in a centralized manner could meaningfully increase accessibility to mental health services for migrant and refugee youth. In the United States, specifically, clinics and hospitals across the country must actively partner with community members to ensure that they are involved in mental health service provision. This care model has the potential to not only address the insufficient number of providers, but also increase access to care—as well as treatment efficacy—as youth and their families may be more likely to build trust with providers who are part of their community.

In addition to expanding services and access to mental health care, any practice that prevents or deters migrant and refugee youth—and their families—from accessing mental health care must be eradicated immediately. For example, notes from therapy provided to children who were in the custody of the Office of Refugee Resettlement (ORR) were shared with ICE by way of a memorandum of agreement between the two agencies put forth in 2018 (Dreier, 2020). These notes were used in ICE proceedings against children to push for the

detention and deportation of migrant youth. Such practices are unethical and undermine the trust necessary for a therapeutic relationship between any provider and child seeking mental health services. Mental health providers have an urgent responsibility to advocate against such practices, which must be eliminated, and to prevent establishment of similar practices in the future (Mills, 2020).

Ensuring that migrant and refugee children receive quality mental health services while in government custody is essential, but it is important to highlight that this approach can only mitigate harm as long as migrant and refugee children continue to be detained in horrific conditions, which is itself an act of violence. Ultimately, no child should be imprisoned in a detention center as the target of government-sanctioned violence; thus, abolition-focused policies (discussed later in this section) should be enacted immediately.

4.1.2 | Recommendation #2: Every migrant and refugee child should receive mental health screening, which should be conducted in both community and healthcare settings—

Mental health assessments and dissemination of interventions outside of clinical and hospital settings are essential for the well-being of migrant and refugee youth. For example, providing care through community centers could help increase access to care by building on existing networks of trust between community organizations and immigrant and refugee families (Rusch et al., 2015). Utilizing community settings to disseminate mental health care and implement the aforementioned task-sharing model has the potential to significantly improve access to assessment and intervention among migrant and refugee youth and families (Sijbrandij et al., 2017). Schools are also an ideal location at which to provide mental health-related services as schools can mobilize community-based social supports and help families and individuals to manage ongoing stressors following migration (e.g., Ehntholt et al., 2005; Ellis et al., 2013; Fazel et al., 2012). For example, the province of Ontario, Canada—which has a large immigrant and refugee population—is in the process of implementing ethnocultural after-school programs that prioritize mental health care for refugee youth (Paramalingam et al., 2018). These after-school programs harness community engagement and organic sources of support to provide holistic care for youth. For example, family and community members with whom refugee youth may have pre-existing relationships (e.g., from religious settings) are routinely integrated into after-school programming to bolster youth comfort during the transition to the program. Preliminary evidence suggests that programs modeled off of this one have the potential to significantly impact the well-being of refugee and migrant youth (Paramalingam et al., 2018; Shakya, 2010).

Similar programs have also been implemented in cities across the United States. As one example, the Robert Wood Johnson Foundation has funded efforts to enact school-based mental health program models that integrate family, school, student, and mental health agency involvement at 15 school sites. These programs have been shown to increase accessibility to assessment and care in school environments (Kim, 2012). Though there are notable differences between the overall healthcare infrastructure of the United States and Canada, the strength of community-based mental health programming in both countries suggests that state and federal policies should require that community settings (e.g., schools) provide every child who has migrated to the United States seeking asylum the option to

receive mental health assessments and care in these environments (Paris et al., 2018). Such policies must also require that governmental funding is provided to conduct this work.

4.1.3 | Recommendation #3: Mental healthcare providers should provide trauma-informed care for migrant and refugee children—

Migrant and refugee children face several barriers to mental health care throughout the resettlement period. These barriers include cultural stigma associated with mental health disorders, lack of access to trauma-informed care that is provided in their native languages by clinicians who practice cultural humility (Abdi, 2018; Amri & Bemak, 2013; Ellis et al., 2013; Saechao et al., 2012), and prioritization of everyday, logistical needs associated with resettlement (e.g., housing, food, employment) over mental health care (e.g., Ellis et al., 2011; Lustig et al., 2004). In order to address these barriers, clinics, community organizations, and hospitals providing mental health services must be required to train all providers who will be working with migrant youth on cultural humility (Fisher-Borne et al., 2015). Specifically, trainings must emphasize the social and environmental stressors and types of trauma that are unique to the specific populations of migrant and refugee children who are receiving care (Abdi, 2018a; Paris et al., 2018).

For example, organizations that will be working with unaccompanied Latinx minors must be required to have all providers of mental health services trained on The National Latina/o Psychological Association's guidelines for best practices (Paris et al., 2018; Torres Fernández et al., 2015a, 2015b). Additionally, Trauma Systems Therapy for Refugees (TST-R) is a school-based evidence-based therapy (Ellis et al., 2013) that was adapted from the Trauma Systems Therapy model (Saxe et al., 2007) and aims to address the unique traumatic experiences of migrant youth while simultaneously tackling the multiple barriers encountered by migrant and refugee children seeking mental health care (Abdi, 2018a). TST-R represents just one of several individual- and family-based interventions that are specifically optimized for dissemination in refugee populations (Eruyar et al., 2018; Fazel & Betancourt, 2018; Mancini, 2020). Importantly, provider trainings must be conducted by professionals (e.g., social workers, educators, clinical psychologists) with expertise in understanding and addressing unique social, environmental, and systemic stressors and trauma faced by migrant and refugee youth.

When addressing barriers to providing appropriate care for migrant youth and working to combat cultural stigma, organizations and clinics must also ensure that care is community-based and holistic (in contrast to solely individual-focused therapy), as these types of approaches have been shown to be more effective by building on the strengths of a collective community rather than only focusing on an individual's current needs (Ellis et al., 2011; Murray et al., 2010). Finally, unique solutions must be implemented to address the barriers related to language as there often are not enough clinicians who are able to provide care in migrant and refugee youth's native languages. Given the rapidly growing use of telehealth to provide mental health care (Endale et al., 2020), clinics, hospitals, private practices, and community health centers can invest in hiring professionals out of their immediate networks who can provide the necessary care to migrant and refugee youth.

Another key barrier to mental health care is that migrant and refugee families often need to prioritize basic needs such as housing, food, employment, and education over mental health needs for individuals in the family (Abdi, 2018a; Lustig et al., 2004). It is therefore imperative to integrate and address the essential logistical challenges of daily living that families face in order to effectively ensure delivery of mental health services to children (Abdi, 2018a; Rousseau et al., 2013). Clinics, hospitals, and other organizations providing mental health care should have the infrastructure to effectively connect children and families to resources that will address concerns regarding housing, education, and other tasks of daily living. A notable model for this type of care is The Immigrant Children's Legal and Service Partnership based in Miami, Florida, through which counselors, scholars, and lawyers provide free holistic mental health, legal, and social services to migrant youth (Aldarondo & Becker, 2011; Paris et al., 2018). Such programs comprehensively address the complex challenges that migrant and refugee children face in receiving mental health care while simultaneously meeting their essential needs. Thus, tackling elements that prevent migrant youth from receiving the mental health services they need must always remain a key point of focus for policy reform moving forward.

4.2 | Addressing chronic daily stressors in the lives of migrant and refugee children

In addition to the trauma experienced in their countries of origin and upon arrival to the United States, migrant youth face several multidimensional chronic traumas and adversities throughout their lives post-migration that may further impact their health. Here, we will outline specific policy recommendations for change in response to several, but not all, key chronic stressors that affect youth, including daily fear of separation from a loved one, housing instability, and food insecurity (Ayón, 2015; Betancourt et al., 2015; Potochnick & Arteaga, 2018). Importantly, lawmakers, health professionals, and scientists alike have a vital responsibility to be involved in these efforts to facilitate change at every level of action. Therefore, key recommendations are outlined below at the state, federal, medical, institutional, and community level.

4.2.1 | The daily threat of family separation—Migrant and refugee youth and families who are undocumented face the threat of family separation at every foreseeable point in their daily lives. The deportation or detention of parents or children by way of raids by ICE (López et al., 2017), racial profiling by police (Lind, 2015), and for-profit sharing of cellphone location data (Hackman, 2020) are only some of the major mechanisms through which migrant families confront the reality of potential separation of family members. Migrant families are systematically targeted through home and work raids that take place in neighborhoods with large migrant communities (Ayón, 2015). Furthermore, this constant threat of separation can impact the ways in which migrant and refugee youth and families access vital resources in their communities.

4.2.2 | Recommendation #1: End deportations of migrant youth and their family members—First and foremost, the violent and inhumane act of forcibly separating families either via deportation or through placement of family members in separate detention centers must end immediately (Cházaro, 2019). The complexities underlying how and why policies ending deportations can and must be achieved have been analyzed thoroughly by

legal and political experts (Cházaro, 2019; Stevens, 2013). In addition, the United Nations High Commissioner for Refugees (UNHCR) enforcement of refoulement protections for refugees in the United States, which includes prohibition of deportation to countries where refugees would face ill treatment, persecution, and violence (UNHCR, 2007), must be strengthened. For example, UNHCR has been able to fortify its protection of refugees in European countries by supporting international agencies that were better positioned to engage stronger enforcement mechanisms to carry out protections for refugees placed in European countries (Sy, 2015). Thus, in addition to the ongoing grassroots organizing strategies currently in progress, a similar approach by the UNHCR to halt deportations in the United States is urgently necessary. By underscoring this broader policy goal here, we aim to bring the importance of advocating for systemic legal changes, in addition to temporary mitigatory solutions, to the immediate attention of scientists and clinicians in the fields of child development and mental health.

4.2.3 | Recommendation #2: Implement protocols that protect migrant youth and their families in accessing vital resources—Until termination of deportation-related governmental practices is in sight, however, the daily stress of fearing for the potential separation of a family member can often influence the ways in which migrant and refugee children and families access resources that are critical to their health. For example, fewer migrant and refugee children may receive necessary health care due to fear that their or their family members' information will be shared with ICE or United States Customs and Border Protection (CBP) or that immigration officers will be present at health centers (Artiga & Ubri, 2017; Hacker et al., 2011). For this reason, clinics, mental health centers, community centers, and hospitals must put protocols into place that address migrant safety. As one example, posting visible signs that outline migrants' rights both inside and outside of the clinic and making clinic policies regarding confidentiality clear at the phone screening phase may ultimately help alleviate some degree of daily stress associated with accessing routine medical and mental health care (Dawson-Hahn & Cházaro, 2019).

Healthcare providers are largely prohibited by the Health Insurance Portability and Accountability Act to share any patient information with anyone. This mandate includes a prohibition on sharing information with immigration authorities (National Immigration Law Center, 2017). Furthermore, healthcare facilities are largely considered sensitive locations at which governmental immigration-related actions cannot take place (National Immigration Law Center, 2017). Under specific circumstances, however, ICE and CBP can request patient information (e.g., if there is a viable warrant) or they can carry out immigration-related actions in public areas of clinics and hospitals such as waiting rooms or parking lots (Artiga & Ubri, 2017; National Immigration Law Center, 2017). It is essential that every clinic, mental health center, community center, and hospital serving migrant families works to develop safety plans to be followed in the event that immigration officials carry out these actions that directly compromise the safety of migrant and refugee children and families in their care (Dawson-Hahn & Cházaro, 2019). Several specific protocols to protect patients' rights have been outlined by the National Immigration Law Center (National Immigration Law Center, 2017). Importantly, making information about these safety plans

publicly available and accessible (e.g., translated into all languages native to the patient population) will promote a sense of trust in migrant families seeking care.

4.2.4 | The chronic stress of housing and food insecurity

Recommendation #1: The government must provide essential resources to migrant and refugee children and families: Housing instability and food insecurity are persistent forms of adversity that can have significant negative effects on the health and development of migrant and refugee children (Cook & Frank, 2008; Potochnick & Arteaga, 2018). Refugee youth and families have some access to essential support such as housing, medical, and social services through provisions by the ORR; these services are not available, however, to all migrant youth even if their experiences leading to migration are similar to those of refugees (Kennedy, 2013). Taking these inconsistencies in the determination of refugee status into account, state and federal governing bodies must enact changes to their existing laws such that all migrant children are thoroughly assessed to determine whether they should qualify as refugees (Paris et al., 2018).

In addition, the current social services provided by the state to refugees must be expanded to ensure that adequate housing—and other basic needs—are met. Two examples from different countries demonstrate potential ways in which governments can effectively provide essential services for migrant and refugee youth and families. First, in 2014, the German federal government authorized a housing policy that allowed construction of temporary housing for refugees and asylum seekers in nonresidential areas. This effort led to new housing for nearly 30,000 asylum seekers in Hamburg, Germany in less than two years (Sprandel, 2018). Second, a Toronto-based organization, Sojourn House, uses government funding to provide emergency and transitional housing services, food security, and medical services to refugees in the community (https://www.sojournhouse.org/). More specifically, the organization procures funding through the Ontario Trillium Foundation, which is a granting foundation and agency of the Government of Ontario. Although community-led transitional homes indeed exist across the United States (e.g., California Department of Social Services, 2016; Immanuel House, Santa Clara, CA [http://www.immanuelhousesj.org/]), they are often funded via donations and community-based fundraising efforts and operate on a significantly smaller scale relative to government-funded organizations such as Sojourn House. Governmental funding agencies in the United States—at both the state and federal level—must take urgent action to support the expansion of community organizations striving to provide basic living rights, such as housing, to migrants and refugees.

It is also essential to eliminate discriminatory policies such as the Public Charge Rule that was expanded by the Trump administration in 2018 such that migrants who have utilized public safety net services, including cash assistance, Medicaid, food stamps, and housing subsidies, would become ineligible for lawful permanent resident status (U.S. Department of Homeland Security, 2018). By punishing migrant families who access vital services, caregivers will be discouraged from seeking the essential resources they need in order to keep themselves and their children safe and healthy (Batalova et al., 2018; Zallman et al., 2019).

Recommendation #2: Temporary community-based solutions must be provided to migrant and refugee children and families: Another tangible way in which policies can address migrant families' direct needs is through the direct provision of resources via community-based organizations (CBOs), which have historically been engaged in providing services relating to health, education, social support, and housing for migrant communities. CBOs are historically relatively better trusted by migrants due to their integration in local communities (Chaudry et al., 2016). Although large institutions, such as academic medical centers and hospitals, undoubtedly have an obligation to develop and enhance programming that supports migrant youth and their families, studies show that migrant families—in particular, parents with low income—are more likely to enroll in public programs that are offered through a trusted organization or agency (Capps & Fortuny, 2006; Yoshikawa, 2011). Thus, institutions as well as local and state governments can play a critical role in supporting CBOs by bolstering funding and resources that directly ameliorate the recurring stressors faced by migrant youth and their families.

As one example of a CBO, formal medical–legal partnerships (known as MLPs) between healthcare professionals and lawyers have been established as an effective approach to increase access to health, social, and legal services (Weintraub et al., 2010). MLPs focused exclusively on migrant youth can have a powerful impact on the well-being of migrant communities at large. For example, Terra Firma at Montefiore Medical Center, an MLP in the Bronx, New York, provides care and services to unaccompanied migrant and refugee children who are entering the community. They provide comprehensive and coordinated medical, mental health, and legal services such that children are connected with extended services in the greater Bronx community and receive legal assistance throughout their legal proceedings related to immigration and resettlement (Stark et al., 2015). Ultimately, the collective need to address chronic stress in addition to acute trauma exposure among migrant youth calls for a diverse set of policies across sectors and disciplines that need to be developed, strengthened, and reformed.

Finally, mutual aid programs are another critical resource that serves the acute needs of migrant, immigrant, and refugee families. For example, the Semilla Collective of New Haven, CT, provides vital cash and food assistance to local immigrant and refugee communities (Gardner, 2020). Such efforts often rely on donations and funds from individuals in the community and local organizations and must be bolstered through institutional support until the same resources are provided directly by the state (see Recommendation #1). For example, scientists and clinicians affiliated with large academic institutions could raise funds through their institution and redistribute institutional wealth and resources to mutual aid organizations that are directly serving members of the community.

4.3 | Taking an abolitionist approach to prevent the infliction of trauma upon migrant and refugee children

Numerous agencies and individuals have called for the immediate suspension of family separation and migrant child detention and the minimization of time spent in detention centers (Pompa, 2019). Although the Trump administration suspended the zero-tolerance

policy that was solely constructed and implemented to separate migrant and refugee children from their parents, as of this writing, children continue to be separated from their families and held in detention centers (Sherman et al., 2019). In 2020, during the COVID-19 pandemic alone, at least 7000 migrant and refugee children have remained in United States governmental custody under life-threatening circumstances, leading judges, scientists, clinicians, and activists alike to call for the immediate release of all migrants to safe housing (Kribakaran & Gee, 2020). Despite these persistent calls to action, the Trump administration not only failed to release all migrants from detention, but weaponized the pandemic to drastically increase the number of deportations of family members and to release children from detention without their caregivers. Under the Biden administration, migrant youth and families continue to be detained at the United States–Mexico border and face deportation at alarming rates (Merchant, 2021; Rogers & Green, 2021). In addition, thousands of migrant families seeking asylum are being turned away under the auspices of Title 42, a public health policy dating back to 1944 that was reissued and used under the Trump administration to expel asylum seekers (Sganga & Montoya-Galvez, 2021). Though scientists at the Centers of Disease Control and Prevention and public health experts more broadly have denied a public health rationale for Title 42 in the present context (Diaz & Schrobilgen, 2021), the Biden administration has not repealed Title 42. Following a lawsuit brought by the American Civil Liberties Union, the Biden administration exempted unaccompanied minors (Narea, 2021); however, the enforcement of Title 42 in any form leads to family separation (Morin, 2021). This continued violence against migrant and refugee children sheds light on the need for radical systemic change.

No amount of trauma faced by migrant youth at the hands of the United States government is permissible (Dubal et al., 2021). The systemic and structural bodies in place that allow imprisonment of migrant youth and the separation of families must be dismantled, and mental health professionals—researchers and clinicians alike—have a central responsibility to uphold this process. Specifically, there have been several calls from activists and politicians for the abolishment of ICE and CBP, the two central bodies under the Department of Homeland Security that carry out violence against migrant youth and families (Rogers & Green, 2021). Although clinicians and researchers have taken swift action to speak out against inhumane family separation practices and policies as well as to outline critical recommendations (Habbach et al., 2020), there has been little advocacy around uprooting the harmful system entirely. There are a vast number of ways in which individuals can get involved in such abolition work. For example, clinicians and researchers could contribute time and resources to local community organizations working to abolish ICE and the prison–industrial complex (more on the prison–industrial complex below), promote immigration justice, organize to lobby their representatives in Congress, and pool collective institutional power through organized actions such as petitions to government representatives. The options are extensive, and we underscore that advocacy and activism must focus on prevention of trauma inflicted by the United States government in addition to temporary solutions and mitigation of the effects of traumatic separation and detention of families.

Furthermore, understanding the deep connection between the prison–industrial complex and the detention of migrant and refugee children and migrants at large is essential to fully grasp the scope of change necessary. The unprecedented level of mandatory detention of

noncitizens in the United States is an intrinsic product of the exponential expansion of mass incarceration in the United States (Iglesias, 2018). In 2014, a bed quota was implemented by the United States Congress for migrant detention, whereby ICE was required to detain a mandatory daily minimum of 34,000 migrants per day exclusively due to their immigration status (Iglesias, 2018). Due to this bed quota, a staggering number of people—both children and adults—have been exposed to severe trauma in order to benefit private, for-profit prisons (García Hernández, 2017; Iglesias, 2018). This, coupled with the government's enforcement of violent immigration policies, highlights the need for mental health professionals to engage in abolition work. We must work to dismantle the very structures that make such violence against children and families a reality.

Finally, we find it critical to highlight the history of trauma relating to family separation and state- and federally sanctioned violence against children in the United States, which are deep-seated and not unique to migrant youth (Smith et al., 2019). The system that condones separating children as young as 4 months old from their caregivers (Dickerson, 2019) and places children in cages in detention centers is part of the same system that has separated families for centuries now, starting with settler colonialism, enslavement of African peoples, and the continued incarceration of Black and brown people in this country (García Hernández, 2017). Abolitionist movements that aim to dismantle systems that perpetuate violence against children and families, such as the prison-industrial complex, therefore play a vital role in the work of improving the lives of migrant and refugee children. Thus, mental health professionals—clinicians and researchers alike—have a responsibility to partner with activists on the front lines of these movements and fight for the eradication of systemic and structural violence against children and families.

5 | CONCLUSION

Migrant youth are frequently exposed to a range of traumatic experiences, which can have lasting effects on development and mental health. We have outlined common experiences of migrant and refugee children before, during, and after migration, and discussed the impact of such exposures on behavior and mental health. In addition, we have identified potential effects of migration-related trauma on both the structure and function of the developing brain, with a focus on implications for the neurobiological underpinnings of attachment relationships with caregivers, the development of emotion regulation, and fear learning and extinction.

Building upon this review of the effects of migration-related trauma on development and mental health, we have highlighted key policy recommendations that aim to address the well-being of migrant youth. Specifically, we have outlined policy implications regarding (1) the implementation and dissemination of mental health services that address several barriers to care, (2) the mechanisms of support that aim to mitigate daily chronic stressors experienced by migrant and refugee children and their families, and (3) the need for systemic and structural changes that utilize an abolitionist lens to focus on the prevention of migration-related trauma in the United States. We hope that these recommendations will inform policy-making and allow clinicians and researchers across disciplines to advocate for the mental health of migrant and refugee youth. In addition, it is our hope that this set

of recommendations represents one of many important steps in the direction of systemic change that eliminates the ongoing infliction of trauma against migrant and refugee children in the United States.

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