Distribution Agreement

In presenting this thesis or dissertation as a partial fulfillment of the requirements for an advanced degree from Emory University, I hereby grant to Emory University and its agents the non-exclusive license to archive, make accessible, and display my thesis or dissertation in whole or in part in all forms of media, now or hereafter known, including display on the world wide web. I understand that I may select some access restrictions as part of the online submission of this thesis or dissertation. I retain all ownership rights to the copyright of the thesis or dissertation. I also retain the right to use in future works (such as articles or books) all or part of this thesis or dissertation.

Signature:

_____ _____

Rachel Hayley Kappel Date

Prevalence of Adverse Childhood Experiences (ACEs) and Associated Health Outcomes Among Youth Women and Men in Honduras

By

Rachel H. Kappel
MPH

Behavioral Sciences and Health Education

_____
Melvin D. Livingston
Committee Chair

_____
Greta Massetti
Committee Member

_____
Shilpa N. Patel
Committee Member

_____
Colleen McBride
BSHE Department Chair

Prevalence of Adverse Childhood Experiences (ACEs) and Associated Health Outcomes Among Young Women and Men in Honduras

By

Rachel H. Kappel

Thesis Committee Chair: Melvin D. Livingston, PhD

An abstract of a thesis submitted to the Faculty of the Rollins School of Public Health of Emory University in partial fulfillment of the requirements for the degree of Master of Public Health in Behavioral Sciences and Health Education 2020

Abstract

Background: Adverse Childhood Experiences (ACEs) are potentially traumatic events that occur during childhood and have been shown to be associated with negative health outcomes. Most ACE studies to date have been in high-income countries with limited data on ACEs from low- and middle-income countries (LMICs). No ACEs studies have been done in Honduras.

Objective: The purpose of this study is to assess the prevalence of and health consequences associated with ACEs in Honduras. This study examines the association between ACEs and health consequences to further establish if a dose-response relationship exists and if specific ACEs are more strongly predictive of individual health outcomes. Sex differences in prevalence of ACEs were also examined.

Participants and Setting: The Violence Against Children and Youth Survey (VACS) was conducted in Honduras between August and September 2017. In order to assess ACEs before age 18, data is restricted to participants ages 18-24 years old, resulting in a final sample size of 1,265 males and 1,436 females.

Methods: VACS is a nationally representative survey that uses a standardized methodology to measure child violence and other ACEs. This study estimated the weighted prevalence of individual ACEs (physical, emotional, and sexual violence; witnessing violence; parental migration) before age 18. Logistic regression analyses assessed the relationship between individual ACEs and cumulative ACEs and health outcomes (psychological distress; suicide ideation or self-harm; binge drinking; smoking; drug use; STIs; early pregnancy). Estimates were stratified by sex and chi-square tests examined differences by sex.

Results: An estimated 77% of 18-24 year olds in Honduras experience at least one ACE and 39% experience three or more ACEs. Physical violence is prevalent in Honduras, with an estimated 30.8% experiencing physical violence and 35.4% witnessing physical violence in the community. Females experience significantly more sexual abuse (16.2% vs. 9.9%) and emotional violence (14.7% vs. 7.7%) compared to males. A dose-response relationship exists between the count of ACEs and negative health outcomes with increased odds for psychological distress (aORs: 1.8, 2.8), suicidal ideation and self-harm (aORs: 2.3, 6.4), and smoking (aORs: 1.7, 1.9) for 1-2 ACEs and 3+ ACEs compared to no ACEs. The aORs were significantly higher for 3+ ACEs compared to no ACEs for binge drinking (aOR: 1.6), drug use (aOR: 4.0), STIs (aOR: 3.9), and early pregnancy (aOR: 1.7). Physical violence vicitimization and exposure in the community were both associated with increased odds of all health outcomes.

Conclusions: A majority of adolescents and young adults in Honduras are living with the consequences of ACEs. The high prevalence of ACEs and associated negative health outcomes in this population support the need for early intervention and prevention strategies in order to disrupt the cycle of ACEs and avoid the accumulation of these traumatic experiences.

Prevalence of Adverse Childhood Experiences (ACEs) and Associated Health Outcomes Among Young Women and Men in Honduras

By

Rachel H. Kappel

Thesis Committee Chair: Melvin D. Livingston, PhD

A thesis submitted to the Faculty of the Rollins School of Public Health of Emory University in partial fulfillment of the requirements for the degree of Master of Public Health in Behavioral Sciences and Health Education
2020

Abbreviations

ACEs – Adverse Childhood Experiences

LMICs- Low- and Middle-Income Countries

SEM – Social Ecological Model

VACS – Violence Against Children and Youth Surveys

CDC – The United States Centers for Disease Control and Prevention

WHO – The World Health Organization

IRB – Institutional Review Board

STI – Sexually Transmitted Infection

OR – Odds Ratio

aOR – Adjusted Odds Ratio

CI – Confidence Interval

Acknowledgements

I would like to take this opportunity to express my deepest gratitude to the people who helped me make this thesis a reality. I could not have done it without the support of my professors, advisors, colleagues, family and friends.

I am so grateful to Dr. Greta Massetti who gave me the opportunity to learn from her and the VACS team at CDC. Thank you Greta for your encouragement to pursue a thesis project with the Honduras VACS data and for your unwaivering mentorship throughout the process. Thank you to all the others on the VACS team, including Dr. Andrés Villaveces and Francisco Palomeque-Rodriguez, who helped orient me to the data and shared their content expertise with me.

I am grateful for the VACS in-country study staff and the families who welcomed them into their homes. I hope the survey provided an opportunity for these young adults to share their experiences and I am honored to have had the opportunity to use this data to tell their stories.

Thank you so much to Dr. Melvin Livingston for serving as my thesis committee chair and for the opportunity to collaborate and learn from you. You challenged me to be independent in my process while supporting me with consistent feedback and timely advice throughout.

My sincerest gratitude to Dr. Shilpa Patel for your willingness to serve on my committee and share your expertise with me. Your devotion to the success of your students does not go unnoticed.

Finally, I would like to thank my family and friends for all your support and encouragement throughout this entire process. I hope I have made you proud!

Table of Contents

Chapter 1: Introduction

Adverse Childhood Experiences (ACEs) are of great public health concern globally. ACEs are potentially traumatic events that occur during childhood (before age 18) such as experiencing violence (physical, sexual, and/or emotional), neglect, witnessing violence in the home, and growing up in a household with substance misuse, mental health problems, or instability due to parental separation or incarceration of a family member (CDC, 2019). One global estimate of ACEs suggests that 38.8% of people worldwide have experienced at least one type of childhood adversity with 59.3% to 66.2% of those individuals experiencing more than one (Kessler et al., 2010). Most ACE studies to date have been in high-income countries, specifically the United States, with estimates suggesting about 61% of adults have experienced at least one ACE and 16% have experienced four or more before age 18 (Merrick et al., 2019). Very little ACEs research has been done in low- and middle-income countries (LMICs), but one study conducted in the Philippines found that about 75% of participants had at least one exposure to ACEs and 9% had experienced four or more (Ramiro et al., 2010).

Violence against children, one type of ACE, is currently a target of the United Nation's 2030 Agenda for Sustainable Development (United Nations General Assembly, 2015). Globally, over half of all children, an estimated one billion children, experience violence each year (Hillis et al., 2016). Specifically, every year, 23% of children experience physical violence, 37% experience emotional abuse, and 8% of boys and 18% of girls experience sexual violence around the world (Stoltenborgh et al., 2014). A systematic review of the global prevalence of violence against children calculated that in Latin America, at least 33% of 15-17 year olds experienced violence in the past year (Hillis et al., 2016).

Although some data exists on the prevalence of violence in Central America, no nationally representative studies have been published on the prevalence of ACEs in Central America or in specific countries in the region. Research on violence against children in Honduras suggests that about 7.8% of children experience sexual abuse before age 15 (Speizer et al., 2008) and 15-24 years old is the age group most likely to suffer from fatal and non-fatal injuries due to violence (Yacoub et al., 2006). Children in Honduras are also likely to be exposed to or witness intimate partner violence, with almost one in four women (22%) reporting lifetime physical and/or sexual intimate partner violence (Secretaria de Salud, 2013). Violence in Honduras is part of a complex, recurring cycle with prevalent gang activity, drug trafficking, and challenges in the law enforcement and criminal justice systems (Landa-Blanco et al., 2020; Ransford et al., 2017). High levels of poverty (66%), food insecurity, and a lack of access to basic services in Honduras are often associated with crime and violence in order to meet basic needs (The World Bank, 2019). Children from families that report experiencing food insecurity are also more likely to show behavioral, emotional, and academic problems than children whose families are not living in such conditions (Kleinman et al., 1998).

Early studies that have examined the long-term effects of violence on children often focused on one form of child maltreatment, like physical violence (Nelson et al., 1995) or sexual abuse (Beitchman et al. 1992; Speizer et al., 2008). By examining only one form of violence, these studies neglect to consider other, often co-occurring, household factors, such as drug use or witnessing domestic violence, and their negative outcomes (Felitti et al., 2019). These studies are also unable to measure the cumulative effects of experiencing multiple forms of trauma (Ford & Delker, 2018). However, incidents of childhood trauma are not limited to violence alone and often occur repeatedly, resulting in greater impairment than a single traumatic experience

(Higgins & McCabe, 2000; Turner et al., 2010). Therefore, the ACEs framework (Felliti et al., 1998) enables us to capture experiences of physical, emotional, and sexual violence, witnessing violence, and parent-child separation before age 18 in order to create a more holistic understanding of the impacts of childhood adversity.

Sex differences have been observed in both exposure to ACEs (Felitti et al., 1998; Baglivio et al., 2014) and outcomes associated with these exposures (Cavanaugh et al., 2015; Duke et al., 2010). Generally, girls tend to report experiencing more (Felitti et al., 1998) and different (Baglivio et al., 2014) ACEs than their male counterparts. Specifically, sexual abuse is more prevalent among girls (Baglivio et al., 2014) and physical abuse tends to be more prevalent among boys (Kilpatrick & Saunder, 1997). There are also gender differences in how boys and girls cope with and react to adverse events. Girls are more likely than boys to experience depression following a traumatic experience (Piccinelli & Wilkinson, 2000) whereas boys are more likely to engage in criminal or delinquent behaviors (Broidy & Agnew, 1997). As with most ACEs literature, however, these studies have largely been conducted in high-income western countries. There is a need for replication of these studies to determine whether these gender patterns are also evident in low- and middle-income contexts.

There is growing evidence that highlights the relationship between ACEs and negative health outcomes into adulthood (Kalmakis & Chandler, 2015; Petruccelli et al., 2019; Felitti et al., 2019). This evidence suggests a dose-response relationship, so as the number and severity of ACEs increases so does the risk of negative health outcomes, including: poor mental health (Bellis et al., 2014), chronic illnesses (Felitti et al., 1998; Hughes et al., 2017), infectious diseases like HIV (Reisner et al., 2011), and reproductive health (Ramiro et al., 2010). High exposure to ACEs has also been linked to “health-risk behaviors” including drug use,

alcoholism, violence, and crime (Leban & Gibson, 2019; Broidy & Agnew, 1997). Other traumatic childhood experiences, such as the loss of a parent due to parental migration or orphanhood, can result in an increased risk for mental health disorders (depression, anxiety, conduct disorder), suicidal ideation, substance use, and infectious disease (Fellmeth et al., 2018). While it is important to understand the cumulative risk of ACEs, further research needs to be done to understand whether specific adverse experiences represent different levels of risk for specific health consequences (Lanier et al., 2018).

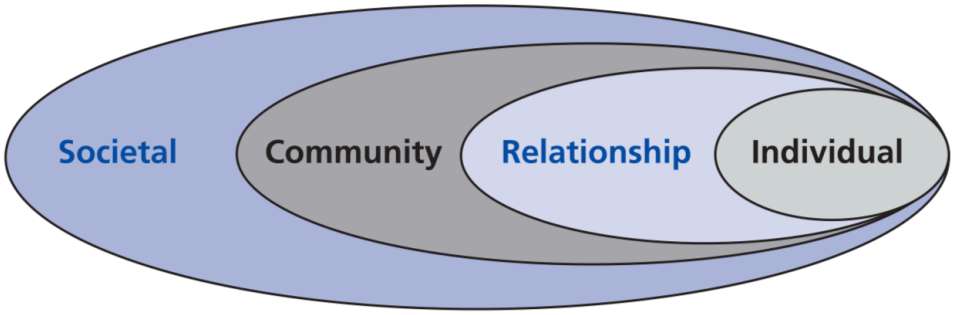
Problem Statement

The prevalence of ACEs and their relationship with health outcomes has been well studied in high-income countries like the United States, but ACEs data from Central America is very limited. Specifically, there have been no nationally representative studies of the prevalence of ACEs and associated health consequences in Honduras. Studies of violence against children in Honduras are sparse and an understanding of sex differences in ACE prevalence and associated health outcomes is limited.

Theoretical Framework

The Social-Ecological Model (SEM) is a theory-based framework that was designed as a way to broadly examine multiple factors that affect health (WHO, 1947). It has since been adapted by the Centers for Disease Control and Prevention (CDC) as a framework for prevention, specifically prevention of violence (CDC, 2002) and has been adapted here as a framework for better understanding ACEs. The factors that influence childhood violence and adversity do not exist in isolation, so the SEM serves as a helpful tool for conceptualizing the complex interplay between individual, interpersonal, community, and societal level factors that can either increase an individual's risk of experiencing violence or serve as protective factors

against these childhood adversities (WHO, 2002). The model can also be used to further understand factors, at all levels, that may exacerbate or mitigate the development of negative health behaviors as a result of trauma. The overlapping nature of the model suggests that factors at one level can influence factors at the next level. Therefore, in order to effectively address child maltreatment, interventions need to work both within and across levels (Krug et al., 2002).



Ecological Model for Understanding Violence, Krug et al., 2002

Purpose Statement

The purpose of this study is to assess the prevalence of, and health consequences associated with, ACEs in Honduras. This study provides the first-ever national estimates of ACEs in Central America and examines associations with health consequences among young adults in Honduras. This study also aims to examine the association between ACEs and health consequences within this population to further establish if a dose-response relationship exists and if specific ACEs are more strongly predictive of individual health outcomes. In addition, sex differences in prevalence of ACEs were examined.

Research Questions

The study aims will be achieved by answering the following research questions:

1. What is the prevalence of ACEs and related health behaviors and consequences in Honduras?

    a. Do these estimates vary by sex?

2. What is the relationship between ACEs and those health consequences?
    a. Are specific ACEs driving specific outcomes?

Significance Statement

There is a substantial body of research supporting that ACEs have detrimental effects on children and their health into adulthood. We also know that ACEs tend to have a cumulative effect on a variety of health outcomes. The current study adds to the existing body of literature by exploring these issues in a new context, Honduras. This study also further examines sex differences and the effect specific ACEs have on individual health behaviors and outcomes. By understanding the prevalence and impact of ACEs in Honduras, we can provide evidence to support a need for evidence-based interventions for the prevention of violence and support following childhood adversity. By better understanding gender differences and which ACEs have the largest impact, we can better prioritize and target interventions for all youth.

Chapter 2: Literature Review

Availability of ACEs data and research has been expanding significantly in recent years yet many gaps still remain. Much of the research to date has been conducted in high-income countries, primarily the United States (Hughes et al., 2017; Stoltenborgh et al., 2014). The Violence Against Children and Youth Surveys (VACS) have filled critical gaps in the availability of nationally representative ACEs data in low- and middle-income countries. These data allow researchers to explore the prevalence and burden of ACEs in varying contexts. One country with recent VACS data is Honduras. This was the first country in Latin America to have completed a VACS; no previous studies have reported nationally representative data on ACEs in Honduras. A comprehensive understanding of the prevalence, consequences, and context within which ACEs occur in Honduras is necessary for planning, implementing, and evaluating evidence-based policies and programs to mitigate associated negative health behaviors and outcomes.

ACEs as a Global Health Concern

Global estimates of Adverse Childhood Experiences (ACEs) suggest that 38.8% of people worldwide have experienced at least one of the 12 measured types of childhood adversity, with 59.3% to 66.2% of those individuals experiencing more than one (Kessler et al., 2010). Findings from the Kessler et al. 2010 study suggest that the most common childhood adversities globally are parental death and physical abuse. While global estimates are important to understanding the extent of the problem, we must also recognize that there is wide variation in ACEs prevalence from country to country. Attempts to synthesize global ACEs data have found significant variation in ACEs estimates between countries within the same income category (i.e. 21% in Spain, Perales et al., 2013, vs. 57% in the United States, Schussler-Fiorenza Rose et al.,

2014) and even inconsistent estimates from within the same country (Hughes et al., 2017). Estimates in the United States suggest that about 61% of adults have experienced at least one ACE and 16% have experienced four or more before age 18 (Merrick et al., 2019). A study conducted in the Philippines, one of the only developing countries that has examined ACEs prevalence, found that 75% of participants experienced at least one ACE (Ramiro et al., 2010). These discrepancies indicate a need for further investigation of country-specific estimates and exploration of factors that may be driving these differences.

The Violence Against Children and Youth Surveys (VACS), led by CDC in partnership with Together for Girls, are working to address this gap in data by conducting nationally representative, cross-sectional household surveys of youth ages 13-24 years in countries around the world. VACS use a standardized methodology to measure physical, emotional, and sexual violence in childhood (before age 18). They include a short questionnaire for an adult in the household to obtain household consent and build rapport with the family and to determine current socioeconomics of the household. The participant questionnaire for 13-24 year olds includes questions assessing: demographics, socioeconomic status, parent relationships, migration history, education, connectedness to family, friends, and community, marital status and relationships, sexual behavior and practices, pregnancy, experiences of physical, emotional, and sexual violence, health problems associated with exposure to violence, and utilization of services for violence. The CDC VACS team has written reports and publications using VACS data to assess the prevalence of and risk factors and health outcomes associated with ACEs in multiple countries including Malawi (VanderEnde et al., 2016), Swaziland (Breiding et al., 2013; Reza et al., 2009), Tanzania (Chiang et al., 2015; Vagi et al., 2016), and a composite study of Haiti, Cambodia, and Kenya (Sumner et al., 2016).

ACEs in Honduras

VACS was conducted in Honduras between August and September 2017 but to date, no nationally respresentative data, VACS or otherwise, has been used to estimate the prevalence of ACEs in any Central American countries. Some research in Honduras has examined the prevalence of specific forms of violence against women and children. For example, a nationally representive study of three central American countries found that an estimated 7.8% of children in Honduras experienced sexual abuse before age 15, compared to 6.4% in El Salvador and 4.7% in Guatemala (Speizer et al., 2008). In Honduras, 15-24 year olds suffer the most from fatal and non-fatal injuries due to violence (Yacoub et al., 2006).

Violence against women is also prevalent in Honduras with almost one in four women (22%) reporting lifetime physical and/or sexual intimate partner violence (Secretaria de Salud, 2013). This high prevalence of violence against women puts children at an increased risk of witnessing or being exposed to intimate partner violence during childhood. Honduras also has one of the highest femicide rates in the world (Radford & Russell, 1992), and in 2012 feminicide was considered the second-highest cause of death for women of reproductive age in Honduras (IACHR, 2013). Unfortunately, gender-based violence is vastly underreported among women experiencing physical or sexual violence in Honduras, with only 10% making a formal report to police, medical personnel, or social services (Palermo et al., 2014). Similarly, incidents of violence against children are rarely disclosed and are prone to underreporting in health, police, or death reports (Government of Honduras, 2019).

Femicide is one of many factors that contributes to a high rate of orphanhood in Honduras. As of 2015, 220,000 Honduran children (aged 0-17) had lost one or both parents (UNICEF). Violence and economic instability have encouraged population movement and

migration as individuals seek new opportunities and improved living conditions or are forced to move due to conflict and violence (Government of Honduras, 2019). An estimated 43% of children do not live with their parents because their parents have departed for other countries (Dineen, 2019). Significant migration can increase the risk of human trafficking, gender-based violence, and limited supervision of youth (Government of Honduras, 2019).

The Social Ecological Model for Understanding ACEs

ACEs are rooted in many social, economic and cultural factors that impact communities, families, and relationships. The Social Ecological Model (SEM) can help us understand the contexts within which violence and adversity happen for children (CDC, 2002; Krug et al., 2002; WHO, 2002). By better understanding the risk and protective factors associated with ACEs, we can more effectively target interventions to work both within and across levels of the model.

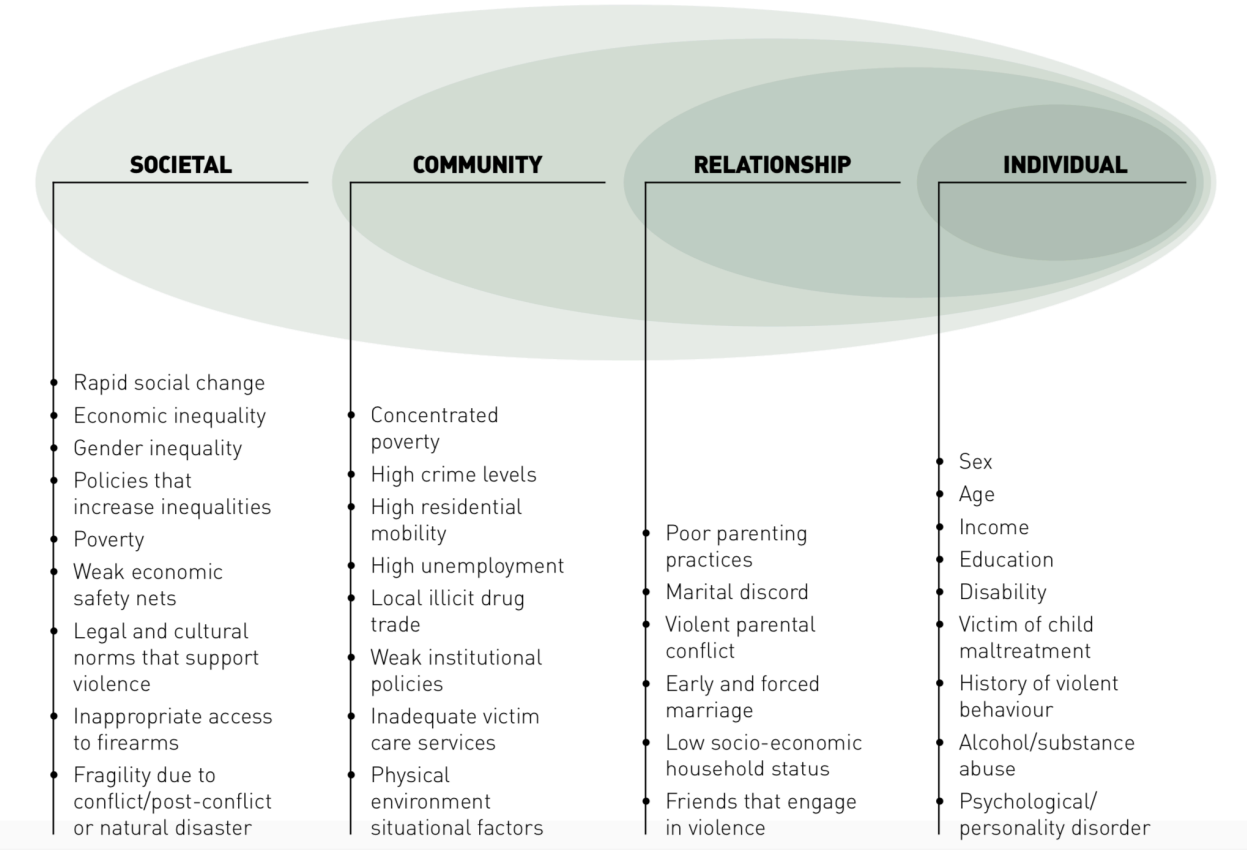
Individual. The first level of the model identifies biological and personal factors of the child or parent that increase the likelihood of experiencing violence or adversity. Some of these individual factors include age, sex, education, income, substance use, or a history of maltreatment. Prevention strategies at this level promote attitudes, beliefs, and behaviors that prevent violence and may include educational or life skills approaches.

Relationship. The second level captures close relationships such as those with family, friends, intimate partners, and peers. For ACEs, this could include witnessing domestic violence at home or separation from a parent. This could also include poor parental supervision of children or association with delinquent peers. Relationships at this level of the model can also serve as protective factors if the child has strong supportive relationships during times of adversity. Therefore, prevention efforts at this level often focus on fostering social connections,

increasing communication skills, and promoting healthy parenting (Wisconsin Child Abuse & Neglect Prevention Board).

Community. The third level of the model explores community settings such as schools and neighborhoods. Factors that influence childhood adversity at this level can include poverty, neighborhood safety, residential mobility, local drug trade, and gang violence. With high prevalence of poverty and gang activity in Honduras, community-based interventions such as increasing employment opportunities and economic resources for parents and after-school programs for youth could be useful.

Societal. Lastly, the fourth level of the model encompasses broad societal factors that create an environment that either encourages or inhibits childhood adversity. This level includes social and cultural norms as well as health, education, and economic laws and policies. Specifically, societal norms around gender and social tolerance of victimization of young women and perpretration by young men can be detrimental to the health and safety of women and children. The social tolerance of violence often stems from the low status of women and children in many societies nad cultural norms surrounding gender and masculinity (WHO, 2016). Prevention strategies at this level may include legislation to encourage employers to offer family-leave options or a public media campaign to change the way people think about violence (CDC, 2002).



Social Ecological Model for understanding and preventing violence against children (Krug et al., 2002; WHO, 2016)

ACEs and Potential Health Outcomes

Despite discrepencies in prevalence estimates, the strong association between ACEs and negative health outcomes is supported globally (Stark et al., 2017; Hughes et al., 2017). Across studies, ACEs have been shown to be associated with substance use, suicidal behavior, and mental health problems (Hughes et al., 2017; Kessler et al., 2010). Victims of child abuse and intimate partner violence are consistently at an elevated risk for sexual and reproductive health outcomes such as sexually transmitted infections (STIs) and unintended pregnancies, with an increased risk for preterm birth and low birthweight (Grose et al., 2020; Chisholm et al., 2017). Victims of childhood violence are also more likely to perpetrate violence against others or be re-victimized later in life (Anda et al., 2010). There are also numerous negative effects of being

orphaned or separated from one's parents in a resource-poor country including traumatic grief, mental health disorders, compromised cognitive and emotional development, less access to education, and a greater probability of being exploited for child labor (Whetten et al., 2009; Fellmeth et al., 2018).

More recent evidence suggests that traumatic stress as a response to these adverse experiences can result in lasting impairment of the brain and damage to the nervous, endocrine, and immune systems (Anda et al., 2010; Danese & McEwen, 2012). Also consistent in the literature is that ACEs and health outcomes have a dose-response relationship, meaning exposure to more ACEs is associated with an increased risk for poor health outcomes (Tourangeau & Yan, 2007). These strong associations are of great public health concern, with ACEs attributing to an estimated 30% of adult psychopathology globally (Kessler et al., 2010). A study in the the United Kingdom indicated that ACEs account for between 14% and 60% of their health and social problems including poor diet, binge drinking and incarceration (Bellis et al., 2014). Similarly, a study modeling data from South Africa found that preventing violence against children could reduce drug abuse by up to 14%, self-harm by 23%, and alcohol abuse by 14% (Hsiao et al., 2017).

Preventing ACEs

Fortunately, evidence-based prevention and intervention strategies are beginning to emerge. By better understanding risk and protective factors that drive ACEs, with the use of the social-ecological model, and the mechanisms by which ACEs lead to health outcomes, we can better target interventions.

One such development has been the INSPIRE technical package that includes seven evidence-based strategies for preventing violence against children (WHO, 2016). INSPIRE:

Seven Strategies to End Violence Against Children includes evidence-based programs categorized in 7 strategies: Implementation and Enforcement of Laws; Norms and Values; Safe Environments; Parenting and Caregiver Supports; Income and Economic Strengthening; Response and Support Services; and Education and Life Skills.

The CDC has also recently developed a technical package for the prevention of ACEs (CDC, 2019). This resource proposes six strategies including: 1) strengthening economic supports to families, 2) promoting social norms that protect against violence and adversity, 3) ensuring a strong start for children, 4) teaching skills, 5) connecting youth to caring adults and activities, and 6) intervening to lessen immediate and long-term harms. Interventions that have the potential to prevent ACEs include strengthening economic supports to families, changing social norms supportive of violence, providing support to parents using positive parenting, providing quality care and education early in life, and intervening early to mitigate harm and prevent future risk (Fortson et al., 2016).

Summary of Current Problem and Study Relevance

ACEs threaten the health and well-being of children globally. There is a substantial body of research supporting that ACEs have detrimental effects on children and their health into adulthood. Yet to date, most ACEs research has been done in higher-income countries, primarily the United States and United Kingdom (Hughes et al., 2017; Kessler et al., 2010), with little data from low- or middle-income countries. Similarly, while there is evidence to suggest that gender-based violence is prevalent in Honduras, there are very few studies that have examined the gender patterns of ACEs in low- and middle-income contexts. Therefore, this study provides the first-ever national estimate of ACEs in Central America and specifically explores associations with health consequences among adolescent and young adults in Honduras. ACEs have been

shown to have a cumulative effect on a variety of health outcomes but until now we have lacked the data to support evidence-based intervention strategies that target the most harmful ACEs and interrupt the cycles of violence and adversity among youth in Honduras.

Chapter 3: Student Contribution

This secondary data analysis was initially conceptualized through discussions with thesis committee member Dr. Greta Massetti, Branch Chief and Principal Investigator for VACS at the Centers for Disease Control and Prevention (CDC). Andrés Villaveces, VACS Latin America lead, also assisted in the establishment of research questions and study purpose specific to the Honduras context. Francisco Palomeque-Rodriguez, a VACS epidemiologist, oriented the student to the cleaned and weighted dataset prior to data analysis.

Following conceptualization and receiving access to the data, the MPH student undertook data analysis planning, cleaning, re-coding, and statistical analysis of the data. Specifically, after re-coding variables, the student ran descriptive statistics and logistic regression models in SAS. The student calculated means, frequencies, weighted percentages, and 95% confidence intervals for all variables of interest and chi-square tests were used to examine differences by sex. The student also ran survey-adjusted logistic regression models and adjusted for potential confounders. Complex survey analysis was used to account for the nationally representative nature of this large dataset. The student then designed and completed all data output tables. The student was also responsible for writing and revising the written journal manuscript and thesis chapters.

Thesis committee chair, Dr. Melvin Livingston, provided mentorship throughout the process including guidance on appropriate statistical tests and SAS coding, conceptualization of table shells, and multiple revisions to manuscript drafts. Advising meetings with Dr. Livingston also helped to ensure the project stayed on track. Dr. Shilpa Patel, thesis committee member, contributed her insight and feedback on manuscript drafts throughout the process. Committee

members and VACS staff provided suggestions for journals for manuscript submission. The journal for first manuscript submission is *The Journal of Child Abuse and Neglect.*

Chapter 4: Manuscript

Prevalence of Adverse Childhood Experiences (ACEs) and Associated Health Outcomes among Young Women and Men in Honduras

By

Rachel H. Kappel

Thesis Committee Chair: Melvin Livingston, PhD

A manuscript submitted to the Faculty of the Rollins School of Public Health of Emory University in partial fulfillment of the requirements for the degree of Master of Public Health in Behavioral Sciences and Health Education 2020

Authors
Rachel H. Kappel, Emory University, Atlanta, Georgia, USA, rkappel@emory.edu
Melvin Livingston, Emory University, Atlanta, Georgia, USA, melvin.livingston@emory.edu
Shilpa Patel, Emory University, Atlanta, Georgia, USA, snpate5@emory.edu
Andrés Villaveces, Centers for Disease Control and Prevention, Washington, DC, USA
avillaveces@cdc.gov
Greta Massetti, Centers for Disease Control and Prevention, Atlanta, Georgia, USA,
ghz6@cdc.gov

Abstract
Background: Adverse Childhood Experiences (ACEs) are childhood events that are associated with negative health outcomes. Most ACE studies have been in high-income countries. Limited data on ACEs exists from low- and middle-income countries (LMICs), and no ACEs studies have been done in Honduras.
Objective: This study assessed the prevalence of ACEs in Honduras and associated health outcomes among young adults.
Participants and Setting: Data from the 2017 Honduras Violence Against Children and Youth Survey (VACS) were used. Analyses were restricted to participants ages 18-24, resulting in a final sample size of 1,265 males and 1,436 females.
Methods: VACS is a nationally representative survey that uses a standardized methodology to measure childhood violence and other ACEs. This study estimated the weighted prevalence of individual ACEs (physical, emotional, and sexual violence; witnessing violence; parental migration) before age 18. Logistic regression analyses assessed the relationship between individual ACEs and cumulative ACEs and health outcomes (psychological distress; suicide ideation or self-harm; binge drinking; smoking; drug use; STIs; early pregnancy). Estimates were stratified by sex and chi-square tests examined differences by sex.
Results: An estimated 77% of 18-24 year olds in Honduras experienced at least one ACE and 39% experienced three or more ACEs. Young women experienced significantly more sexual violence, emotional violence, and physical violence compared to young men. A dose-response relationship exists between the count of ACEs and all negative health outcomes. A dose-response relationship exists between the count of ACEs and negative health outcomes with increased odds for psychological distress (aORs: 1.8, 2.8), suicidal ideation and self-harm (aORs: 2.3, 6.4), and smoking (aORs: 1.7, 1.9) for 1-2 ACEs and 3+ ACEs compared to no ACEs. Physical violence vicitimization and exposure in the community were both associated with increased odds of all health outcomes.
Conclusions: The high prevalence of ACEs and associated negative health outcomes in this population support the need for prevention and early intervention for ACEs.
Keywords: adverse childhood experiences, violence prevention, violence against children, child abuse, health outcomes

Introduction

Adverse Childhood Experiences (ACEs) are of great public health concern globally. Violence against children, one type of ACE, is currently a target of the United Nation's 2030 Agenda for Sustainable Development (United Nations General Assembly, 2015). Globally, over half of all children, an estimated one billion children, experience physical, sexual, and/or emotional violence each year (Hillis et a., 2016). Specifically, every year, 23% of children experience physical violence, 37% experience emotional abuse, and 8% of boys and 18% of girls experience sexual violence around the world (Stoltenborgh et al., 2014). A systematic review of the global prevalence of violence against children calculated that in Latin America, at least 33% of 15-17 year olds experienced violence in the past year (Hillis et al., 2016). There are very few studies that have attempted to estimate the prevalence of ACEs globally (Hughes et al., 2017). Most ACE studies to date have been in high-income countries, with estimates suggesting about 61% of adults in the United States have experienced at least one ACE and 16% have experienced four or more before age 18 (Merrick et al., 2019). Very little ACEs research has been done in low- and middle-income countries (LMICs). One study conducted in the Philippines found that about 75% of participants had at least one exposure to ACEs and 9% had experienced four or more (Ramiro et al., 2010).

Although some data exists on the prevalence of violence in Central America, no nationally representative studies have been published on the prevalence of ACEs in Central America or in specific countries in the region.Research that has focused on violence against children in Honduras suggests that about 7.8% of children experience sexual abuse before age 15 (Speizer et al., 2008) and 15-24 years of age is the age group most likely to suffer from fatal and non-fatal injuries due to violence (Yacoub et al., 2006). Violence against women is also

prevalent in Honduras with almost one in four women (22%) reporting lifetime physical and/or sexual intimate partner violence (Secretaria de Salud, 2013). This high prevalence of violence against women puts children at an increased risk of witnessing or being exposed to intimate partner violence both in the home and in the community. Violence in Honduras is part of a complex, recurring cycle with prevalent gang activity, drug trafficking, and challenges in the law enforcement and criminal justice systems (Landa-Blanco et al., 2020; Ransford et al., 2017). High levels of poverty (66%), food insecurity, and a lack of access to basic services in Honduras are associated with crime and violence often out of necessity in order to meet basic needs (The World Bank, 2019). Children from families experiencing food insecurity are also more likely to show behavioral, emotional, and academic problems than children whose families are not living in such conditions (Kleinman et al., 1998).

Early studies that have examined the long-term effects of violence against children often focused on one form of child maltreatment, like physical violence (Nelson et al., 1995) or sexual violence (Beitchman et al. 1992; Speizer et al., 2008). By examining only one form of violence, these studies neglect to consider other, often co-occurring, household factors such as drug use or witnessing domestic violence and their negative outcomes (Felitti et al., 2019). These studies are also unable to measure the cumulative effect of experiencing multiple forms of trauma (Ford & Delker, 2018). Incidents of childhood trauma are not limited to violence alone and often occur repeatedly, resulting in more severe long-term effects than a single traumatic experience (Higgins & McCabe, 2000; Turner et al., 2010).

There is growing evidence that highlights the relationship between ACEs and negative health outcomes into adulthood (Kalmakis & Chandler, 2015; Petruccelli et al., 2019; Felitti et al., 2019). This evidence suggests a dose-response relationship, so as the number and severity of

ACEs increases so does the risk of negative health outcomes, including poor mental health (Bellis et al., 2014), chronic illnesses (Felitti et al., 1998), infectious diseases like HIV (Reisner et al., 2011), and reproductive health (Ramiro et al., 2010). Exposure to more ACEs has also been linked to health-risk behaviors including drug use, alcoholism, violence, infrequent condom use, and crime (Leban & Gibson, 2020; Broidy & Agnew, 1997; VanderEnde et al., 2018). Other traumatic childhood experiences, such as the loss of a parent due to parental migration or orphanhood, can result in an increased risk for mental health disorders (depression, anxiety, conduct disorder), suicidal ideation, substance use, and infectious disease (Fellmeth et al., 2018). While it is important to understand the cumulative risk of ACEs, further research needs to be done to understand whether specific adverse experiences represent different levels of risk for specific health consequences (Lanier et al., 2018).

Sex differences have been observed in both exposure to ACEs (Felitti et al., 1998; Baglivio et al., 2014) and outcomes associated with these exposures (Cavanaugh et al., 2015; Duke et al., 2010). Generally, females experience more ACEs than their male counterparts (Felitti et al., 1998; Merrick et al., 2019) and experience different types of ACEs compared to males (Baglivio et al. 2014). Specifically, sexual violence is more prevalent among girls (Baglivio et al. 2014) and physical abuse tends to be more prevalent among boys (Kilpatrick & Saunder, 1997). There are also sex differences in how boys and girls cope with and react to adverse events. Girls are more likely than boys to experience depression following a traumatic experience (Piccinelli & Wilkinson, 2000) whereas boys are more likely than girls to engage in criminal or delinquent behaviors (Broidy & Agnew, 1997). As with most ACEs literature, however, these studies have largely been conducted in high-income western countries. Therefore, it is not possible to know whether these patterns in sex differences are also evident in LMICs.

The purpose of this study is to assess the prevalence of and health consequences associated with ACEs in Honduras. This study provides the first-ever national estimates of ACEs in the central America region and examines associations of ACEs with health consequences among young adults in Honduras. Health outcomes assessed included psychological distress, suicide ideation and self-harm, substance abuse, sexually transmitted infections (STIs), and early pregnancy. This study also aims to establish whether a dose-response relationship exists between ACEs and health outcomes, and the individual associations between each ACE type and each health outcome. In addition, sex differences in prevalence of ACEs were examined.

Methods

Design

The Honduras 2017 Violence Against Children and Youth Survey (VACS) is a nationally representative, cross-sectional, household survey that was conducted in Honduras between August and September 2017. VACS uses a standardized methodology to measure physical, emotional, and sexual violence in childhood (before age 18). It includes a short survey for an adult in the household to obtain household consent and build rapport with the family and to determine current socioeconomics of the household. The longer survey is administered to participants 13-24 years old who are eligible and consent to participating. In addition to questions about sexual, physical, and emotional violence, the survey also collects data on health outcomes, risk and protective factors for violence, and service utilization. Questionnaire adaptation for the Honduras context was led by technical working groups under the guidance of a steering committee represented by the Gabinete de Prevencion and the Children and Youth Prevention Council (COPREV). Data collection was conducted by staff who received comprehensive training, interview practice, and training on building rapport and create a

comfortable environment for disclosure. Details regarding interviewer training procedures for VACS are included in CDC's *Critical Elements of Interviewer Training for Engaging Children and Adolescents in Global Violence Research: Best Practices and Lessons Learned from the Violence Against Children Survey.* Field implementation for the 2017 Honduras VACS was led by the National Institute of Statistics (INE). CDC trained interview teams and conducted quality control of data collection, data cleaning, and statistical weighting of the data. The survey was funded by the USAID Central America Regional Security Initiative (CARSI) program. Detailed information on the methodology and procedures for the 2017 Honduras VACS is available in the fully survey report (Government of Honduras, 2019).

Participant Selection

The sample was selected using a multistage, geographically clustered design (Figure 1) which includes the following steps: 1) randomly selecting geographic areas within the country, 2) randomly selecting a sample of households from a list of all households within each selected area, and 3) randomly selecting one eligible individual from each selected household to participate. For the first stage, enumeration areas (EAs), the smallest geographical unit used for the census, were used as the primary sampling units. A split sample approach was used, in which the survey for females is conducted in different EAs than the survey for males. This approach serves to protect the confidentiality and safety of participants. In the second stage, 21 households within each EAs were randomly selected using equal probability systematic sampling. In the third stage, at each selected household interviewers identified the head of the household to introduce the study and determine eligibility of household members for study participation. Females and males ages 13-24 years who lived in a sampled household were eligible to participate. Individuals were excluded if they were in the military, institutionalized (i.e. in

hospitals, prisons, nursing homes), or had a severe mental or physical disability that would preclude participation in the one-on-one interview. One eligible resident (female or male, depending on the selected EA) was randomly selected from each household to participate in the interview. Interviews were completed face-to-face in a private space to ensure confidentiality, and participant responses were recorded electronically on netbooks by interviewers.

In the male sample, 4,704 households were surveyed in 228 randomly selected EAs, including in 2,659 completed individual interviews. The household response rate was 89.5% and the individual response rate was 83.4%, resulting in an overall response rate of 74.6% for males. In the female sample, 3,714 households were surveyed in 180 EAs, resulting in 2,357 completed individual interviews. The household response rate was 93.7% for females, the individual response rate was 89.4%; the overall response rate was 83.8% for females. In order to assess ACEs before age 18 in the present study, data is restricted to only participants ages 18-24 years old, resulting in a final analytic sample size of 1,265 males and 1,436 females.

Ethical Procedures

The Honduras VACS was reviewed and approved by the CDC's Institutional Review Board and the Ethics Committee on Biomedical Research of the Universidad Nacional Autónoma de Honduras. The VACS protocol is consistent with the WHO ethical recommendations for violence against women (World Health Organization, 2001). Field staff followed protocol and offered direct referrals for counseling to participants who needed it. Additional information about ethics and privacy protections is available in separate publications (CDC, 2017; Government of Honduras, 2019). IRB approval was waived for this secondary data analysis.

Measures (Figure 2)

Demographics. Available demographic characteristics included current age, completed level of schooling, and food insecurity. Current age was measured based on the participant's age at the time of the interview. Participants were asked to report the highest level of schooling they completed, and the variable was dichotomized to categorize those who had less than a secondary school education and those who completed secondary school or higher. Food insecurity was evaluated based on a yes or no response to the question, "Do you think your household has enough money for food?" Level of schooling and food insecurity were chosen as covariates for the analyses as a proxy for socio-economic status, which has been associated with both exposure to ACEs and lifetime health outcomes (Nurius et al., 2016).

Adverse Childhood Experiences. The ACEs assessed in the present study include the following experiences before age 18: 1) sexual violence, 2) physical violence, 3) emotional violence, 4) witnessed physical violence in the home, 5) witnessed physical violence in the community, 6) orphan status, and 7) parental migration. Sexual violence included experiences of unwanted sexual touching, attempted sex, physically forced sex, or any pressured or coerced sex. Physical violence included having been slapped, pushed, shoved, shook, intentionally thrown at, punched, kicked, whipped, beaten with an object, choked, smothered, intentionally burned, attempted drowning, attacked or threatened with a knife, and attacked or threatened with a gun. These questions were asked about experiences of physical violence perpetrated by intimate partners, peers, parents, or other adult in the community. Emotional violence was measured by asking participants if a parent, adult caregiver, or other adult relative ever told them that they were not loved, wished they had never been born, or ever ridiculed or put them down. Witnessing physical violence in the home included seeing or hearing one's mother or step-mother being punched, kicked, or beaten up by one's father or step-father and/or seeing or

hearing a parent punch, kick, or beat up one's brother or sisters. To measure witnessing physical violence in the community, participants were asked how many times they saw anyone get attacked outside of the home and family environment. To capture orphan status, participants were asked, "is your biological mother still alive?" and "is your biological father still alive?" Participants were considered an orphan if they lost one or both parents prior to age 18. Similarly, for parental migration, participants were asked "has your biological mother ever lived away from you for 6 months or more before you were 18 years old?", and the same question about his or her biological father. Participants were considered to have experienced parental migration if the participant's biological mother and/or father lived away from them for 6 months or more before age 18. A summative ACEs score was also created to categorize the ACEs count as none, one or two, or three or more. These ACEs count categorical cutoffs were chosen based on existing cumulative ACEs research (VanderEnde et al., 2018; Dube et al., 2009).

Health Outcomes. Health behaviors and consequences included: psychological distress, suicide ideation and self-harm, binge drinking, smoking, drug use, sexually transmitted infections (STIs), and early pregnancy. Psychological distress was assessed using the Kessler Screening Scale for Psychological Distress (K6) and includes six questions about feeling nervous, hopeless, restless, sad, and worthless in the past 30 days (Kessler, 2002). The K6 is sum scored and then categorized into low (K6<5), moderate ($5 \leq K6 < 13$), and severe mental health risk categories (K6>=13; Kessler, 2008). If a participant's K6 score indicated moderate or severe distress, they were coded as having experienced psychological distress in the past 30 days. The suicide ideation and self-harm variable was coded by combining responses from two separate items: "have you ever thought about killing yourself?" and "have you ever intentionally hurt yourself?" A dichotomous suicide ideation/self-harm variable was coded to capture individuals

who reported yes to one or both of the suicide/self-harm-related questions. Three behaviors were included that assessed substance misuse: binge drinking, smoking, and drug use. To measure binge drinking, females were asked, "in the past 30 days, on how many days did you have 4 or more drinks of alcohol in a row?" and males were asked, "in the past 30 days, on how many days did you have 5 or more drinks of alcohol in a row?" This binge drinking question was only asked of individuals who said yes to ever having a drink of alcohol that was more than a few sips. This variable was then recoded into a binary variable in which any response of one day or more of binge drinking in the past month was considered binge drinking. To assess smoking, participants were asked if they currently smoke tobacco on a daily basis, less than daily, or not at all. Responses of "daily basis" or "less than daily" were recoded as affirmative for smoking in the past 30 days. For drug use, participants were asked if they used drugs such as marijuana, pills, ecstasy, or sniffed any chemical such as petrol or glue in the last 30 days, with yes or no response options. STIs were measured by asking participants if they had ever been diagnosed with a sexually transmitted infection or had a genital sore, ulcer, or abnormal genital discharge. Lastly, if female participants reported they had ever been pregnant, then a follow up question asked, "how old were you the first time that you got pregnant?" Early pregnancy was coded as any pregnancy before age 18.

Data Analysis

The study included only participants who were age 18-24 years and completed the interview in order to estimate the weighted prevalence of demographic characteristics, ACEs, and health outcomes among 18-24-year-olds in Honduras. Means, frequencies, weighted percentages, and 95% confidence intervals were calculated for all variables of interest, including demographic characteristics, individual ACEs, ACEs count, and health outcomes. Both

prevalence overall and estimates stratified by sex were reported. Chi-square tests were used to examine if observed differences by sex were statistically significant. Additionally, we estimated weighted prevalence and 95% confidence intervals of the co-occurrence of individual health outcomes by ACEs count. All estimates were calculated using SURVEYMEANS or SURVEYFREQ in SAS and accounted for the complex survey design.

Survey-adjusted logistic regression was used to estimate the relationship between ACEs and each health outcome. First, we tested whether the relationship between the ACEs count and individual health outcomes varied by sex by including an ACEs by sex interaction in the model. None of these interactions were found to be significant. Therefore, the interaction term was dropped and the overall relationships, for both males and females, between the ACEs count and each health outcome were estimated. Finally, to assess whether specific ACEs were associated with specific outcomes, a series of models were run to look at the relationship between each individual ACE and each outcome. For all sets of models, both crude and adjusted models were estimated. The adjusted models included age, food insecurity and schooling as covariates. All of these models were estimated using SURVEYLOGISTIC in SAS and accounted for the complex survey design of VACS.

Results

Population Characteristics (Table 1)

The mean age was 20.7 years old. About half (52.6%) of 18-24-year-olds completed secondary school or higher and there was no significant difference between males (51.5%) and females (53.6%) in regard to level of schooling completed (p=0.5645). An estimated one third (34.3%) of the population experienced food insecurity.

Different forms of physical violence are commonly experienced in childhood in Honduras, with an estimated one-third (30.8%) of the population experiencing physical violence, 35.4% witnessing physical violence in the community, and 19.7% witnessing physical violence in the home in childhood. Additionally, 13.3% experienced childhood sexual violence and 11.5% experienced childhood emotional violence. Parental loss is also relatively common, with almost half (42.1%) of young men and women experiencing parental migration and 12.0% experiencing orphanhood. Overall, 77.1% of 18-24-year-olds in Honduras experience at least one ACE, with 38% experiencing one or two ACEs, and 39% experiencing three or more ACEs.

More than half (52.3%) of youth experienced psychological distress in the past 30 days. An estimated 15.6% ever experienced suicide ideation or self-harm. Binge drinking was the most common (28.9%) form of substance use, while an estimated 13.5% smoked and 2.9% used illicit drugs in the past 30 days. An estimated one in three (34.0%) females got pregnant before age 18.

There was a statistically significant difference ($p=0.0012$) between the overall ACEs count for males and females. Almost 10% more females (43.1%) experiencing 3-7 ACEs than males (34.4%). Females also experienced significantly more sexual violence (16.2% vs. 9.9%; $p<0.0001$), emotional violence (14.7% vs. 7.7%; $p<0.0001$) and witnessing physical violence in the home (23.0% vs. 15.8%; $p<p.0001$) compared to males. There were no statistically significant differences between females and males on childhood physical violence, witnessing violence in the community, and orphanhood. Females experienced significantly higher prevalence of psychological distress (56.6% vs. 47.1%; $p<0.0001$), suicide ideation or self-harm (19.3% vs. 11.3%; $p<0.0001$), and STI diagnosis or symptoms (7.1% vs. 1.4%; $p<0.0001$) compared to males. Males experience significantly more binge drinking (35.8% vs. 19.4%;

p<0.0001), smoking (23.8% vs. 4.8%; p<0.0001), and drug use (4.6% vs. 1.5%; p<0.0001). One out of three females (34.0%) were pregnant before age 18.

Cumulative ACEs and Health Outcomes (Table 2)

Table 2 includes results of logistic regression models assessing the relationship between ACEs exposures (none, 1-2, 3+) and health outcomes among young adults. These results suggest a dose-response relationship between ACEs and health outcomes. The ORs increased in a dose-response fashion from 1.8 to 2.8 for psychological distress, 2.3 to 6.3 for suicidal ideation or behavior, 1.4 to 1.5 for binge drinking, 1.6 to 1.7 for smoking, 1.9 to 3.7 for drug use, and 1.3 to 3.5 for STIs for 1-2 ACEs and 3+ ACEs, respectively, compared with those reporting no ACEs. Prevalence of each health outcome for different ACE category groups and 95% CIs for the ORs and aORs are provided in Table 2. In the adjusted models controlling for age, food insecurity, and level of schooling completed, we found increased odds for psychological distress (aORs: 1.8, 2.8), suicidal ideation and self-harm (aORs: 2.3, 6.4), and smoking (aORs: 1.7, 1.9) for 1-2 ACEs and 3+ ACEs compared to no ACEs. The aORs were significantly higher for 3+ ACEs compared to no ACEs for binge drinking (aOR: 1.6), drug use (aOR: 4.0), STIs (aOR: 3.9), and early pregnancy (aOR: 1.7). For these health outcomes, the odds for 1-2 ACEs compared with no ACEs were not significantly increased.

Individual ACEs and Health Outcomes (Table 3)

We assessed the relationship between each ACE and health outcome through separate multiple logistic regressions for each ACE and health outcome individually. Results, including aORs, 95%CIs, and p-values, are presented in Table 3. In the adjusted models, sexual violence was significantly associated with higher odds for suicide ideation or self-harm (aOR=4.9), STIs (aOR=4.7), psychological distress (aOR=2.8), and drug use (aOR=2.3), but not binge drinking

(aOR=1.2), smoking (aOR=1.4), or early pregnancy (aOR=1.2). Physical violence was associated with higher odds of all of the health outcomes (all aORs, 95% CIs, and p-values in Table 3). Emotional violence was significantly associated with psychological distress (aOR=3.7), suicide ideation or self-harm (aOR=4.9), drug use (aOR=2.2), and STIs (aOR=3.2), but not binge drinking (aOR=1.3), smoking (aOR=1.2), or early pregnancy (aOR=1.2).

Witnessing violence in the home was significantly associated with higher odds of psychological distress (aOR=1.7), suicide ideation or self-harm (aOR=2.5), binge drinking (aOR=1.4), drug use (aOR=2.1), STIs (aOR=2.1), but not smoking (aOR=1.0) or early pregnancy (aOR=0.7).Witnessing violence in the community was significantly associated with higher odds of all health outcomes.

Being orphaned by one or both parents was associated with higher odds of suicide ideation or self-harm (aOR=1.4) and drug use (aOR=2.1), but not the other health outcomes. Migration by one or both parents was associated with higher odds of psychological distress (aOR=1.3), suicide behavior or self-harm (aOR=1.6), and STIs (aOR=1.8), and not the other health outcomes.

Discussion

Adverse Childhood Experiences (ACEs) have been shown to be associated with numerous negative mental and physical health outcomes in adulthood. However, little is known about the frequency and consequences of ACEs in LMICs, with particular data gaps in Central America, including Honduras. Therefore, this study presents the first-ever national estimate of ACEs and their impacts in Honduras by examining the prevalence of ACEs, including violence victimization, witnessing violence, and parent-child separation, and potential health consequences among young adults.

Findings from this study indicate that ACEs, including violence, witnessing violence, and separation from a parent, are common among young men and women in Honduras. An estimated 77% of 18-24-year-olds experienced at least one ACE before age 18. Over one third of young adults in Honduras experienced multiple forms of childhood adversity, with 43% of females and 34% of males experiencing three or more ACEs. These prevalence estimates are high compared to ACEs estimates in the United States which suggest about 61% of adults in the United States experienced at least one ACE before age 18 (Merrick et al., 2019). Rather, these estimates are more similar to findings from the Philippines, a developing country, where about 75% reported at least one ACE exposure (Ramiro et al., 2010).

Consistent with other ACEs studies (VanderEnde et al., 2016; Bellis et al., 2014), different forms of physical violence are common forms of childhood adversity in Honduras, with an estimated one third (30.8%) of the population experiencing physical violence, 35.4% witnessing physical violence in the community, and 19.7% witnessing physical violence in the home. Poor health outcomes and risk behaviors are also common among young adults in Honduras. Results indicate moderately high prevalence of psychological distress (52.3%) and binge drinking (28.9%) among young adults; 15.6% of young adults had suicide ideation or self-harm, and 13.5% of young adults smoke. These findings suggest a significant prevalence of mental health problems and risk behaviors in this population. Such levels indicate a need for preventive interventions to promote mental and behavioral health to avoid future serious health problems.

There were also significant sex differences in the prevalence of health outcomes. Generally, young women experience more psychological distress and suicide ideation or self-harm than their male counterparts. Young men engage in more substance use than women,

including binge drinking, smoking, and drug use. These results suggest a need to tailor interventions for different populations of young adults. Preventive interventions to reduce smoking and address alcohol and drug misuse may be particularly relevant for young men in Honduras. For young women, strategies that support mental health and promote resilience are needed.

Sex differences are also evident in the prevalence of specific ACEs, with young women experiencing significantly more sexual violence, emotional violence, and witnessing physical violence in the home in childhood compared to young men. These differences in violence prevalence by sex are consistent with other ACEs and VACS studies where women generally report more victimization than men (Baglivio et al. 2014; Felitti et al., 1998). Interestingly, inconsistent with studies that have suggested that males experience more physical violence (Kilpatrick & Saunder, 1997), there was not a statistically significant difference in prevalence of childhood physical violence between males and females in Honduras. These findings suggest unique patterns of childhood physical violence by sex in Honduras compared to other countries and contexts.

Consistent with growing evidence that supports the cumulative effects of ACEs (Kalmakis & Chandler, 2015; Petruccelli et al., 2019; Felitti et al., 2019), a striking dose-response relationship exists between the count of ACEs and negative health outcomes in Honduras. Clear and consistent graded relationships between ACEs and psychological distress, suicide ideation and self-harm, and smoking were seen. Young adults with 3 or more ACEs were also at increased risk for binge drinking, drug use, STIs, and early pregnancy compared with those with no ACEs. These findings are consistent with those from previous research documenting a dose-response relationship between ACEs and health outcomes from other

countries. Indeed, the consistency in patterns emphasizes the need to prevent the accumulation of ACEs to reduce risk for poor health (CDC, 2019).

Continued exposure to childhood adversities increases the risk that health consequences will persist into adulthood, negatively impacting future health and life outcomes. These findings support the need for comprehensive interventions that target multiple forms of childhood adversity. Fortunately, there are a number of evidence-based approaches to lessen the immediate and long-term harms of ACE exposures (CDC, 2019). Timely access to assessment, intervention, effective care, and support for children and families exposed to ACEs can help mitigate health and behavioral consequences (CDC, 2019). Early signs of psychological distress, suicide ideation, or health compromising behaviors such illicit drug use may indicate a need for victim-centered psychological services and enhanced primary care (CDC, 2019). Ultimately, primary prevention of ACEs can reduce risk and promote health. Strategies such as those highlighted in INSPIRE: Seven Strategies to End Violence Against Children (WHO, 2016) highlight comprehensive, multisectoral efforts supported by the best-available evidence. INSPIRE: Seven Strategies to End Violence Against Children includes evidence-based programs categorized in 7 strategies: Implementation and Enforcement of Laws; Norms and Values; Safe Environments; Parenting and Caregiver Supports; Income and Economic Strengthening; Response and Support Services; and Education and Life Skills. The programs and strategies highlighted in INSPIRE have the added value of having been implemented and/or evaluated in LMICs, making them a potential fit for the Honduran context.

Several programs in INSPIRE may fit the patterns of ACE exposures and health outcomes noted here. Promoting social norms that protect against violence and adversity, especially for women and children, could be useful to the prevention of ACEs in Honduras

(CDC, 2019). Specifically, fostering healthy and positive norms around gender, masculinity and violence can help reduce violence against women, intimate partners, children, and peers (Basile et al., 2016; David-Ferdon et al., 2016; Niolon et al., 2017). Given the prevalence of witnessing violence in the home or community in Honduras, such programs can address social norms supportive of such violence. Bystander interventions and community-based efforts to mobilize men and boys to establish new positive social norms through their networks have been shown to reduce violence against dating partners and sexual violence perpetration (Coker et al., 2017; Miller et al., 2013). These strategies could be effective in an environment with high prevalence of community violence and where violence in the home is common. Public education campaigns can reframe the way people think and talk about ACEs and can include positive parenting programs around safe and effective discipline (Fortson et al., 2016). Legislative approaches to reduce corporal punishment can also help establish norms around safer discipline strategies in the home (Fortson et al., 2016). These approaches can address the high prevalence of physical violence experienced by youth in Honduras.

The strengths of this study include the rigorous methodology and nationally representative sample, and inclusion of a broad range of questions on both ACEs and health outcomes. Several limitations are also noted. Due to the self-report, retrospective data collection methods used in this study, it is possible that the prevalence of ACEs has been underreported. This would lead to underestimating the true strength of the association between exposure to ACEs and health outcomes. The cross-sectional design of the study also limits the ability to establish temporality between associations. Nonetheless, restricting analysis to experiences that occurred prior to 18 and health outcomes in the past 30 days aids in separating the temporality of exposures and some of the outcomes. Additionally, because this was a secondary analysis, this

study was limited to the use of variables asked about in the VACS questionnaire and therefore only able to examine ACEs that were captured with the instrument. Other ACEs that could be explored in Honduras in future studies include living with someone who is a substance user, mentally ill, or imprisoned, childhood neglect, and gang violence (Campbell et al., 2016).

Since this is the first nationally representative study of ACEs in Honduras, further research to more deeply establish these relationships could provide additional information to the field. It may also be important to explore the mechanisms driving these ACEs, specifically in Honduras, in order to design targeted, evidence-based interventions and policy strategies. Future analyses may also explore additional risk behaviors that have been shown to be associated with childhood trauma like violence perpetration or re-victimization later in life (Swedo et al., 2019; Stroem et al., 2019).

In conclusion, a majority of adolescents and young adults in Honduras are living with the consequences of ACEs. The high prevalence of ACEs and associated negative health outcomes in this population support the need for early intervention and prevention strategies in order to avoid the accumulation of traumatic experiences and disrupt the cycle of ACEs. This study provides compelling evidence to inform future interventions and prevention efforts to decrease the prevalence of ACEs and ultimately mitigate the resulting burden of disease in Honduras.

References

Baglivio, M. T., Epps, N., Swartz, K., Huq, M. S., Sheer, A., & Hardt, N. S. (2014). The prevalence of adverse childhood experiences (ACE) in the lives of juvenile offenders. Journal of Juvenile Justice, 3(2).

Basile, K.C., DeGue, S., Jones, K., Freire, K., Dills, J., Smith, S.G., & Raiford, J.L. (2016). *STOP SV: A technical package to prevent sexual violence*. Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention.

Beitchman, J.H., Zucker Hood, J.E., DaCosta, G.A., Akman, D., Cassavia, E. (1992). A review of the long-term effects of child sexual abuse. *Child Abuse & Neglect*; 16:101–118.

Bellis, M.A., Hughes, K., Leckenby, N., Jones, L., Baban, A., Kachaeva, M., Povilaitis, R., Pudule, I., Qirjako, G., Ulukol, B., Raleva, M., & Terzic, N. (2014). Adverse childhood experiences and associations with health-harming behaviours in young adults: surveys in eight eastern European countries. *Bulletin of the World Health Organization*, 92:641-655.

Broidy, L., & Agnew, R. (1997). Gender and crime: A general strain theory perspective. *Journal of Research in Crime and Delinquency*, 34(3), 275–306.

Campbell, J.A., Walker, R.J., & Egede, L.E. (2016). Associations between adverse childhood experiences, high-risk behaviors, and morbidity in adulthood. *American Journal of Preventive Medicine,* 50(3), 344-352.

Cavanaugh, C.E., Petra, H., & Martins, S.S. (2015). Gender-specific profiles of adverse childhood experiences, past year mental and substance use disorders, and their associations among a national sample of adults in the United States. *Soc Psychiatry and Psychiatric Epidemiology, 50:1257-1266.*

Centers for Disease Control and Prevention (2017). *Critical Elements of Interviewer Training for Engaging Children and Adolescents in Global Violence Research: Best Practices and Lessons Learned from the Violence Against Children Survey.* Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention.

Centers for Disease Control and Prevention (2019). *Preventing Adverse Childhood Experiences: Leveraging the Best Available Evidence.* Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention.

Coker, A. L., Bush, H. M., Cook-Craig, P. G., DeGue, S. A., Clear, E. R., Brancato, C. J., Fisher, B. S., & Recktenwald, E. A. (2017). RCT testing bystander effectiveness to reduce violence. *American Journal of Preventive Medicine 52*(5), 566-578.

David-Ferdon, C., Vivolo-Kantor, A. M., Dahlberg, L. L., Marshall, K. J., Rainford, N. & Hall, J. E. (2016). *A comprehensive technical package for the prevention of youth violence and associated risk behaviors.* Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention.

Dube, S.R., Fairweather, D., Pearson, W.S., Felitti, V.J., Anda, R.F., & Croft, J.B. (2009). Cumulative childhood stress and autoimmune diseases in adults. *Psychosomatic medicine, 71(*2), 243-250.

Duke, N. N., Pettingell, S. L., McMorris, B. J., & Borowsky, I. W. (2010). Adolescent violence perpetration: Associations with multiple types of adverse childhood ex- periences. Pediatrics, peds. 125(4), e778–e786 (2009–0597).

Felitti, V.J., Anda, R.F., Nordenberg, D., Wiliamson, D.F., Spitz, A.M., Edwards, V., Koss, M.P., & Marks, J.S. (2019). Relationship of Childhood Abuse and Household Dysfunction to Many of the Leading Causes of Death in Adults: The Adverse Childhood

Experiences (ACE) Study. *American Journal of Preventative Medicine, 56(6):774-786.*

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., & Marks, J.S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) Study. *American Journal of Preventative Medicine, 14(4), 245-258.*

Fellmeth, G., Rose-Clarke, K., Zhao, C., Busert, L.K., Zheng, Y., Massazza, A., Sonmez, H., Eder, B., Blewitt, A., Lertgrai, W., Orcutt, M., Ricci, K., Mohamed-Ahmed, O., Burns, R., Knipe, D., Hargreaves, S., Hesketh, T., Opondo, C., & Devakumar, D. (2018). Health impacts of parental migration on left-behind children and adolescents: a systematic review and meta-analysis. *The Lancet,* 392(10164):2567-2582.

Ford, J.D. & Delker, B.C. (2018). Polyvictimization in childhood and its adverse impacts across the lifespan: Introduction to the special issue. *Journal of Trauma & Dissociation*, 19(3), 275-288.

Fortson, B. L., Klevens, J., Merrick, M. T., Gilbert, L. K., & Alexander, S. P. (2016). Preventing child abuse and neglect: A technical package for policy, norm, and programmatic activities. Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention.

Government of Honduras, Sub-Secretariat of Security in Prevention, Secretariat of Security. Honduras Violence Against Children Survey, 2017. Tegucigalpa, Honduras, 2019.

Higgins, D. & McCabe (2000). Multi-Type Maltreatment and the Long-Term Adjustment of Adults, Child Abuse Review, vol. 0, no. 0, pp. 6–18, John Wiley & Sons Ltd, Journals, UK.

Hillis, S., Mercy, J., Amobi, A., & Kress, H. (2016). Global Prevalence of Past-year Violence Against Children: A Systematic Review and Minimum Estimates. *Pediatrics.* 137(3).

Hughes, K., Bellis, M.A., Hardcastle, K.A., Sethi, D., Butchart, A., Mikton, C., Jones, L., & Dunne, M.P. (2017). The effect of multiple adverse childhood experiences on health: systematic review and meta-analysis. *The Lancet Public Health,* 2(8):e356-66.

Kalmakis, K. A. & Chandler, G. E. (2015). Health consequences of adverse childhood experiences: A systematic review. Journal of the American Association of Nurse Practitioners, 27: 457-465.

Kessler, R.C., Andrews, G., Colpe, L.J., Hiripi, E., Mroczek, D.K., Normand, S.-L.T., Walters, E.E., & Zaslavsky, A. (2002). Short screening scales to monitor population prevalances and trends in nonspecific psychological distress. *Psychological Medicine*. 32(6), 959-976.

Kessler, R.C., Heeringa, S., Lakoma, M.D., Petukhova, M., Rupp, A.E., Schoenbaum, M., Wang, P.S., & Zaslavsky, A.M. (2008). Individual and societal effects of mental disorders on

earning in the United States: results from the national comorbidity survey replication. *Am J Psychiatry.* 165(6): 703-11.

Kleinman, R. E., Murphy, J. M., Little, M., Pagano, M., Wehler, C. A., Regal, K., & Jellinek, M. S. (1998). Hunger in children in the United States: Potential behavioral and emotional correlates. Pediatrics, 101(1), 100–111.

Kilpatrick, D. G., & Saunders, B. E. (1997). Prevalence and consequences of child victimization: Results from the National Survey of Adolescents: Final report. Washington, DC: US Department of Justice, Office of Justice Programs.

Landa-Blanco, M., Cheon, H., Flores, L.G.R., Spohn, C., & Katz, C.M. (2020). Violence in Honduras from 2008 to 2018. *Injury Prevention, 0,* 1-3. Epub ahead of print: 9 Mar 2020.

Lanier, P. Maguire-Jack, K., Lombardi, B., Frey, J., & Rose, R.A. (2018). Adverse Childhood Experiences and Child Health Outcomes: Comparing Cumulative Risk and Latent Class Approaches. *Matern Child Health J, 22:288-297.*

Leban, L., & Gibson, C. L. (2020). The role of gender in the relationship between adverse childhood experiences and delinquency and substance use in adolescence. *Journal of Criminal Justice*, *66*, 101637. doi: 10.1016/j.jcrimjus.2019.101637

Merrick, M.T., Ford, D.C., Ports, K.A., Guinn, A.S., Chen, J., Klevens, J.,… Mercy, J.A. (2019). Vital Signs: Estimated Proportion of Adult Health Problems Attributable to Adverse Childhood Experience and Implications for Prevention – 25 States, 2015-2017. *MMWR. Morbidity and Mortality Weekly Report,* 68(44), 999-1005.

Miller, E., Tancredi, D. J., McCauley, H. L., Decker, M. R., Virata, M. C. D., Anderson, H. A., O'Conner, B., & Silverman, J. G. (2013). One-year follow-up of a coach-delivered dating violence prevention program: a cluster randomized controlled trial. *American Journal of Preventive Medicine, 45*(1), 108-112.

Nelson, D. E., Higginson, G. K., & Grant-Worley, J. A. (1995). Physical Abuse Among High School Students. *Archives of Pediatrics & Adolescent Medicine*, *149*(11), 1254.

Niolon, P. H., Kearns, M., Dills, J., Rambo, K., Irving, S., Armstead, T., & Gilbert, L. (2017). *Preventing intimate partner violence across the lifespan: a technical package of programs, policies, and practices.* Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention.

Nurius, P.S., Green, S., Logan-Greene, P., Longhi, D. & Song, C. (2016). Stress pathways to health inequalities: Embedding ACEs within social and behavioral contexts. *Int Public Health J:* 8(2), 241-256.

Petruccelli, K., Davis, J., & Berman, T. (2019). Adverse childhood experiences and associated health outcomes: A systematic review and meta-analysis. *Child Abuse & Neglect*, *97*, 104127. doi: 10.1016/j.chiabu.2019.104127

Piccinelli, M., & Wilkinson, G. (2000). Gender differences in depression: Critical review. The British Journal of Psychiatry, 177(6), 486–492.

Ramiro, L.S., Madrid, B.J., & Brown, D.W. (November 2010). Adverse childhood experiences (ACE) and health-risk behaviors among adults in a developing country setting. *Child Abuse & Neglect,* 34(11): 842-855.

Ransford, C., Decker, R.B., Cruz, G.M., Sanchez, F., & Slutkin, G. (2017). El modelo *Cure Violence*: Reduccion de la violencia en San Pedro Sula (Honduras). *Revista CIDOB d'Avers Internacionals, 116,* 179-204.

Reisner, S.L., Falb, K.L., & Mimiaga, M.J. (2011). Early life traumatic stressors and the mediating role of PTSD in incident HIV infection among US men, comparisons by sexual orientation and race/ethnicity: Results from the NESARC, 2004–2005. *Journal of Acquired Immune Deficiency Syndromes*, 57, 340–350.

Secretaría de Salud [Honduras], Instituto Nacional de Estadística (INE) e ICF International, 2013. Encuesta Nacional de Salud y Demografía 2011-2012. Tegucigalpa, Honduras.

Speizer, I.S., Goodwin, M., Whittle, L., Clyde, M., & Roger, J. (April 2008). Dimensions of child sexual abuse before age 15 in three Central American countires: Honduras, El Salvador, and Guatemala. Journal of Child Abuse & Neglect. Vol 32, Issue 4, pp.455-462.

Stoltenborgh, M., Bakermans-Kranenburg, M.J., Alink, L.R., & van IJzendoorn, M.H. (2014). The Prevalence of Child Maltreatment across the Globe: Review of a Series of Meta-Analyses.

Stroem, I. F., Aakvaag, H. F., & Wentzel-Larsen, T. (2019). Characteristics of Different Types of Childhood Violence and the Risk of Revictimization. *Violence Against Women*, *25*(14), 1696–1716. doi: 10.1177/1077801218818381

Swedo, E.A., Sumner, S.A., Hillis, S.D. et al. (2019). Prevalence of Violence Victimization and Perpetration Among Persons Aged 13-23 Years – Four Sub-Saharan African Countries, 2013-2015. *Morb Mortal Wkly Rep*, 68:350-355.

The World Bank in Honduras. (October 2019). Retrieved from https://worldbank.org/en/country/honduras.

Turner, H.A., Finkelhor, D., & Ormrod, R. (March 2010). Poly-Victimization in a National Sample of Children and Youth. *American Journal of Preventative Medicine,* 38(3): 323-330.

United Nations General Assembly. (October 2015). Transforming our world: the 2030 Agenda for Sustainable Development.

VanderEnde, K., Chiang, L., Mercy, J., Shawa, M., Hamela, J., Maksud, N., Gupta, S., Wadonda-Kabondo, N., Saul, J., Gleckel, J., Kress, H., & Hillis, S. (2018). Adverse Childhood Experiences and HIV Sexual Risk-Taking Behaviors Among Young Adults in Malwai. *Journal of Interpersonal Violence,* 33(11): 1710-1730.

World Health Organization. (2016). INSPIRE: seven strategies for ending violence against children: executive summary.

Yacoub, S., Sergio, A., & Padgett-Moncada, D. (May 2006). Violence related injuries, deaths and disabilities in the capital of Honduras. International Journal of the Care of the Injured. Vol 37, Issue 5, pp.428-434

Chapter 5: Public Health Implications

The purpose of this study is to assess the prevalence of, and health consequences associated with, ACEs in Honduras. This study provides the first-ever national estimates of ACEs in Central America. This study outlines the prevalence of ACEs and potentially related health consequences among adolescent and young adults in Honduras and explores differences in these estimates by sex. This study also aims to examine the association between ACEs and health consequences within this population to further establish if a dose-response relationship exists and if specific ACEs are more strongly predictive of individual health outcomes. This study has compelling implications for public health programming, policy, and future research. These findings support the need for comprehensive interventions that target multiple forms of childhood adversity at various levels of the social ecological model in order to break the cycle of trauma and prevent the further development of negative health behaviors.

Findings from this study indicate that ACEs, including violence, witnessing violence, and separation from a parent, are common among young men and women in Honduras with an estimated 77% of 18-24 year olds experiencing at least one ACE before age 18. An estimated 43% of females and 34% of males experience more than three unique ACEs. These estimates are striking when compared to the global estimate that predicts 38.8% of young individuals have experienced at least one ACE (Kessler et al., 2010) and an estimated 61% in the United States (Merrick et al., 2019). Fortunately, there is growing evidence to support what works to prevent ACEs with resources like the INSPIRE: Seven Strategies to End Violence Against Children technical package (WHO, 2016) and CDC's ACEs Prevention Resource (CDC, 2019) to inform programs and policies aimed at reducing these traumatic experiences.

Prevention of physical violence should be of focus for Honduras with physical violence victimization and exposure being the most frequently experienced ACE in Honduras. An estimated one third (31%) of young men and women have been a victim of childhood physical violence, 35.4% witness physical violence in the community, and 19.7% witness physical violence in the home. Young men and women both experience a similarly high prevalence of physical violence victimization and witnessing violence in the community. In this context, physical violence was also shown to be associated with all potential health outcomes included in this study and has specifically strong association to suicide ideation or self-harm and drug use.

Women consistently report more victimization than men of all forms (Baglivio et al. 2014; Felitti et al., 1998) and the same is generally true in Honduras. Young women experience more victimization than men including experiencing significantly more sexual abuse (16.2% vs. 9.9%), emotional violence (14.7% vs. 7.7%) and witnessing physical violence in the home (23% vs. 15.8%). Therefore, promoting social norms that protect against violence and adversity, especially for women and children, will be critical to the prevention of ACEs in Honduras (CDC, 2019). Specifically, fostering healthy and positive norms around gender, masculinity and violence can help reduce violence against women, intimate partners, children, and peers (Basile et al., 2016; David-Ferdon et al., 2016; Niolon et al., 2017). Bystander interventions and community-based efforts to mobilize men and boys to establish new positive social norms through their networks have been shown to reduce violence against dating partners and sexual violence perpetration (Coker et al., 2017; Miller et al., 2013). Public education campaigns can reframe the way people think and talk about ACEs and can include positive parenting programs around safe and effective discipline (Fortson et al., 2016). Legislative approaches to reduce

corporal punishment can also help establish norms around safer discipline strategies in the home (Fortson et al., 2016).

We must also acknowledge the cumulative effect of ACEs and the associated elevated risk for negative health outcomes. Consistent with growing evidence that supports the cumulative effects of ACEs (Kalmakis & Chandler, 2015; Petruccelli, Davis & Berman, 2019; Felitti et al., 2019), a striking dose-response relationship exists between the count of ACEs and negative health outcomes in Honduras. Psychological distress has a clear graded relationship; compared to those with no ACEs, those with 1-2 ACEs have two times the odds of experiencing psychological distress and those with 3 or more ACEs have three times the odds of experiencing psychological distress. Additionally, those individuals who experience 3 or more ACEs have six times the odds of experiencing suicide ideation or self-harm compared to those with no ACEs. The odds of illicit drug use were significantly higher for youth who experienced 3 or more ACEs compared to no ACEs.

Continued exposure to these adversities increases the risk that these health consequences will continue into adulthood, negatively impacting their future and possibly their children's future. Fortunately, there are a number of evidence-based approaches to lessen the immediate and long-term harms of ACE exposures (CDC, 2019). Timely access to assessment, intervention, effective care, and support for children and families in which ACEs have already occurred can help mitigate the health and behavioral consequences of ACEs (CDC, 2019). Early signs of psychological distress, suicidal ideation, or health compromising behaviors such illicit drug use may indicate a need for victim-centered psychological services and enhanced primary care (CDC, 2019).

Since this is the first nationally representative study of ACEs in Honduras, further research must be done to more deeply establish these relationships. It may also be important to explore the mechanisms driving these ACEs, specifically in Honduras, in order to design targeted, evidence-based interventions and policy strategies. Future analyses may also explore additional risk behaviors that have been shown to be associated with childhood trauma like violence perpetration or re-victimization later in life (Swedo et al., 2019; Stroem, Aakvaag, & Wentzel-Larsen, 2019). Additional analysis of perpetrator data will help inform if interventions should be tailored for parents, partners, and/or peers.

In conclusion, a majority of adolescents and young adults in Honduras are living with the consequences of ACEs. The high prevalence of ACEs and associated negative health outcomes in this population support the need for early intervention and prevention strategies in order to disrupt the cycle of ACEs and avoid the accumulation of traumatic experiences. This study provides compelling evidence to inform future interventions and prevention efforts to decrease the prevalence of ACEs and ultimately mitigate the resulting burden of disease in Honduras.

References

Anda, R.F., Butchart, A., Felitti, V.J., & Brown, D,W. (2010). Building a framework for global surveillance of the public health implications of adverse childhood experiences. Am J Prev Med;39(1):93-98.

Basile, K.C., DeGue, S., Jones, K., Freire, K., Dills, J., Smith, S.G., & Raiford, J.L. (2016). *STOP SV: A technical package to prevent sexual violence*. Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention.

Baglivio, M. T., Epps, N., Swartz, K., Huq, M. S., Sheer, A., & Hardt, N. S. (2014). The prevalence of adverse childhood experiences (ACE) in the lives of juvenile offenders. Journal of Juvenile Justice, 3(2).

Beitchman, J.H., Zucker Hood, J.E., DaCosta, G.A., Akman, D., Cassavia, E. (1992). A review of the long-term effects of child sexual abuse. *Child Abuse & Neglect*; 16:101–118.

Bellis, M. A., Hughes, K., Leckenby, N., Jones, L., Baban, A., Kachaeva, M., . . . Terzic, N. (2014). Adverse childhood experiences and associations with health-harming behaviours in young adults: surveys in eight eastern European countries. *Bull World Health Organ, 92*(9), 641-655. doi:10.2471/blt.13.129247

Bellis, M. A., Lowey, H., Leckenby, N., Hughes, K., & Harrison, D. (2014). Adverse childhood experiences: retrospective study to determine their impact on adult health behaviours and health outcomes in a UK population. *Journal of Public Health*, *36*(1), 81–91. doi: 10.1093/pubmed/fdt038

Breiding, M. J., Mercy, J. A., Gulaid, J., Reza, A., & Hleta-Nkambule, N. (2013). A national survey of childhood physical abuse among females in Swaziland. *Journal of Epidemiology and Global Health, 3*(2), 73-81.

Broidy, L., & Agnew, R. (1997). Gender and crime: A general strain theory perspective. *Journal of Research in Crime and Delinquency*, 34(3), 275–306.

Cavanaugh, C.E., Petras, H., & Martins, S.S. (2015). Gender-specific profiles of adverse childhood experiences, past year mental and substance use disorders, and their associations among a national sample of adults in the United States. *Soc Psychiatry and Psychiatric Epidemiology, 50:1257-1266.*

Chiang, L. F., Chen, J., Gladden, M. R., Mercy, J. A., Kwesigabo, G., Mrisho, F., … Vagi, K. (2015). HIV and Childhood Sexual Violence: Implications for Sexual Risk Behaviors and HIV Testing in Tanzania. *AIDS Education and Prevention*, *27*(5), 474–487.

Chiang, L. F., Kress, H., Sumner, S. A., Gleckel, J., Kawemama, P., & Gordon, R. N. (2016). Violence Against Children Surveys (VACS): towards a global surveillance system. *Injury Prevention, 22 Suppl 1*, i17-22. doi:10.1136/injuryprev-2015-041820

Centers for Disease Control and Prevention (CDC). (2002). The Social Ecological Model: A Framework for Prevention, http://www.cdc.gov/violenceprevention/overview/social-ecologicalmodel.html (retrieved January 10, 2020).

Centers for Disease Control and Prevention. (2019). *Preventing Adverse Childhood Experiences: Leveraging the Best Available Evidence*. Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention.

Chiang, L., Gleckel, J., Howard, A., Ramly, A.A., Mungate, T., & Karlsson, J. (2017). *Critical Elements of Interviewer Training for Engaging Children and Adolescents in Global Violence Research: Best Practices and Lessons Learned from the Violence Against Children Survey*. Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention.

Chisholm, C.A., Bullock, L. & Ferguson, J.E. (2017). Intimate partner violence and pregnancy: epidemiology and impact. *American Journal of Obstetrics and Gynecology,* 217(2), 141-144.

Coker, A. L., Bush, H. M., Cook-Craig, P. G., DeGue, S. A., Clear, E. R., Brancato, C. J., Fisher, B. S., & Recktenwald, E. A. (2017). RCT testing bystander effectiveness to reduce violence. *American Journal of Preventive Medicine 52*(5), 566-578.

Danese, A. & McEwen, B.S. (2012). Adverse childhood experiences, allostasis, allostatic load, and age-related disease. *Physiology & Behavior,* 106(1), 29-39.

David-Ferdon, C., Vivolo-Kantor, A. M., Dahlberg, L. L., Marshall, K. J., Rainford, N. & Hall, J. E. (2016). *A comprehensive technical package for the prevention of youth violence and associated risk behaviors.* Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention.

Dineen, J. (2019, May 16). Why Children are Fleeing Honduras, and What UNICEF Is Doing About It. Retrieved from https://www.unicefusa.org/stories/why-children-are-fleeing-honduras-and-what-unicef-doing-about-it/35571

Duke, N. N., Pettingell, S. L., McMorris, B. J., & Borowsky, I. W. (2010). Adolescent violence perpetration: Associations with multiple types of adverse childhood ex- periences. Pediatrics, peds. 125(4), e778–e786 (2009–0597).

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., & Marks, J.S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) Study. *American Journal of Preventative Medicine, 14(4), 245-258.*

Felitti, V.J., Anda, R.F., Nordenberg, D., Wiliamson, D.F., Spitz, A.M., Edwards, V., Koss, M.P., & Marks, J.S. (2019). Relationship of Childhood Abuse and Household

Dysfunction to Many of the Leading Causes of Death in Adults: The Adverse Childhood Experiences (ACE) Study. *American Journal of Preventative Medicine, 56(6):774-786.*

Fellmeth, G., Rose-Clarke, K., Zhao, C., Busert, L.K., Zheng, Y., Massazza, A., Sonmez, H., Eder, B., Blewitt, A., Lertgrai, W., Orcutt, M., Ricci, K., Mohamed-Ahmed, O., Burns, R., Knipe, D., Hargreaves, S., Hesketh, T., Opondo, C., & Devakumar, D. (2018). Health impacts of parental migration on left-behind children and adolescents: a systematic review and meta-analysis. *The Lancet,* 392(10164):2567-2582.

Ford, J.D. & Delker, B.C. (2018). Polyvictimization in childhood and its adverse impacts across the lifespan: Introduction to the special issue. *Journal of Trauma & Dissociation*, 19(3), 275-288.

Fortson, B. L., Klevens, J., Merrick, M. T., Gilbert, L. K., & Alexander, S. P. (2016). *Preventing child abuse and neglect: a technical package for policy, norm, and programmatic activities.* Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention.

Government of Honduras, Sub-Secretariat of Security in Prevention, Secretariat of Security. (2019). Honduras Violence Against Children Survey, 2017. Tegucigalpa, Honduras, 2019.

Grose, R.G., Chen, J.S., Roof, K.A., Rachel, S. & Yount, K.M. (2020). Sexual and Reproductive Health Outcomes of Violence Against Women and Girls in Lower-Income Countries: A Review of Reviews, The Journal of Sex Research, DOI: 10.1080/00224499.2019.1707466

Higgins, D. & McCabe (2000). Multi-Type Maltreatment and the Long-Term Adjustment of Adults, Child Abuse Review, vol. 0, no. 0, pp. 6–18, John Wiley & Sons Ltd, Journals, UK.

Hillis, S., Mercy, J., Amobi, A., & Kress, H. (2016). Global Prevalence of Past-year Violence Against Children: A Systematic Review and Minimum Estimates. *Pediatrics.* 137(3).

Hsiao, C., Fry, D., Ward, C. L., Ganz, G., Casey, T., Zheng, X., & Fang, X. (2017). Violence against children in South Africa: The cost of inaction to society and the economy. *BMJ Global Health, 3*, 1-7.

Hughes, K., Bellis, M. A., Hardcastle, K. A., Sethi, D., Butchart, A., Mikton, C., . . . Dunne, M. P. (2017). The effect of multiple adverse childhood experiences on health: a systematic review and meta-analysis. *Lancet Public Health, 2*(8), e356-e366. doi:10.1016/s2468-2667(17)30118-4

IACHR (Inter-American Commission on Human Rights). 2013. *Annual Report of the Inter-American Commission on Human Rights 2012*. Washington, DC: Inter-American Commission on Human Rights.

Kalmakis, K. A. and Chandler, G. E. (2015). Health consequences of adverse childhood experiences: A systematic review. Journal of the American Association of Nurse Practitioners, 27: 457-465. ,

Kessler, R. C., McLaughlin, K. A., Green, J. G., Gruber, M. J., Sampson, N. A., Zaslavsky, A. M… Williams, D. R. (2010). Childhood adversities and adult psychopathology in the WHO World Mental Health Surveys. *British Journal of Psychiatry, 197*(5), 378-385. doi:10.1192/bjp.bp.110.080499

Kilpatrick, D. G., & Saunders, B. E. (1997). Prevalence and consequences of child victimization: Results from the National Survey of Adolescents: Final report. Washington, DC: US Department of Justice, Office of Justice Programs.

Kleinman, R. E., Murphy, J. M., Little, M., Pagano, M., Wehler, C. A., Regal, K., & Jellinek, M. S. (1998). Hunger in children in the United States: Potential behavioral and emotional correlates. Pediatrics, 101(1), 100–111.

Krug, E., Dahlberg, L.L., Mercy, J.A., Zwi, A.B., Lozano, R. (2002). World Report on Violence and Health. Geneva, Switzerland: World Health Organization; 1–56.

Landa-Blanco, M., Cheon, H., Flores, L.G.R., Spohn, C., & Katz, C.M. (2020). Violence in Honduras from 2008 to 2018. *Injury Prevention, 0,* 1-3. Epub ahead of print: 9 Mar 2020.

Lanier, P. Maguire-Jack, K., Lombardi, B., Frey, J., & Rose, R.A. (2018). Adverse Childhood Experiences and Child Health Outcomes: Comparing Cumulative Risk and Latent Class Approaches. *Matern Child Health J, 22:288-297.*

Leban, L., & Gibson, C. L. (2020). The role of gender in the relationship between adverse childhood experiences and delinquency and substance use in adolescence. *Journal of Criminal Justice*, *66*, 101637. doi: 10.1016/j.jcrimjus.2019.101637

Merrick, M.T., Ford, D.C., Ports, K.A., Guinn, A.S., Chen, J., Klevens, J.,… Mercy, J.A. (2019). Vital Signs: Estimated Proportion of Adult Health Problems Attributable to Adverse Childhood Experience and Implications for Prevention – 25 States, 2015-2017. *MMWR. Morbidity and Mortality Weekly Report,* 68(44), 999-1005.

Miller, E., Tancredi, D. J., McCauley, H. L., Decker, M. R., Virata, M. C. D., Anderson, H. A., O'Conner, B., & Silverman, J. G. (2013). One-year follow-up of a coach-delivered dating violence prevention program: a cluster randomized controlled trial. *American Journal of Preventive Medicine, 45*(1), 108-112.

Nelson, D. E., Higginson, G. K., & Grant-Worley, J. A. (1995). Physical Abuse Among High School Students. *Archives of Pediatrics & Adolescent Medicine*, *149*(11), 1254.

Palermo, T., Bleck, J., & Peterman, A. (March 2014). Tip of the Iceberg: Reporting and Gender-Based Violence in Developing Countries, *American Journal of Epidemiology*, Volume 179, Issue 5, Pages 602–612, https://doi.org/10.1093/aje/kwt295.

Perales, J., Olaya, B., Fernandez, A., Alonso, J., Vilagut, G., Forero, C. G., . . . Haro, J. M. (2013). Association of childhood adversities with the first onset of mental disorders in Spain: results from the ESEMeD project. *Soc Psychiatry Psychiatr Epidemiol, 48*(3), 371-384. doi:10.1007/s00127-012-0550-5.

Petruccelli, K., Davis, J., & Berman, T. (2019). Adverse childhood experiences and associated health outcomes: A systematic review and meta-analysis. *Child Abuse & Neglect*, *97*, 104127. doi: 10.1016/j.chiabu.2019.104127

Piccinelli, M., & Wilkinson, G. (2000). Gender differences in depression: Critical review. The British Journal of Psychiatry, 177(6), 486–492.

Radford, Jill, and Diana E. H. Russell, eds. 1992. *Femicide: The Politics of Woman Killing*. New York: Twayne.

Ramiro, L.S., Madrid, B.J., & Brown, D.W. (November 2010). Adverse childhood experiences (ACE) and health-risk behaviors among adults in a developing country setting. *Child Abuse & Neglect,* 34(11): 842-855.

Ransford, C., Decker, R.B., Cruz, G.M., Sanchez, F., & Slutkin, G. (2017). El modelo *Cure Violence*: Reduccion de la violencia en San Pedro Sula (Honduras). *Revista CIDOB d'Avers Internacionals, 116,* 179-204.

Reisner, S.L., Falb, K.L., & Mimiaga, M.J. (2011). Early life traumatic stressors and the mediating role of PTSD in incident HIV infection among US men, comparisons by sexual orientation and race/ethnicity: Results from the NESARC, 2004–2005. *Journal of Acquired Immune Deficiency Syndromes*, 57, 340–350.

Reza, A., Breiding, M. J., Gulaid, J., Mercy, J. A., Blanton, C., Mthethwa, Z., . . . Anderson, M. (2009). Sexual violence and its health consequences for female children in Swaziland: a cluster survey study. *Lancet, 373*(9679), 1966-1972.

Sacks, V., & Murphey, D. (2018). The prevalence of adverse childhood experiences, nationally, by state, and by race or ethnicity. Child Trends. Retrieved from https://www.childtrends.org/publications/prevalence-adverse-childhood-experiences-nationally-state-race-ethnicity.

Schussler-Fiorenza Rose, S. M., Xie, D., & Stineman, M. (2014). Adverse childhood experiences and disability in U.S. adults. *PM&R, 6*(8), 670-680. doi:10.1016/j.pmrj.2014.01.013

Secretaría de Salud [Honduras], Instituto Nacional de Estadística (INE) e ICF International, 2013. Encuesta Nacional de Salud y Demografía 2011-2012. Tegucigalpa, Honduras.

Speizer, I.S., Goodwin, M., Whittle, L., Clyde, M., & Roger, J. (April 2008). Dimensions of child sexual abuse before age 15 in three Central American countires: Honduras, El Salvador, and Guatemala. Journal of Child Abuse & Neglect. Vol 32, Issue 4, pp.455-462.

Stark, L., Asghar, K., Yu, G., Bora, C., Baysa, A. A., & Falb, K. L. (2017). Prevalence and associated risk factors of violence against conflict-affected female adolescents: a multi-country, cross-sectional study. *J Glob Health, 7*(1), 010416. doi:10.7189/jogh.07.010416

Stoltenborgh, M., Bakermans-Kranenburg, M.J., Alink, L.R., & van IJzendoorn, M.H. (2014). The Prevalence of Child Maltreatment across the Globe: Review of a Series of Meta-Analyses.

Sumner, S. A., Mercy, J. A., Buluma, R., Mwangi, M. W., Marcelin, L. H., Kheam, T., . . . Hillis, S. D. (2016). Childhood Sexual Violence Against Boys: A Study in 3 Countries. *Pediatrics, 137*(5). doi:10.1542/peds.2015-3386

The World Bank in Honduras. (October 2019). Retrieved from https://worldbank.org/en/country/honduras.

Tourangeau, R., & Yan, T. (2007). Sensitive questions in surveys. *Psychological bulletin, 133*(5), 859.

Turner, H.A., Finkelhor, D., & Ormrod, R. (March 2010). Poly-Victimization in a National Sample of Children and Youth. *American Journal of Preventative Medicine,* 38(3): 323-330.

UNICEF. UNAIDS 2019 estimates. Received from: https://data.unicef.org/resources/data_explorer/unicef_f/?ag=UNICEF&df=GLOBAL_DATAFLOW&ver=1.0&dq=.HVA_PED_LOST..&startPeriod=2015&endPeriod=2020

United Nations General Assembly. (October 2015). Transforming our world: the 2030 Agenda for Sustainable Development.

Vagi, K. J., Brookmeyer, K. A., Gladden, R. M., Chiang, L. F., Brooks, A., Nyunt, M.-Z., . . . Dahlberg, L. L. (2016). Sexual Violence Against Female and Male Children in the United Republic of Tanzania. *Violence Against Women, 22*(14), 1788-1807. doi:10.1177/1077801216634466

VanderEnde, K., Mercy, J., Shawa, M., Kalanda, M., Hamela, J., Maksud, N., . . . Hillis, S. (2016). Violent experiences in childhood are associated with men's perpetration of

intimate partner violence as a young adult: a multistage cluster survey in Malawi. *Annals of Epidemiology, 26*(10), 723-728.

VanderEnde, K., Chiang, L., Mercy, J., Shawa, M., Hamela, J., Maksud, N., Gupta, S., Wadonda-Kabondo, N., Saul, J., Gleckel, J., Kress, H., & Hillis, S. (2018). Adverse childhood experiences and HIV sexual risk-taking behaviors among young adults in Malawi. *Journal of Interpersonal Violence, 33,* 1710-1730.

Whetten, K., Ostermann, J., Whetten, R. A., Pence, B. W., O'Donnell, K., Messer, L. C., & Thielman, N. M. (2009). A comparison of the wellbeing of orphans and abandoned children ages 6–12 in institutional and community-based care settings in 5 less wealthy nations. *PLoS One*, *4*(12), e8169.

Wisconsin Child Abuse & Neglect Prevention Board. Social-Ecological Model. Retrieved from https://preventionboard.wi.gov/Pages/AboutPrevention/Social-EcologicalFramework.aspx

World Health Organization. (1947). *Constitution.* New York: WHO.

World Health Organization (2001). *Putting Women First: Ethical and Safety Recommendations for Research on Domestic Violence Against Women.* Geneva, Switzerland: World Health Organization.

World Health Organization (2016). *INSPIRE: Seven Strategies for Ending Violence Against Children*. Geneva, Switzerland: World Health Organization.

Yacoub, S., Sergio, A., & Padgett-Moncada, D. (May 2006). Violence related injuries, deaths and disabilities in the capital of Honduras. International Journal of the Care of the Injured. Vol 37, Issue 5, pp.428-434.

Figures

Figure 1. Three-Stage Stratified Random Sampling Method

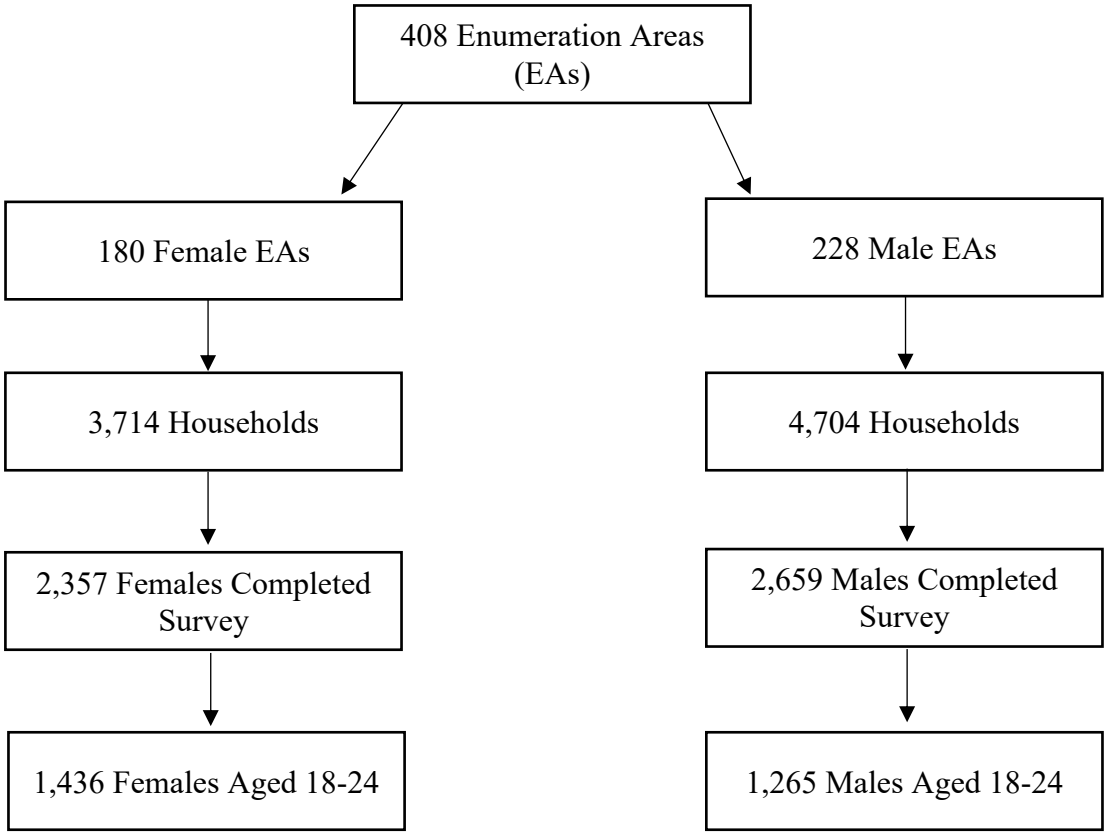


Figure 2. Table of Measures

Variable Name	Survey Question	Response Options	Variable Coding
Demographics			
Age (in years)	How old are you?	Years Old: _ _	Only participants between the age of 18-24 were included
Level of schooling	What is the highest level of schooling you have completed	Less than primary Primary Secondary Higher than secondary	Completed secondary school or higher
Experienced food insecurity	Do you think your household has enough money for food?	Yes No	A response of "no"
ACEs			
Sexual violence	Has anyone ever touched you in a sexual way without your permission, but did not try and force you to have sex? How many times in your life has this happened? How old were you the first time anyone touched you in a sexual way without your permission but did not try to force you to have sex? How many times in your life has anyone tried to make you have sex against your will but did not succeed? How old were you the first time anyone tried to make you have sex against your will but did not succeed? How many times in your life have you been physically forced to have sex? How old were you the first time anyone physically forced you to have sex? How many times in your life has someone pressured you to have sex through harassment, threats or tricks and did succeed?	Yes No	A response of one or more times AND before 18 to ANY of the included questions

	How old were you the first time anyone pressured you to have sex through harassment, threats and tricks and did succeed?		
Physical violence	Has a boyfriend/romantic partner, ex-boyfriend/romantic partner or husband ever: A. slapped, pushed, shoved, shook, or intentionally threw something at you to hurt you? B. punched, kicked, whipped, or beat you with an object? C. choked, smothered, tried to drown you, or burned you intentionally? D. used or threatened you with a knife, gun or other weapon? Also asked about the above experiences perpetrated by peers, parents, or other adult. *These were also asked about parents, peers, and other adults in the community How old were you the first time this happened?	Yes No	A response of "yes" and before 18 to ANY of the included questions
Emotional violence	Has a parent, adult caregiver or other adult relative ever: A. told you that you were not loved, or did not deserve to be loved? B. said they wished you had never been born or were dead? C. ever ridiculed you or put you down, for example said that you were stupid or useless? Did this happen before age 18?	Yes No	A response of "yes" and before 18 to ANY of the included questions
Witnessed physical violence in the home	Before the age of 18: How many times did you see or hear your mother or step-mother being punched, kicked or beaten up by your father or step-father? How many times did you see or hear a parent punch, kick, or beat your brothers or sisters?	Never Once More than one time	A response of "once" or "more than once"

Witnessed physical violence in the community	Outside of your home and family environment, how many times did you see anyone get attacked?	Never Once More than one time	A response of "once" or "more than once"
Orphan status	Is your biological mother still alive? How old were you when she died? Is your biological father still alive? How old were you when he died?	Yes No	"Yes" and before 18 to one or both questions
Parental migration	Has your biological mother ever lived away from you for 6 months or more before you were 18 years old? Has your biological father ever lived away from you for 6 months or more before you were 18 years old?	Yes, mother moved away – in the same country Yes, mother moved away – living in the US Yes, mother moved away – living in Spain Yes, mother moved – abroad but not in the US or Spain No	Any of the "yes" responses
Health Outcomes			
Psychological distress	During the past 30 days, how often did you feel the following ways: all the time, most of the time, some of the time, a little of the time, or none of the time? A) Nervous? B) Hopeless? C) Restless? D) So sad that nothing could cheer you up? E) That everything was an effort? F) Worthless?	All the time (1) Most of the time (2) Some of the time (3) A little of the time (4) None of the time (5)	K6 score indicative of moderate or severe distress
Suicide ideation or self-harm	"Have you ever thought about killing yourself ?" "Have you ever intentionally hurt yourself?"	Yes No	A response of "yes" to one or both questions
Binge drinking in the past 30 days	Females: "In the past 30 days, on how many days did you have 4 or more drinks of alcohol in a row?"	Number of days: _ _	Greater than or equal to 1

	Males: "In the past 30 days, on how many days did you have 5 or more drinks of alcohol in a row?" *This binge drinking question was only asked of individuals who said yes to ever having a drink of alcohol that was more than a few sips.		
Current smoking	"Do you currently smoke tobacco on a daily basis, less than daily, or not at all?"	Daily Less than daily Not at all	"Daily basis" or "Less than daily"
Drug use in the past 30 days	"In the past 30 days, have you used drugs such as marijuana, pills, ecstasy, or sniffed any chemical such as petrol or glue?	Yes No	
Sexually Transmitted Infection(s) (STIs)	"Have you ever been diagnosed with a sexually transmitted infection?" "Have you ever had a genital sore or ulcer, or an abnormal genital discharge?	Yes No	"Yes" to one or both questions
Early pregnancy	"How old were you the first time that you got pregnant?" *only asked of female participants who had ever been pregnant	Years old: _ _	Less than 18 years

*all response options also included "don't know" and "declined"

Tables

Table 1. Characteristics of Honduras Males and Females aged 18 to 24

	Combined (n=2701)			**Males** (n= 1265)			**Females** (n=1436)			
	n	**Weighted %**	**(95% CI)**	**n**	**Weighted %**	**(95% CI)**	**n**	**Weighted %**	**(95% CI)**	**Pr>X²**
Demographic Characteristics										
Age in years (mean)	2701	20.7	(20.7, 20.8)	1265	20.7	(20.5, 20.8)	1436	20.8	(20.7, 20.9)	
Completed secondary school or higher	1428	52.6	(49.2, 56.0)	660	51.5	(46.4, 56.6)	768	53.6	(48.8, 58.4)	0.5645
Experienced food insecurity	870	34.3	(31.7, 36.9)	415	34.9	(31.2, 38.7)	455	33.8	(30.2, 37.4)	0.6630
Adverse Childhood Experiences (ACEs) before age 18										
Any childhood sexual violence	373	13.3	(11.9, 14.8)	135	9.9	(8.2, 11.6)	238	16.2	(14.0, 18.5)	<0.0001*
Any childhood physical violence	845	30.8	(28.4, 33.2)	382	29.5	(26.1, 32.9)	463	31.9	(28.4, 35.3)	0.3459
Any childhood emotional violence	311	11.5	(10.0, 12.9)	98	7.7	(6.1, 9.3)	213	14.7	(12.5, 17.0)	<0.0001*
Witnessed physical violence in the home	548	19.7	(17.9, 21.5)	201	15.8	(13.5, 18.1)	347	23.0	(20.5, 25.5)	<0.0001*
Witnessed physical violence in the community	993	35.4	(33.0, 37.9)	501	37.6	(33.8, 41.4)	492	33.6	(30.2, 37.0)	0.1302
Orphaned (one or both parents died)	329	12.0	(10.4, 13.5)	147	11.3	(9.2, 13.3)	182	12.5	(10.3, 14.8)	0.4183
Migration by one or both parents (for 6 months or more)	963	42.1	(39.2, 45.0)	433	39.0	(35.0, 43.0)	530	44.8	(40.7, 48.9)	0.0446*
ACE exposures before age 18										0.0012*
None	585	22.9	(20.6, 25.2)	309	26.1	(22.6, 29.6)	276	20.2	(17.1, 23.3)	
One or two	1041	38.0	(35.8, 40.2)	507	39.5	(36.3, 42.6)	534	36.7	(33.6, 39.7)	
Three or more	1075	39.1	(36.6, 41.6)	449	34.4	(30.9, 37.9)	626	43.1	(39.6, 46.6)	
Health Outcomes										
Psychological distress	1396	52.3	(49.9, 54.6)	575	47.1	(43.5, 50.7)	821	56.6	(53.6, 59.6)	<0.0001*
Suicide ideation or self-harm	418	15.6	(14.0, 17.2)	144	11.3	(9.3, 13.4)	274	19.3	(17.0, 21.5)	<0.0001*

Binge drinking in the past 30 days	393	28.9	(25.7, 32.1)	282	35.8	(31.8, 39.9)	111	19.4	(15.1, 23.7)	<0.0001*
Current smoking	368	13.5	(11.4, 15.5)	300	23.8	(20.6, 26.9)	68	4.8	(3.3, 6.2)	<0.0001*
Drug use in the past 30 days	76	2.9	(2.1, 3.7)	59	4.6	(3.2, 6.0)	17	1.5	(0.7, 2.3)	0.0001*
STIs	127	4.5	(3.6, 5.4)	20	1.4	(0.8, 2.0)	107	7.1	(5.6, 8.6)	<0.0001*
Early pregnancy (before age 18)							370	34.0	(30.7, 37.2)	

Pr>X² = p-value for the chi-square test comparing the prevalence of categorical factors by sex. Therefore, * indicates that there is a statistically significant difference in prevalence between males and females for that characteristic when $p<0.05$.
See Figure 2 for definition of variables.

Table 2. Cumulative Adverse Childhood Experiences and Health Outcomes in Honduras among 18-24 year olds

Health Outcomes		Weighted % (95% CI)	OR (95% CI)	p-value	aOR (95% CI)	p-value
Psychological distress	No ACEs (n=585)	37.0 (31.9, 42.1)	REF		REF	
	1-2 ACEs (n=1041)	51.3 (47.8, 54.8)	1.8* (1.4, 2.3)	<0.0001	1.8* (1.4, 2.3)	<0.0001
	3+ ACEs (n=1075)	62.1 (58.8, 65.5)	2.8* (2.1, 3.7)	<0.0001	2.8* (2.1, 3.7)	<0.0001
Suicide ideation or self-harm	No ACEs (n=585)	5.4 (3.1, 7.6)	REF		REF	
	1-2 ACEs (n=1041)	10.9 (8.8, 13.1)	2.2* (1.3, 3.5)	0.0021	2.3* (1.4, 3.7)	0.0009
	3+ ACEs (n=1075)	26.2 (23.1, 29.3)	6.3* (3.9, 10.0)	<0.0001	6.4* (4.1, 10.2)	<0.0001
Binge drinking in the past 30 days	No ACEs (n=585)	22.7 (15.8, 29.6)	REF		REF	
	1-2 ACEs (n=1041)	29.2 (24.4, 34.0)	1.4 (0.9, 2.2)	0.1342	1.5 (0.9, 2.3)	0.0928
	3+ ACEs (n=1075)	30.6 (26.2, 35.0)	1.5 (1.0, 2.3)	0.0585	1.6* (1.0, 2.5)	0.0303
Current smoking	No ACEs (n=585)	9.3 (6.1, 12.6)	REF		REF	
	1-2 ACEs (n=1041)	14.2 (11.5, 16.9)	1.6* (1.1, 2.4)	0.0190	1.7* (1.2, 2.5)	0.0067
	3+ ACEs (n=1075)	15.2 (12.3, 18.2)	1.7* (1.2, 2.6)	0.0067	1.9* (1.3, 2.9)	0.0014
Drug use in the past 30 days	No ACEs (n=585)	1.2 (0.6, 2.4)	REF		REF	
	1-2 ACEs (n=1041)	2.3 (1.2, 3.5)	1.9 (0.6, 2.6)	0.2452	2.2 (0.7, 6.8)	0.1895
	3+ ACEs (n=1075)	4.5 (2.9, 6.0)	3.7* (1.3, 10.6)	0.0131	4.0* (1.4, 11.9)	0.0113
STIs	No ACEs (n=585)	2.2 (1.0, 3.5)	REF		REF	
	1-2 ACEs (n=1041)	2.8 (1.7, 3.9)	1.3 (0.6, 2.6)	0.5416	1.4 (0.7, 3.0)	0.3213
	3+ ACEs (n=1075)	7.4 (5.6, 9.3)	3.5* (1.9, 6.5)	<0.0001	3.9* (2.1, 7.5)	<0.0001
Early pregnancy	No ACEs (n=585)	34.7 (26.4, 43.0)	REF		REF	
	1-2 ACEs (n=1041)	30.8 (26.0, 35.6)	1.1 (0.7, 1.7)	0.6599	1.3 (0.8, 2.1)	0.2850
	3+ ACEs (n=1075)	36.0 (31.3, 40.7)	1.5 (1.0, 2.2)	0.0590	1.7* (1.1, 2.5)	0.0146

* indicates values that are statistically significant (p<0.05); aOR = Adjusted Odds Ratio controlling for age, food insecurity, schooling; CI = Confidence Interval

Table 3. Adjusted Odds Ratios for the association between individual ACEs and specific health outcomes

	Psychological distress			Suicide ideation or self-harm			Binge drinking (past 30 days)			Current smoking			Drug use (past 30 days)			STIs			Early Pregnancy (before 18)		
ACE	aOR	95% CI	p	aOR	95% CI	p	aOR	95% CI	p	aOR	95% CI	p	aOR	95% CI	p	aOR	95% CI	p	aOR	95% CI	p
Sexual violence	2.8*	(2.1, 3.7)	<.0001	4.9*	(3.6, 6.5)	<.0001	1.2	(0.8, 1.7)	0.3639	1.4	(1.0 ,2.0)	0.0518	2.3*	(1.1, 4.6)	0.0245	4.7*	(3.1, 7.1)	<.0001	1.2	(0.8, 1.9	0.4342
Physical violence	2.1*	(1.7, 2.5)	<.0001	3.2*	(2.5, 4.3)	<.0001	1.4*	(1.1, 1.9)	0.0064	1.4*	(1.1, 1.9)	0.0091	4.2*	(2.3, 7.7)	<.0001	2.4*	(1.6, 3.6)	<.0001	**1.5***	(1.1, 2.1	0.0230
Emotional violence	3.7*	(2.8, 4.9)	<.0001	4.9*	(3.7, 6.6)	<.0001	1.3	(0.9, 2.0)	0.1955	1.2	(0.8, 1.8)	0.4635	2.2*	(1.2, 4.2)	0.0170	3.2*	(1.9, 5.3)	<.0001	1.2	(0.8, 2.1	0.3937
Witness violence at home	1.7*	(1.3, 2.1)	<.0001	2.5*	(2.0, 3.3)	<.0001	1.4*	(1.0, 2.0)	0.0456	1.0	(0.7, 1.4)	0.9245	2.1*	(1.1, 4.0)	0.0195	2.1*	(1.4, 3.3)	0.0008	0.7	(0.5, 1.0	0.0664
Witness violence in community	2.0*	(1.7, 2.5)	<.0001	2.3*	(1.8, 2.9)	<.0001	1.4*	(1.1, 1.8)	0.0142	1.9*	(1.4, 2.5)	<.0001	2.5*	(1.4, 4.5)	0.0031	**1.7***	(1.1, 2.6)	0.0193	**1.7***	(1.2, 2.4	0.0027
Orphaned by one or both parents	1.2	(0.9, 1.5)	0.2031	1.4*	(1.0, 2.0)	0.0661	1.1	(0.7, 1.7)	0.5644	1.3	(0.9, 2.0)	0.1297	2.1*	(1.0, 4.3)	0.0379	1.6	(0.8, 3.0)	0.1696	**1.3**	(0.9, 1.9	0.2424
Migration by one or both parents	1.3*	(1.1, 1.6)	0.0032	1.6*	(1.2, 2.1)	0.0005	1.0	(0.8, 1.4)	0.8209	1.2	(0.9, 1.7)	0.1478	1.4	(0.8, 2.7)	0.2743	1.8*	(1.2, 2.8)	0.0097	1.0	(0.7, 1.3	0.9097

*indicates values that are statistically significant ($p<0.05$)
aOR = Adjusted Odds Ratio; CI = Confidence Interval
Adjusted values controlled for age, food insecurity, and level of schooling

Note: The only estimates that were substantively different in the unadjusted model (not significant in the unadjusted model but significant when co-variates were included or vice versa) are bolded above.