

# Trauma Exposure and Mental Health Outcomes Among Central American and Mexican Children Held in Immigration Detention at the United States-Mexico Border

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## ABSTRACT

We explored the associations between early-life adversity and migration-related stress on the mental health of Central American and Mexican migrating children held in United States immigration detention facilities. Migrating children have high rates of trauma exposure prior to and during migration. Early-life adversity increases risk for developing mental health disorders. Forced separation of migrating children from their parents at the United States-Mexico border potentially exacerbates this risk. We sought to determine whether exposure to trauma prior to immigration and specific features of immigration detention were associated with post-traumatic stress symptomatology. We interviewed parents of 84 migrating children (ages 1-17) after families were released from immigration detention facilities to assess children's migration- and detention-related experiences. A modified version of the UCLA Post-traumatic Stress Disorder (PTSD) Reaction Index was administered to assess children's PTSD symptoms and document trauma exposure. 97.4% of children experienced at least one pre-migration traumatic event. PTSD symptom severity was most strongly predicted by pre-migration trauma and duration of parent-child separation. This study contributes to a growing empirical literature documenting that early-life adversity increases risk of developing mental health disorders, particularly following additional stress exposure, and that remaining with parents during immigration detention may help mitigate children's stress response.

## 1. INTRODUCTION

The current study sought to understand how the practices of detention and parent-child separation at the United States border — together with trauma experienced prior to migration — impact mental health outcomes among children migrating from Central America and Mexico. Beginning in 2014, there was a demographic shift toward increasing numbers of families and unaccompanied children attempting to migrate to the United States (U.S. Customs and Border Protection, n.d.), particularly from Mexico and a region of Central America known as the Northern Triangle, comprising Guatemala, Honduras, and El Salvador (Baugh, 2020). In 2019, 81% of migrants taken into custody by United States Customs and Border Protection (CBP) at the United States' southern border were family units or unaccompanied minors (Meyer, 2019), representing a four-fold increase in the numbers of families attempting to enter the United States compared to 2018, and a nearly 32-fold increase since 2013 (U.S. Customs and Border Protection, 2019). In 2018, the United States adopted

a “Zero Tolerance” policy intended to deter migration by separating immigrating children from parents and caregivers upon being taken into CBP custody (Provost Family Separation Testimony, 2019). Despite a formal end to this policy in 2018, parent-child separations continued into 2019 and the Department of Health and Human Services estimates that at least 2,737 children were separated from their parents (Pierce, 2019). In addition, reports documented inhumane detention conditions and prolonged detention of children (Costello, 2019a; Horton & Aratani, 2019) that violated the Flores Settlement (1997) which set minimum standards for detention conditions and maximum detention length for migrating children, including a maximum detention length of 20 days in Immigration and Customs Enforcement (ICE) facilities, 72 hours in CBP facilities, and access to specific support and sanitary resources (*Jenny Lisette Flores, et al., Plaintiffs, v. Loretta E. Lynch, Attorney General of the United States, et al., Defendants.*, 2015). These reports motivated the present study.

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Migrating children seeking asylum have high rates of exposure to childhood trauma prior to migration (Cleary, Snead, Dietz-Chavez, Rivera, & Edberg, 2018; Keller, Joscelyne, Granski, & Rosenfeld, 2017; United Nations High Commissioner for Refugees, 2015; Zetino, Galicia, & Venta, 2020). Epidemiological evidence indicates that families migrating from the Northern Triangle have high a incidence of exposure to sexual and physical assault, murder, extortion, human trafficking, disappearance of family members, and threats by gangs or other armed criminal groups and drug cartels (United Nations High Commissioner for Refugees, 2015). Early-life adversity and trauma are associated with higher rates of adverse mental health outcomes across the lifespan, including impaired cognitive and emotional development, behavioral problems, attempted suicide, post-traumatic stress disorder (PTSD), and anxiety, mood, and substance use disorders (Bensley, Van Eenwyk, Spieker, & Schoder, 1999; Copeland, Keeler, Angold, & Costello, 2007; Enoch, 2011; Hackman, Farah, & Meaney, 2010; Hahm, Lee, Ozonoff, & Wert, 2010; Christine Heim, Newport, Mletzko, Miller, & Nemeroff, 2008; Holmes & Robins, 1987; Jonson-Reid, Kohl, & Drake, 2012; Riggs, Alario, & McHorney, 1990; Scott, McLaughlin, Smith, & Ellis, 2012). Indeed, recent studies have documented elevated rates of PTSD and other mental health difficulties among detained migrating children (Buchmüller, Lembcke, Busch, Kumsta, & Leyendecker, 2018; MacLean et al., 2019, 2020; Mares & Jureidini, 2004). Cumulative childhood — but not adult — trauma exposure predicts PTSD symptom complexity (Cloitre et al., 2009), suggesting that trauma experienced as a child may have an outsized impact on stress-regulatory processes. Children may be at heightened risk for developing future mental health disorders following trauma and adversity exposure in part due to heightened plasticity of the developing brain (Bick & Nelson, 2016; Gee, Gabard-Durnam, et al., 2013; C Heim & Nemeroff, 2001; McEwen, 2012).

Childhood trauma and adversity can also sensitize individuals to recent stressful experiences (Espejo et al., 2007; K A McLaughlin, Conron, Koenen, & Gilman, 2010; Katie A. McLaughlin et al., 2017; Catherine J Peña et al., 2017; Catherine Jensen Peña et al., 2019; Saxton & Chyu, 2020), such that children with a history of adversity may display a heightened response to subsequent stressors (Koss, Mliner, Donzella, & Gunnar, 2016; Wade, Fox, Zeanah, & Nelson III, 2019). Thus, exposure to trauma prior to migration may sensitize children to stressful experiences during migration and detention. However, the combined impact of pre-migration trauma and

exposure to stressful experiences during migration and detention on children's mental health outcomes is understudied (Teicher, 2018).

### 1.1 The current study

The primary aim of the present study was to understand how trauma experienced prior to migration interacted with factors related to detention in United States CBP or ICE detention facilities to predict mental health among migrating Central American and Mexican children. Specifically, we characterized rates of traumatic events children experienced before and during migration, documented children's experiences in immigration detention facilities (i.e., length of detention and whether a child was separated from their parents), and assessed the severity of PTSD symptoms in relation to these experiences.

## 2. METHODS

### 2.1 Participants

We evaluated a convenience sample of 84 children aged 1-17 years ( $M_{age} = 7.78$ ,  $SD = 4.18$ , 54.8% female), collected from interviews with 65 parents. **Table 1** provides descriptive statistics for all demographic variables, including country of origin and race/ethnicity of the children. All parents were monolingual Spanish-speakers. All parents present in the shelter were offered the opportunity to participate in study procedures. Most interviews (75%,  $n = 63$ ) were conducted with the mother as mothers accepted the interview invitation in the majority of cases. Parents were recruited in shelters in Brownsville and San Antonio, Texas through which families passed temporarily on their way to their final destination in the United States during the summer of 2019. All families included in this study were interviewed within 2 days of their release from CBP and ICE detention facilities. All children who participated in the study who had been separated from their parents at the United States-Mexico border had been reunited with their families by the time the interviews were conducted. If a given family had more than one child present with them at the shelter, information was collected about each child. Family characteristics including household income, parental education, and responding parent's self-identified relationship status are included in **Table 1**. Annual household income ranged from less than \$20,000 ( $n = 67$ ; 79.8%), to \$20,000-\$40,000 ( $n = 7$ ; 8.3%), converted into US Dollars, although 11.9% of children had parents who did not disclose their annual family income. A majority of children had parents who reported high school or equivalent education ( $n = 43$ ; 51.2%), with parental education ranging from no

formal education to having completed university education (see Table 1).

## **2.2 Interview procedure and questionnaires**

Semi-structured interviews with parents were conducted in Spanish in July and August 2019 in Brownsville and San Antonio, Texas. Qualitative components of interviews will be presented in future work. Interviews were conducted in accordance with a protocol approved by Princeton University's Institutional Review Board. Identifying information was not collected for this sensitive population, and verbal rather than written consent was collected to maintain anonymity and increase participant comfort. Interviews consisted of: 1) a questionnaire on their child's migration and detention experience and 2) a modified Spanish version of the University of California Los Angeles PTSD Reaction Index (UCLA PTSD RI) (Steinberg & Pynoos, 2015a). All questionnaires administered were translated to Spanish by the authors or obtained in Spanish prior to administration. Interview and questionnaire data were then translated by the authors into English for analysis. The average interview time was 27.85 minutes ( $SD = 9.55$ ,  $range = 16-53$  minutes).

### **2.2.1 Migration and detention questionnaire**

A semi-structured migration and detention questionnaire was developed to ask about family demographics, the lengths of families' migration journey and detention, whether or not parent-child separation occurred, means of border crossing, types of detention facilities, and other characteristics of their immigration experience (see Supplemental Methods and Supplemental File S1). A questionnaire developed to survey adults migrating to the United States was consulted in determining relevant demographic questions (Keller et al., 2017). These questions were reworded so that they could be directed to the parent rather than child.

### **2.2.2 UCLA PTSD Reaction Index**

Parents were asked about their children's exposure to traumatic events, as well as current trauma-related symptomatology using a modified version of the UCLA PTSD RI, administered in Spanish. The UCLA PTSD RI is a widely-used tool to screen for exposure to traumatic events and to assess symptoms of post-traumatic stress that map directly onto Diagnostic and Statistical Manual of Mental Disorders (DSM-5) criteria for intrusion, avoidance, negative alterations in cognition and mood, and arousal (Steinberg, Brymer, Decker, & Pynoos, 2004). The unmodified UCLA PTSD RI is validated to exhibit internal consistency ( $\alpha = .96$ ), criterion-referenced validity, specificity, and diagnostic accuracy to the DSM-5 (Kaplow et al.,

2020a; Steinberg et al., 2013). An abbreviated version of the original questionnaire was administered due to limited time available for the interviews in the shelters. In the trauma history screening section, the timeline was abbreviated from "age experienced" to experienced "before leaving home," "during transit to the United States," and "once in the United States." The "trauma details" sub-section was omitted as it does not contribute to the quantification of PTSD symptomatology. In the RI section, the symptom score sheet was not modified, although the dissociative subtype was not assessed. Parents were asked to rate their child's PTSD symptoms over the last month without regard to a specific traumatic event given the potential for multiple co-occurring stressful events immediately prior to and during the child's immigration journey in the month prior to the interview. Finally, questions were reworded in order to ask about multiple children during one administration, due to the limited interview time.

## **2.3 Interview locations**

We interviewed parents in six locations: four non-governmental shelters in Brownsville, Texas, as well as one non-governmental facility and one city-run facility in San Antonio, Texas. These locations were chosen to specifically recruit migrating Central American and Mexican families who had been held in detention. In Brownsville, parents were interviewed upon release from CBP facilities. In San Antonio, parents were interviewed upon release from both CBP and ICE detention facilities. CBP and ICE are both part of the Department of Homeland Security. CBP facilities are intended to process non-citizens without formal immigration status attempting to enter the United States at or near the border. ICE facilities accept individuals transferred from CBP custody, are used for longer-term immigration-related detention, and are more widely distributed geographically. Numerous requests to access CBP, ICE, and Office of Refugee Resettlement facilities for study purposes were denied.

## **2.4 Analytical plan**

We describe sociodemographic characteristics of migrating children in the current convenience sample, as well as characteristics of their migration journey and length of parent-child separation and/or length of detention. We examined frequency and type of traumatic events children experienced prior to and during migration. Level of pre-migration trauma was calculated as the total number of different types of traumatic events screened for on the UCLA PTSD RI that parents reported their child experienced prior to leaving their home. For example, experience of multiple instances of community violence was only

counted once. For two cases for which information about one pre-migration trauma exposure was incomplete for one sibling but complete for the other, the exposure was assumed to be experienced by both siblings, since the RI asks about events experienced, witnessed, and heard about with a significant impact. During-migration trauma was calculated as the number of different types of traumatic events screened for that parents reported their child experienced during the journey to the United States-Mexico border.

PTSD RI symptom severity and criterion statistics were calculated according to the scoring protocol of the UCLA PTSD RI (*Administration and Scoring of the UCLA PTSD Reaction Index for DSM-5 Video*, 2013). Missing values for individual symptoms were replaced with the mean of the subscale for four participants who had only one missing value (Murray et al., 2011). We determined whether PTSD symptom severity (total scale score) was directly correlated with main independent variables including age, pre-migration trauma exposure, during-migration trauma exposure, length of immigration journey, length of detention, and length of separation using two-tailed Spearman's correlations (Shapiro-Wilk test of normality  $p < 0.01$  for all variables). We determined whether PTSD symptom severity was related to categorical data (e.g., child's parent-reported sex and other family demographic information) using two-tailed t-tests or ANOVA, as described in Results. We further modeled PTSD symptom severity using multiple linear regression with pre-migration trauma exposure, length of detention, and length of separation as mean-centered independent variables entered first, followed by all two-way interactions, and the three-way interaction. To visualize a potential interaction between level of pre-migration trauma exposure and parent-child separation, we created post-hoc categories for level of pre-migration trauma experienced by children in the current sample ("medium" was considered within 1 standard-deviation of the mean level of pre-migration trauma, with "low" and "high" more than one standard-deviation below or above the mean, respectively). Statistical analyses and graphing were performed in SPSS (version 26) and GraphPad Prism (version 9). We considered results with  $p < 0.05$  to be significant, and  $p < 0.1$  to be at a trend level.

### 3. RESULTS

#### 3.1 Characterization of migration journey and detention

The lengths of families' immigration journeys, time in the United States prior to the interview, detention (if detention occurred), and parent-child separation (if

parent-child separation occurred), method of border crossing, and time waiting in Mexico before crossing the border are summarized in **Table 2**. The mean length of migration journey to the United States was 39.07 days ( $SD = 35$ ,  $range = 3-180$  days). Families had been in the United States for 1-26 days prior to the interview ( $M = 7.43$ ,  $SD = 7.22$ ). Of the 40 parents who disclosed how their family crossed the border, 95% crossed via the Rio Grande ( $n = 38$ ) and 5% crossed through a port of entry ( $n = 2$ ). A subset of 37 families were asked whether they had to wait in Mexico before crossing the border, of which 83.8% ( $n = 31$ ) reported affirmatively and provided information about length of time waiting ( $M = 15.65$  days,  $SD = 17.38$ ,  $range = 1-60$  days).

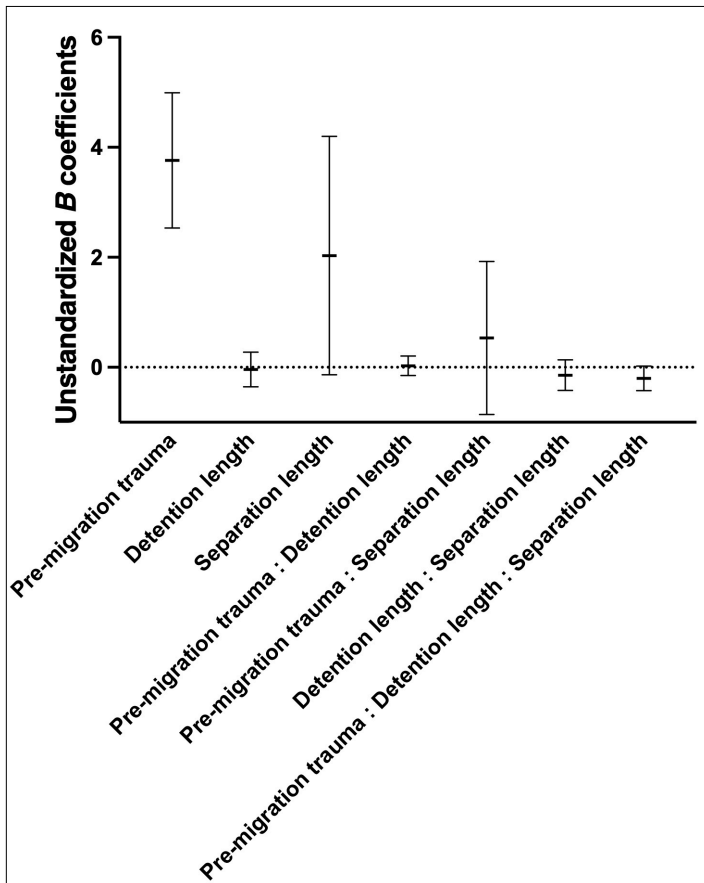
All but two of the children in the current study (97.6%;  $n = 82$ ) were detained in the United States for at least one day ( $M = 7.31$  days,  $SD = 7.15$ ,  $range = 1-26$  days). Two children included in the current study were detained for less than one day; detention length for these children was coded as "0" days in all analyses. Four children (4.9% of detained children) were detained for more than 20 days. Of detained children, 17.1% ( $n = 14$ ) were separated and detained away from their parent(s) at some point during detention ( $M = 3.36$  days,  $SD = 1.69$ ,  $range = 1-7$  days).

#### 3.2 Rates of traumatic experiences

Complete screening for exposure to traumatic events and symptoms with the UCLA PTSD RI was collected for 77 children. Some families were unable to complete the entire interview due to external factors interrupting the interview (e.g., arrival of transportation to their next destination). **Table 3** summarizes rates of migrating children's exposure to traumatic events prior to migration, including both the total number of different types of traumatic events to which each child was exposed, and overall rates of each type of traumatic event queried across all children in the sample. 97.4% ( $n = 75$ ) of children experienced at least one pre-migration traumatic event ( $M = 3.29$ ,  $SD = 2.13$ ,  $range = 0-10$  events). **Table 4** summarizes rates of migrating children's exposure to different types of traumatic events during migration, including both the total number of different types of traumatic events to which each child was exposed, and overall rate of each type of traumatic event queried. 16.88% ( $n = 13$ ) of children reported experiencing at least one during-migration traumatic event ( $M = 0.29$ ,  $SD = 0.78$ ;  $range = 1-4$  events), with kidnapping or abduction experienced most frequently during migration.

#### 3.3 Child PTSD symptomatology

Rates of PTSD symptomatology exhibited by migrating children, as per parent report, are



**Figure 1: Assessing interactions between pre-migration trauma and detention-related factors on PTSD symptom severity.** Unstandardized beta coefficients and 95% confidence intervals for predictor variables are plotted from a multiple linear regression modeling PTSD symptom severity from pre-migration trauma, detention length, parent-child separation length, and all two- and three-way interactions.

summarized in **Table 5**. 37.66% ( $n = 29$ ) of children met criteria for DSM-5 category B intrusion symptoms, 27.27% ( $n = 21$ ) met criteria for category C avoidance symptoms, 22.08% ( $n = 17$ ) met criteria for category D negative alterations in cognition and mood symptoms, and 18.18% ( $n = 14$ ) met criteria for category E arousal and reactivity symptoms. Overall, 6.49% ( $n = 5$ ) of children met criteria in all four symptom categories. 5.19% ( $n = 4$ ) met three of four symptom criteria, 18.18% ( $n = 14$ ) met two of four symptom criteria, and 27.27% ( $n = 21$ ) met only one symptom criterion (summarized in **Table 5**).

### 3.4 Pre-migration childhood trauma history predicts PTSD symptom severity

PTSD symptom severity was positively correlated with rates of pre-migration trauma ( $r = 0.492$ ,  $p < 0.001$ ),

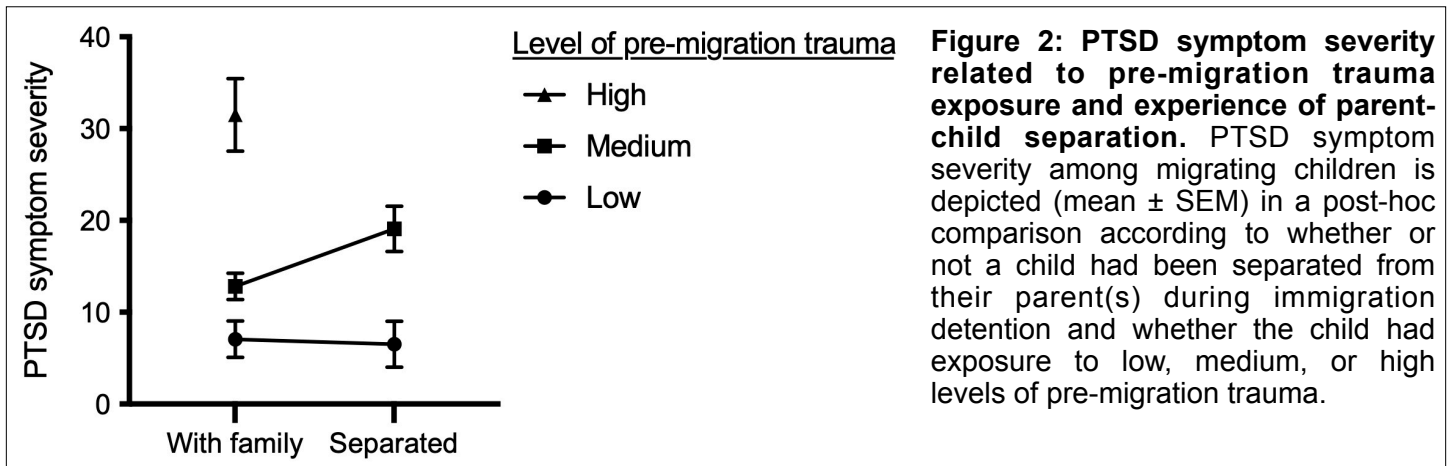
and trended towards correlation with during-migration trauma exposure ( $r = 0.203$ ,  $p = 0.077$ ). Rates of pre-migration trauma and during-migration trauma were not correlated ( $p = 0.285$ ). PTSD symptom severity was not correlated with other main variables including age ( $p = 0.806$ ), length of immigration journey ( $p = 0.917$ ), length of detention ( $p = 0.233$ ), or length of parent-child separation ( $p = 0.211$ ). PTSD symptom severity was not related to the child's parent-reported sex [ $t(1,75) = 0.9051$ ,  $p = 0.3683$ ] or whether the child lived in a single parent household [ $t(1,75) = 1.519$ ,  $p = 0.133$ ]. PTSD symptom severity score was not related to country of origin [ $F(4,72) = 1.35$ ,  $p = .260$ ], parental education level [ $F(3,71) = 1.085$ ,  $p = 0.361$ ], family income level [ $F(2,74) = 1.278$ ,  $p = 0.285$ ], or self-identified race or ethnicity [ $F(5,71) = 1.65$ ,  $p = 0.158$ ].

### 3.5 Modeling PTSD symptom severity with factors related to migration and detention

Multiple linear regression was used to determine whether pre-migration trauma and factors related to detention — including length of detention and length of parent-child separation — interacted to predict PTSD symptom severity. The overall regression model was statistically significant [ $R^2 = 0.408$ ,  $F(7,69) = 6.793$ ,  $p < 0.001$ ]. Overall results of the model did not change when controlling for child's age and sex. 95% confidence intervals for the parameter estimates of the model are shown in **Figure 1**. Pre-migration trauma was the strongest predictor of PTSD symptom severity ( $B = 3.76$ ,  $t = 6.106$ ,  $p < 0.0001$ ), followed by parent-child separation length ( $B = 2.03$ ,  $t = 1.867$ ,  $p = 0.066$ ), and an interaction between pre-migration trauma, length of detention, and length of parent-child separation ( $B = 0.202$ ,  $t = 1.814$ ,  $p = 0.074$ ). In order to visualize a potential interaction between level of pre-migration trauma exposure and experience of parent-child separation on PTSD symptom severity, we created post-hoc categories for low ( $n = 18$ ), medium ( $n = 49$ ), and high ( $n = 10$ ) levels of pre-migration trauma, and grouped cases by whether or not a child was separated from parents at the border (**Figure 2**). The current sample did not include children who experienced both high levels of pre-migration trauma and parent-child separation and precluded further statistical analysis.

## 4. DISCUSSION

The present study investigated how experiences of traumatic events prior to migration interacted with factors related to immigration detention in the United States to influence mental health outcomes of children migrating from Central American countries and Mexico to the United States. We document frequency and



**Figure 2: PTSD symptom severity related to pre-migration trauma exposure and experience of parent-child separation.** PTSD symptom severity among migrating children is depicted (mean ± SEM) in a post-hoc comparison according to whether or not a child had been separated from their parent(s) during immigration detention and whether the child had exposure to low, medium, or high levels of pre-migration trauma.

types of pre-migration trauma exposure, the presence and severity of PTSD symptoms, and characterize stressors experienced during migration and detention in the United States. We modeled interactions between pre-migration trauma and factors related to detention to predict PTSD symptom severity, providing a novel assessment of factors contributing to the mental health of migrating children. We find that early-life adversity in the form of pre-migration trauma is the most significant predictor of PTSD symptom severity among Central American and Mexican migrating children after release from United States ICE and CBP detention centers, such that higher levels of pre-migration trauma were associated with higher PTSD symptom severity. This finding is consistent with past findings documenting an association between early-life adversity and emotional problems in recently immigrated Latinx youth (Zetino et al., 2020).

#### 4.1 Trauma exposure

Children in this sample experienced high rates of trauma prior to migration, with 97.4% having experienced exposure to at least one traumatic event. This rate is elevated compared to 60-62% of adolescents in the United States reporting at least one potentially traumatic experience (Katie A McLaughlin et al., 2013; Vacek & Whisman, 2021). The percentage of children in our sample who had experienced at least one pre-migration traumatic event is also higher than reported percentages of children with exposure to war-related adversities (69.4%) and other childhood adversity (68.6%) in a sample of Syrian refugees resettled in Lebanon (Karam et al., 2019).

#### 4.2 PTSD symptomatology

Our finding that 6.49% of migrating children in the current sample met all four categorical PTSD symptom criteria is lower than the prevalence of PTSD (17%) reported in a recent study of migrating children

held in ICE custody in mid-2018 (MacLean et al., 2019). Differences between the present study and that by MacLean et al. (2019) may be a consequence of sample size: the previous study collected complete information on 150 children using the PTSD RI, compared to 77 children in the current sample. In addition, the MacLean et al. (2019) study utilized data from interviews that were conducted while families remained in immigration detention, whereas the present study included data from interviews collected following families' release from immigration detention. This notable distinction between the samples is likely to have influenced differences in symptom presentation and/or reporting by parents. Further, MacLean et al. (2019) relied on both parental and child report of children's symptoms, which likely contributed to a more comprehensive assessment of children's presentation. Finally, the range of detention lengths experienced by children in the MacLean et al. (2019) sample is much greater at 1-44 days, compared to 1-26 days in the present study. PTSD is known to have delayed symptom expression (American Psychiatric Association, 2013; Herringa, 2017), so it may be possible that the relatively longer lengths of detention in the MacLean et al. (2019) sample included children with greater symptom expression. Increased length of detention is associated with increased psychiatric illness symptom severity among migrating children in immigration detention in other (non-U.S.) countries (Dudley, Steel, Mares, & Newman, 2012) and among migrating adults seeking asylum in the United States (Keller et al., 2003).

Pre-migration trauma has been shown to influence aspects of stress and mental health in other migrating populations across the world, both in children and adolescents (Fazel, Reed, Panter-Brick, & Stein, 2012; Hodes, Jagdev, Chandra, & Cuniff, 2008; Karam et al., 2019) and adults (Rasmussen,

Rosenfeld, Reeves, & Keller, 2007; von Werthern et al., 2018). Indeed, the strongest finding in the current study was a positive association between pre-migration trauma and PTSD symptom severity. While the current study only assessed PTSD symptomatology, other research additionally finds elevated rates of several clinical diagnoses (i.e. major depressive disorder, separation anxiety disorder, oppositional defiant disorder), emotional difficulties, and peer problems among asylum-seeking migrating children (MacLean et al., 2019, 2020; Dudley et al., 2012), pointing to the breadth and complexity of mental health outcomes for which children in this population may be at increased risk.

#### **4.3 Family separation as a major attachment-related trauma**

Separation from a parent or caregiver is inherently stressful, especially for young children (Teicher, 2018; Waddoups, Yoshikawa, & Strouf, 2019). The impact of parent-child separation on children's emotional and behavioral problems is thought to be mediated by disruptions in attachment, or the secure relationship formed between parents and children (Waddoups et al., 2019). Parents and caregivers can respond to distress, serve as external sources of emotion regulation, and mitigate a child's stress response (Ainsworth & Bell, 1970; Hofer, 1994; Gunnar & Donzella, 2002). Mere presence of a parent can even facilitate the return of elevated cortisol to baseline levels (Gunnar & Donzella, 2002; Campos, Emde, Gaensbauer, & Henderson, 1975; Gunnar, Hostinar, Sanchez, Tottenham, & Sullivan, 2015). Especially among young children who are still developing the neural circuitry necessary to support intrinsic emotion regulation — including amygdala-to-prefrontal cortical circuitry (Gee, Humphreys, et al., 2013; Gee, Gabard-Durnam, et al., 2013) — the absence of a parent may impair a child's ability to regulate emotion. Indeed, recent studies found that children who had been forcibly separated from their mothers during immigration detention showed higher rates of emotional problems and total emotional and behavioral difficulties compared to children who had never been separated (MacLean et al., 2019), and among the children who experienced parent-child separation, those 5-11 years old showed greater total emotional and behavioral difficulties than those 12-17 years old (MacLean et al., 2020). Although limited by sample size, we similarly find length of parent-child separation to be the second strongest predictor of PTSD symptom severity in our model. Together with the previous literature, these findings suggest that parent-child separation itself is stressful, and that

parents are critical to help buffer their children's stress response during migration.

#### **4.4 Pre-migration trauma and stress sensitization**

The finding that children's exposure to trauma experienced in their home country prior to migration is associated with increased PTSD symptom severity adds to an extensive literature that childhood adversity increases risk of anxiety and mood disorders (Zetino et al., 2020; Scott et al., 2012; Katie A. McLaughlin et al., 2017; Björkenstam, Vinnerljung, & Hjern, 2017; Chapman et al., 2004; Dunn, Nishimi, Powers, & Bradley, 2017; Nelson, Klumparendt, Doebler, & Ehring, 2018; Yehuda, Halligan, & Grossman, 2001). Post-hoc visualization of the association between level of pre-migration trauma exposure and experience of parent-child separation may suggest that a child's trauma history influences their response to parent-child separation, consistent with stress sensitization models that theorize that early-life adversity primes a greater salience or reaction to subsequent stress (Koss et al., 2016; K A McLaughlin et al., 2010; Catherine J Peña et al., 2017; Saxton & Chyu, 2020; Wade et al., 2019). However, such an interaction will need to be examined with a larger sample, including children who experienced both high levels of pre-migration trauma and parent-child separation. Mechanistically, aspects of early-life adversity have been related to enduring changes in both basal and stress-induced cortisol levels into adulthood (Otte et al., 2005; Yehuda et al., 2001), blunted physiological adaptation to stressors (Koss et al., 2016), and changes in amygdala and prefrontal cortex volume and connectivity (Katie A. McLaughlin, Weissman, & Bitrán, 2019). High rates of pre-migration trauma exposure among migrating children (Cleary et al., 2018; Keller et al., 2017; United Nations High Commissioner for Refugees, 2015; Zetino et al., 2020) may imply that this population is particularly vulnerable to stress experienced during migration and detention.

#### **4.5 Limitations**

This study is limited by a relatively small sample size, although the sample size is in range of other studies of migrating children's mental health (Mares & Jureidini, 2004; Rojas-Flores, Clements, Hwang Koo, & London, 2017; Zetino et al., 2020). All but two of the children in the current sample were detained in CBP and/or ICE facilities for at least one day. Without recruitment of a larger group of migrating children who were not detained, we are unable to evaluate whether experiences specific to detention are associated with PTSD symptom severity. Of note, the ranges for the lengths of detention and parent-child separation were

narrower than those in government reports released during the summer of 2019 that were part of the motivation for this study (Costello, 2019b). In addition, because only 14 out of 84 children in the current convenience sample experienced parent-child separation, our statistical power for analyses related to separation was particularly limited, and thus, we are cautious in our interpretation of findings related to parent-child separation.

Several modifications were made to the standard administration of the Spanish-version of the UCLA PTSD RI due to interview time constraints (see Methods). Of note, information was gathered and included for children under age 7. The standardized version of the UCLA PTSD RI adapted in the present study has only been validated for children age 7 and older (Kaplow et al., 2020b; Steinberg & Pynoos, 2015b), in part due to age-related differences in the presentation of symptoms (American Psychiatric Association, 2013). Here, the survey was administered to parents, which alleviates the concern about younger children understanding the questions but may also lead to underreporting of trauma-related symptoms, since parents can only report what they observe and what children disclose to them. Rather than sacrifice the data from the younger children in our sample, we include and present analyses with all participants. Given these changes to the traditional administration of the UCLA PTSD RI, we note only the probable presence of PTSD in the current sample but cannot make clinical diagnoses of PTSD. Despite these limitations, we believe the preliminary findings reported here have important implications for immigration policy and practices that affect migrating children (Cohodes et al., 2021).

#### **4.6. Call to action**

Our results and those of other recent reports and studies (MacLean et al., 2019, 2020; Cohodes et al., 2021; Ackerman et al., 2019; Oberg et al., 2021) underscore the importance of humane treatment of migrating children and abolishing immigration policy and practices that enact further trauma exposure on this vulnerable population.

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#### **DATA AVAILABILITY STATEMENT**

The data that support the findings of this study will be available from the corresponding author upon reasonable request.

#### **Conflict of interest**

The authors declare no conflicts of interest.



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**Table 1**  
***Demographics of Children (N=84) and Families***

|   |                 | <u><i>n</i></u> | <u>Percentage</u> |
|---|-----------------|-----------------|-------------------|
| <u>Child characteristics</u>                  |                 |                 |                   |
| Biological sex of child                       | Male            | 38              | 45.2              |
|   | Female          | 46              | 54.8              |
| Age<br><i>Median: 7</i><br><i>Range: 1-17</i> | <5 years        | 28              | 33.3              |
|   | 6-10 years      | 35              | 41.7              |
|   | 11-17 years     | 21              | 25.0              |
| Race/ethnicity                                | Mixed           | 37              | 44.0              |
|   | Indigenous      | 12              | 14.3              |
|   | Hispanic/Latinx | 9               | 10.7              |
|   | White           | 7               | 8.3               |
|   | Other           | 13              | 15.5              |
|   | No response     | 6               | 7.1               |
| Country of origin                             | Honduras        | 45              | 53.6              |
|   | El Salvador     | 20              | 23.8              |
|   | Mexico          | 9               | 10.7              |
|   | Guatemala       | 8               | 9.5               |
|   | Nicaragua       | 2               | 2.4               |
|   | Other           | 0               | 0.0               |
| <u>Family characteristics</u>                 |                 |                 |                   |
| Income range (USD)                            | <\$20,000       | 67              | 79.8              |
|   | \$20-40,000     | 7               | 8.3               |
|   | >\$40,000       | 0               | 0.0               |
|   | Undisclosed     | 10              | 11.9              |

|   |                                    |    |      |
|---|------------------------------------|----|------|
| Respondent's relation to child                  | Mother                             | 63 | 75.0 |
|   | Father                             | 18 | 21.4 |
|   | Mother and father                  | 3  | 3.6  |
| Respondent's level of education                 | No formal education                | 8  | 9.5  |
|   | Primary                            | 27 | 32.1 |
|   | High school/GED/<br>bachillerato   | 43 | 51.2 |
|   | University                         | 5  | 6.0  |
|   | Undisclosed                        | 1  | 1.2  |
| Marital status of respondent                    | In a relationship/<br>cohabitating | 28 | 33.3 |
|   | Single                             | 27 | 32.1 |
|   | Married                            | 20 | 23.8 |
|   | Separated/<br>divorced             | 7  | 8.3  |
|   | Widowed                            | 2  | 2.4  |
|   | Undisclosed                        | 0  | 0.0  |
| Family remaining in country of origin           | Yes                                | 81 | 96.4 |
|   | No                                 | 1  | 1.2  |
|   | Undisclosed                        | 2  | 2.4  |
| Other child(ren) remaining in country of origin | Yes                                | 32 | 38.1 |
|   | No                                 | 51 | 60.7 |
|   | Undisclosed                        | 1  | 1.2  |
| Family in the United States                     | Yes                                | 65 | 77.4 |
|   | No                                 | 19 | 22.6 |
|   | Undisclosed                        | 0  | 0.0  |

**Table 2**  
***Characteristics of Migration Journey and Detention in United States Facilities***

| <u>Characteristics of journey and detention</u> | <u>Mean (days) ± SD</u> | <u>Range</u>      |
|---|-------------------------|-------------------|
| Length of migration journey                     | 39.07 ± 35.0            | (3-180)           |
| Length of time in US at interview               | 7.43 ± 7.22             | (1-26)            |
| Detention length (n=82)                         | 7.31 ± 7.15             | (1-26)            |
| Parent/child separation length (n=14)           | 3.36 ± 1.69             | (1-7)             |
|   | <u>n</u>                | <u>Percentage</u> |
| <u>Means of border crossing</u>                 |                         |                   |
| Crossing Rio Grande                             | 38                      | 45.2              |
| Bridge  | 2                       | 2.4               |
| Undisclosed                                     | 44                      | 52.4              |
| <u>Family waited in Mexico before crossing</u>  |                         |                   |
| Yes   | 31                      | 36.9              |
| No  | 6                       | 7.1               |
| Undisclosed                                     | 47                      | 56.0              |



**Table 3*****Rates of Traumatic Event Exposures: Pre-migration***

|   | <u><i>n</i></u> | <u>Percentage</u> |
|---|-----------------|-------------------|
| <u>Number of types of traumatic events</u>  |                 |                   |
| 0   | 2               | 2.4               |
| 1   | 16              | 19.0              |
| 2   | 11              | 13.1              |
| 3   | 16              | 19.0              |
| 4   | 18              | 21.4              |
| 5   | 4               | 4.8               |
| 6   | 3               | 3.6               |
| 7   | 4               | 4.8               |
| 9   | 1               | 1.2               |
| 10  | 2               | 2.4               |
| <u>Type</u>                                 |                 |                   |
| Illness/ medical trauma                     | 48              | 57.1              |
| Community violence                          | 45              | 53.6              |
| Bereavement                                 | 29              | 34.5              |
| War/political violence                      | 27              | 32.1              |
| Domestic violence                           | 20              | 23.8              |
| Serious accidental injury                   | 19              | 22.6              |
| Forced displacement                         | 14              | 16.7              |
| Disaster                                    | 10              | 11.9              |
| Psychological maltreatment/ emotional abuse | 10              | 11.9              |
| Terrorism                                   | 8               | 9.5               |
| Interference with caregiving                | 7               | 8.3               |
| School violence/ emergency                  | 6               | 7.1               |
| Physical abuse                              | 4               | 4.8               |
| Physical aggression                         | 3               | 3.6               |
| Kidnapping/abduction                        | 2               | 2.4               |
| Sexual assault                              | 1               | 1.2               |

**Table 4*****Rates of Traumatic Event Exposures: During-migration***

|   | <u><i>n</i></u> | <u>Percentage</u> |
|---|-----------------|-------------------|
| <u>Number of types of traumatic events</u>  |                 |                   |
| 0   | 64              | 76.2              |
| 1   | 8               | 9.5               |
| 2   | 3               | 3.6               |
| 4   | 2               | 2.4               |
| <u>Type</u>                                 |                 |                   |
| Kidnapping/abduction                        | 6               | 7.79              |
| Illness/ medical trauma                     | 3               | 3.9               |
| Serious accidental injury                   | 3               | 3.9               |
| Terrorism                                   | 3               | 3.9               |
| Bereavement                                 | 2               | 2.6               |
| Community violence                          | 2               | 2.6               |
| Disaster                                    | 2               | 2.6               |
| War/political violence                      | 1               | 1.3               |
| Domestic violence                           | 0               | 0                 |
| Forced displacement                         | 0               | 0                 |
| Interference with caregiving                | 0               | 0                 |
| Physical abuse                              | 0               | 0                 |
| Physical aggression                         | 0               | 0                 |
| Psychological maltreatment/ emotional abuse | 0               | 0                 |
| School violence/ emergency                  | 0               | 0                 |
| Sexual assault                              | 0               | 0                 |

**Table 5*****UCLA PTSD Reaction Index Scores***  
(N=77)

|   | <u><i>n</i></u>  | <u>Percentage</u> |
|---|------------------|-------------------|
| <u>Subscale criteria met</u>                          |                  |                   |
| (B) Re-experiencing (intrusion)                       | 29               | 37.7              |
| (C) Avoidance   | 21               | 27.3              |
| (D) Negative alterations in cognition and mood        | 17               | 22.1              |
| (E) Increased arousal and reactivity                  | 14               | 18.2              |
| <u>Number of total symptom criteria met per child</u> |                  |                   |
| 0   | 33               | 42.9              |
| 1   | 21               | 27.3              |
| 2   | 14               | 18.2              |
| 3   | 4                | 5.2               |
| 4   | 5                | 6.5               |
|   | <u>Mean ± SD</u> | <u>Range</u>      |
| Reaction Index total scale score                      | 14.78 ± 11.57    | 0-55              |