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Childhood trauma is associated with depressive symptoms in Mexico City women

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Childhood trauma is associated with depressive
symptoms in adult women in Mexico City

by

Maria Openshaw

THESIS

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Dedication and Acknowledgments

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This thesis research is dedicated to the 100 Mexico City women who offered their stories up to the study. Your voices have been heard, and I wish you peace.

Childhood trauma is associated with depressive symptoms in Mexico City women

Maria Openshaw

Abstract

Background: There is a well-documented association between childhood trauma, including childhood abuse, and adult depression. Gender-based differences exist in this relationship, with adverse childhood experiences having a greater influence on depression in adult women. This paper joins the body of literature by describing the scope of mental health disorders and trauma in women residing in Mexico City.

Specific Aims: The goal of this study was to describe childhood trauma and depressive symptoms in Mexican women and to explore the relationships between number and type of childhood traumatic events and depressive symptoms.

Methods: This is a secondary analysis of a cross-sectional study conducted in Mexico City. A community-based sample of 100 women was interviewed in their homes, using a demographic questionnaire, the Life Stressor Checklist-Revised (LSC-R) and the Center for Epidemiologic Studies Depression Scale (CES-D). Childhood trauma and depressive symptoms are described; logistic regression was used to analyze the relationship between childhood traumatic events and depressive symptoms.

Results: Participants reported an average of 9.46 (SD = 4.18) lifetime traumas and 2.76 (SD = 2.34) childhood traumas. The mean CES-D score was 18.9 (SD = 12.0) and 36% of participants had clinically significant depression (CES-D ≥ 24). Depression scores were correlated with lifetime trauma, childhood trauma, education level, and number of comorbid health conditions. Depression scores were not significantly correlated with age, employment, marital status, number of children, or socioeconomic level. For every additional childhood trauma experienced,

the odds of clinically significant depressive symptoms (CES-D $\geq$ 24) increased by 51% (adjusted

OR 1.51, 95% CI 1.16 – 1.95), after controlling for number of children, education level, and

number of comorbidities.

Discussion: Our study builds on large population-based studies in Mexico, demonstrating the

feasibility of conducting collaborative nurse-led research among community-based women in

Mexico City. By utilizing an instrument designed specifically for the assessment of trauma in

women, we found that the number of childhood trauma exposures predicts depression in an

urban population. There is clear evidence supporting the need for trauma-informed care and

interventions to reduce depression in urban, Mexican women.

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I. Introduction

Adverse childhood experience can be a powerful predictor of adult health status (Felitti et al. 1998). Recent studies conducted in the United States have established an association between the number and type of childhood traumatic events and depression and other mental health disorders (Chapman et al. 2004; Edwards et al. 2003; Heim et al. 2008). Although childhood trauma and its resultant morbidities have been less commonly studied in low-resource settings, childhood adversity has been proposed as a major contributor to the global mental health disease burden (Kessler et al. 2010). Understanding the complex relationships between childhood trauma and mental health disorders (including depression) is a necessary precursor to the development, implementation and utilization of needed mental health services. This Master's thesis will explore the relationship between number of traumatic events in childhood and presence of depressive symptoms in a community-based sample of women living in Mexico City.

This study is a secondary analysis of data collected during a larger study entitled "Lifetime Trauma Exposure, Chronic Pain, Depression, and PTSD in Mexican women: A pilot study", funded by the University of California Institute for Mexico and the United States (UC-MEXUS). The study was conducted by a binational team of nurse-researchers, members of the *Enfermeras del Anillo del Pacífico en Investigación sobre Violencia de Pareja* (Nurses of the Pacific Rim Researching Intimate Partner Violence) research consortium, from the University of California, San Francisco and the National Institute of Perinatology in Mexico City. The purpose of the larger study was to examine the relationships between lifetime trauma exposure and health outcomes including depression, post-traumatic stress disorder (PTSD), and chronic pain. The primary aim of this thesis research is to examine the relationship between past childhood trauma and current depressive symptoms in 100 women living in five districts of Mexico City. A

secondary aim is to describe the number and types of childhood traumatic events and the prevalence of depressive symptoms in this sample.

II. Background

Trauma, as defined by the American Psychiatric Association, has two components: "an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others" and a subsequent response involving "intense fear, helplessness, or horror" (American Psychiatric Association 2000). Studies in the United States have shown a robust association between childhood trauma and the subsequent development of deleterious health outcomes in adulthood, up to and including premature death (Felitti et al. 1998; Brown et al. 2009). Cardiovascular disease (Dong et al. 2004), autoimmune disease (Dube et al. 2009), and mental health disorders such as depression (Chu et al. 2013; Chapman et al. 2004), have all been found to be more prevalent in individuals with a history of childhood adverse events.

Childhood Trauma and Depression

The association between childhood trauma and depression in United States (U.S.) adults has been extensively documented. The Adverse Childhood Experience (ACE) Study (Felitti et al. 1998, Brown et al. 2009; Chapman et al. 2004; Edwards et al. 2009), a large retrospective cohort of primarily white, middle-income members of a health maintenance organization, assessed exposure to adverse childhood experiences including abuse, neglect, and household dysfunction. Using a predictor variable of the number of types of adverse childhood experiences (a cumulative "ACE Score" between 0 and 7), Chapman et al. (2004) found a positive dose-response relationship between adverse childhood experience and depression. Women with ACE scores greater than or equal to 5 were five times more likely (95% CI 3.7 – 6.7) to have a lifetime

history of depression, and 6.4 times more likely (95% CI 4.7 – 8.7) to have recent depression compared to women with an ACE score of zero. In this study, emotional abuse appeared to have the greatest impact on depression risk, followed by physical and sexual abuse (Chapman et al. 2004). Another analysis of the same data found a similar dose-response relationship between ACE score and a composite mental health score assessing depression and anxiety (Edwards et al. 2003).

Gender-based differences exist in the relationship between childhood trauma and depressive symptoms (Chapman et al. 2004; Heim et al. 2008; Young & Korszun 2010). Women are more likely than men to report emotional and sexual abuse in childhood, and also reported a greater intensity of emotional abuse (Edwards et al. 2003). Women are more likely to report a recent or lifetime history of depression than men, and adverse childhood experiences appear to have a greater influence on depression rates in women (Chapman et al. 2004). It is unclear whether this differential response is related to gender differences in exposures, or neurobiological differences in the stress response (Heim et al. 2008). Stressful lifetime events and environmental adversity, particularly childhood sexual abuse, are among the strongest predictors of depressive episodes in adult women (Kendler et al. 2002). Finally, physiologic differences related to hypothalamic-pituitary-adrenal (HPA) axis dysregulation in depressed women as well as variability in estrogen and other steroid levels (as evidenced by cyclical depression in women as well as increased rates at menarche and menopause) may play a role in gender differences in depression (Young & Korszun 2010). These pathways, however, continue to be poorly understood.

Although the biology of depression should be consistent across cultures, the relative contribution of environmental and social stressors can vary greatly across geographical settings

and in different populations. Therefore, it is less clear whether predictive models developed in the U.S. are meaningful in evaluating depression in women in other regions. Additionally, participants in many of the U.S.-based studies (Chapman 2004; Kendler et al. 2002; Dennis et al. 2009) were recruited in clinical settings, limiting their generalizability to community-based women. Recent findings in non-clinical adults in Chile and Australia indicate that the association between childhood trauma and mental health problems, including depression, in community samples is cross-culturally robust (Zlotnick et al. 2008; Chu et al. 2012). The Chilean study, which used a single Diagnostic Interview Schedule question to screen for potentially traumatic events (PTE), found that individuals with childhood exposure to PTE had higher rates of psychiatric diagnosis and depression compared to those with PTE in adulthood or no PTE; gender-based differences were not described (Zlotnick et al. 2008). The Australian study described higher rates of depression and anxiety in adults with early life stressor (ELS) exposure, assessed using the Early Life Stress Questionnaire (Chu et al. 2013). Interpersonal violation ELS, such as bullying and emotional abuse, were the strongest predictors of depression and anxiety in this sample (Chu et al. 2013).

Finally, the largest study on this topic, the World Health Organization World Mental Health Survey (Kessler et al. 2010), was conducted in 21 countries including the U.S. and Mexico. This survey assessed childhood adversity using a set of twelve adverse events, and lifetime DSM-IV disorders using the Composite International Diagnostic Interview (CIDI). Childhood adversity was estimated to account for 29.8% of mental health disorders worldwide, although the relationship between adversity and individual psychiatric disorders such as depression was not described. The strongest predictors of mental health disorders were

adversities of maladaptive family functioning, including domestic violence, physical and sexual abuse, and neglect (Kessler et al. 2010).

Mexico City Context

Our study builds on previous U.S. and international work by examining the relationship between past childhood trauma exposure and current depressive symptomatology in a community-based sample of women in Mexico City. Depression-related morbidity appears to be a significant health issue for urban Mexican women. The largest survey conducted on mental illness in Mexico, the Mexican National Comorbidity Survey, suggests that Mexican women have a 26.1% lifetime prevalence of psychiatric disorders. This includes an estimated prevalence of 9.2% for any mood disorder and 14.3% for any anxiety disorder (Medina-Mora et al. 2007). Mental health disorders and depression are more prevalent in Mexican women than Mexican men (Medina-Mora et al. 2007; Slone et al. 2006). In one urban sample, the lifetime prevalence of major depressive disorder (MDD) was 15.9% for women and 9.0% for men; in this study, additional predictors of MDD included age, marital status, years of residence, and city of residence (Slone et al. 2006).

Lifetime and childhood trauma impact the health of Mexican women. In a study that assessed the prevalence of traumatic events and PTSD among 2,509 urban Mexicans, 76% of the participants reported lifetime exposure to potentially traumatic events; most participants reported multiple traumatic events, with 27% reporting four or more (Norris et al. 2003). Seven percent of this sample met the criteria for chronic PTSD. However, the relationship between trauma exposure and PTSD diagnosis differed based on gender and demographic variables. Trauma exposure was more common for men, but the rates of PTSD were higher among women. Although socioeconomic status did not influence exposure to trauma, subsequent PTSD was

more common in individuals with low educational attainment and low socioeconomic status (Norris et al. 2003). These data suggest that contextual and demographic variables may mediate the impact of stressful events on subsequent mental health outcomes. A secondary analysis of these data, focusing on childhood trauma, found a positive relationship between childhood trauma and depression and PTSD, especially in women, suggesting that mental health status may mediate the relationship between childhood trauma and poor adult physical health (Baker et al. 2009). This may explain the findings of excess psychological and physical morbidity in women with a history of childhood trauma.

Although trauma- and depression-related morbidity in Mexican women is high, these conditions are widely undertreated. According to the Mexican National Comorbidity Survey, resources for mental health treatment are limited in Mexico. Only 24.7% of women with a major depressive episode seek treatment within twelve months of the episode, with lower rates of treatment in subgroups, including young adults (Rafful et al. 2012). There is a tremendous unmet need for psychiatric treatment, with underutilization (by both men and women across socioeconomic strata) of the services that do exist (Borges et al. 2006).

This paper joins the body of literature describing the scope of mental health disorders and trauma in Mexican women who may have few treatment options. Our study builds on large epidemiologic surveys by targeting urban, community-based women from diverse socioeconomic strata. This is the first published study on the topic to be conducted in Mexico City, the most populous city in the Western hemisphere. This study is also the first to focus on the relationships between childhood trauma and depression using an instrument designed specifically for the assessment of trauma in women.

III. Theoretical Framework

McEwen's theory of allostatic load (1998) proposes a physiologic mechanism linking lifetime stressors to poor health outcomes. *Allostasis* is the process by which an organism undergoes physiologic and behavioral changes in order to adapt to high levels of stress. *Allostatic load* is the "wear and tear on the body and brain" due to this chronic stress activation (McEwen 1998). McEwen's model describes four states that contribute to allostatic load: repeated challenges or stressors, inability to adapt to these challenges, inability to end the allostatic responses once the stressor has been removed, and inability to produce an adequate allostatic response (McEwen 1998). Allostatic load in humans can be clinically assessed through a composite score of physiologic markers based on the hypothalamic-pituitary-adrenal (HPA) axis, the sympathetic nervous system, as well as immune and metabolic markers (Friedman & McEwen 2004). The associations between higher allostatic load scores and greater morbidity and mortality over time suggest that stress may impact a wide range of medical disorders and causes of poor health.

The women's health adaptation by Groër and colleagues of McEwen's theory of allostatic load describes the cumulative effects of lifetime stress on disease states in adult women (Groër 2010). Groër and colleagues suggest that both social and physiologic gender-based differences can influence the allostatic load on a woman's body. Life circumstances and role strain, including marital, occupational, educational, and financial factors, can add to a woman's stress and subsequent allostatic load. External factors such as economic climate, healthcare system, community norms, and social standing can also place a disparate burden on a woman. Through the mediation of allostatic load, traumatic events such as physical and sexual abuse and intimate partner violence can result in physiologic changes resulting in poor health. Noting the

association of trauma and abuse, allostatic load, and depressive illness, Groër and colleagues propose that depression may be a proinflammatory illness caused in part by immune activation and subsequent alterations in brain structures (Groër 2010). For the purposes of this study, depression is depicted as a potential outcome of maladaptive physiologic responses to environmental stressors, life events, and trauma or abuse (Figure 1).

Proposed physiologic mechanisms link adverse childhood events to adult health outcomes. Heim et al. (2008) conducted a series of studies on the HPA stress axis, suggesting that early adverse experience results in a number of neuroendocrine and neuroanatomical changes. Clinical symptoms related to these changes closely resemble clinical depression. This study proposes a model where genetics and environment result in development of a central nervous system (CNS) phenotype that can be altered by the trauma of chronic stress or ameliorated by social support and treatment, resulting in behavioral and physiological responses (Heim et al. 2008). Similarly, work by Danese and McEwen (2012) uses the model of allostatic load to connect childhood adverse events to adult disease. This model implicates neuroanatomical changes, HPA axis activation, and elevated levels of inflammation, sustained across the lifespan, as the pathophysiologic basis for adult disease.

Allostasis is a helpful theoretical framework for understanding the connection between early traumas and later health outcomes. By describing the impact of both a stressful event and the organism's subsequent response, allostasis incorporates both elements of the APA trauma definition (American Psychiatric Association 2000). This provides theoretical grounding for the present study because it proposes a physiologic pathway for the observed relationships between childhood traumatic events and depressive symptoms and comorbid medical conditions that

present in adulthood. This theory can help explain the relationships between the number of childhood traumas and the presence of depressive symptoms in our Mexico City cohort.

IV. Methods

This paper reports on a secondary analysis of a cross-sectional study conducted in Mexico City in early 2013. The goal of this study is to describe the number and type of childhood trauma exposure and the presence of depressive symptoms in a community-based sample of Mexico City women and to examine the relationship between childhood trauma and subsequent depressive symptoms in adulthood. My hypothesis is that there will be a positive relationship between the number of past childhood trauma exposures and the presence of clinically significant current depressive symptoms reported by participants.

Participants

Our team recruited a community-based sample of 100 women living in the five most populous districts of Mexico City. The sample was stratified by socioeconomic level in order to recruit women representative of each district. Data collectors used census information and tracts provided by district health centers to select neighborhoods representative of each district's socioeconomic composition. Eligible participants were Spanish-speaking women over the age of 18, residing in the selected neighborhoods, who had ever experienced trauma, and who were willing to participate in the study. Data collectors visited a total of 716 homes. In 303 homes, there was no one home, or no woman in the home who met the study criteria. Of the remaining 413 homes, 100 (24.2%) women agreed to participate.

Procedures

Prior to data collection, approval was obtained from the UCSF Committee on Human Research and the office of the Mexico City Federal District Secretary of Health. Spanish-

speaking, Mexican nurses served as data collectors, conducting verbal interviews in the women's homes. The nurses went door-to-door seeking eligible women willing to enroll in the study. Enrolled participants provided written and verbal consent. The interviewers compiled demographic and general health information and completed questionnaires about depressive symptoms, PTSD symptoms, chronic pain, and stressful events during a woman's lifetime. Each interview lasted approximately one hour. At the end of the interview, each woman received compensation equivalent to five U.S. dollars. Due to the sensitive nature of the interviews, women were also asked to rate their stress level at the beginning and end of each interview to ensure that women were not being caused undue distress. All participants were given information on community resources related to trauma and mental health. Any woman who reported distress was to be offered referral to a trained psychologist; however, none of the 100 participants required mental health counseling as a result of the interview.

Study Measures

Standardized demographic questionnaires were used to assess current depressive symptoms and lifetime traumatic events and gather contextual data about participants. The dependent variable was current depressive symptoms. The independent variables included number of traumas during childhood (age 16 and under) and demographic variables including self-report measures of health. The instruments utilized in this analysis were the researcher-designed demographic questionnaire, the Life Stressor Checklist-Revised (LSC-R) and the Center for Epidemiologic Studies Depression Scale (CES-D).

Demographic Questionnaire

A demographic questionnaire designed by the senior author was collected at the start of each interview and included: age, district of residence, marital status, number of children,

employment or student status and type of job, education level, and family income. Employment type was categorized using Mexico's nine-category National System for Classification of Occupations (SINCO). Women were asked about pregnancy status, history of any medical problems and whether they had sought treatment for these problems. Interviewers specifically asked about a list of twelve common medical conditions, and participants could also report additional medical problems. The chronic medical conditions were collapsed into a variable "number of comorbidities", which ranged from 0 to 10. Women were asked to rank their current health status on a scale of 0 to 10 ("self-reported health score"). Interviewers also assigned each respondent a socioeconomic level (low, middle, or high) based on census information acquired from district health centers.

Center for Epidemiologic Studies Depression Scale (CES-D)

The well-validated Center for Epidemiologic Studies Depression Scale (CES-D) was used to assess depressive symptoms (Radloff 1977). This short self-report scale includes twenty items that are assigned a score of 0-3 points based on their frequency in the past week. A positive CES-D screen is strongly correlated with clinical depression across age, gender, and socioeconomic status (Radloff 1977). In this study, the CES-D was chosen because of its availability in Spanish and its ease of administration by interviewers. The CES-D has also been validated for evaluation of depressive symptoms in Spanish speaking populations. A systematic review of depression-screening instruments for Spanish-speaking primary care outpatients found that the diagnostic accuracy of the 20-item CES-D compared favorably with other comparable instruments at detecting clinical depression, with a sensitivity ranging between 76-92% and a specificity between 70-74% (Reuland et al. 2009).

A positive CES-D screen was originally defined as at least 16 out of 60 points, representing the upper quintile in US community-based populations (Radloff 1977). However, studies have reported higher scores in Latino populations, suggesting that 24 may be a more appropriate threshold for clinically significant depression in some populations (Vega et al. 1986; Torres 2010). Therefore, a higher threshold of CES-D score $\geq$ 24 was used as the dependent variable for this study, with a positive screen indicating current depressive symptoms consistent with clinical depression.

Life Stressor Checklist-Revised (LSC-R)

Trauma exposure was surveyed using the Life Stressor Checklist-Revised (LSC-R), a standardized self-report instrument designed by Wolfe et al. (1996) to assess PTSD in civilians. Diverging from previous PTSD measures that focused on combat-related trauma, this measure is used to screen for events that could potentially trigger post-traumatic stress in the general population. Recognizing that PTSD may have differential presentation and manifestations in women, the instrument targets events of specific importance to women such as pregnancy loss and severe handicap or illness of a child (Norris & Hamblen 2004). It can be self-administered or conducted by interview. The checklist includes 28 discrete events as well as an option for "other" and an option for being distressed about an event experienced by another person but not witnessed by the respondent (Wolfe et al. 1996). A maximum score of 30 would indicate the respondent reported exposure to every type of trauma described, including an "other" response and at least one episode of vicarious trauma. Follow-up questions for each item assess the age each event was experienced and the degree of stress and fear produced by the event, which allows the instrument to be scored for presence of PTSD. The Spanish-language adaptation by

Humphreys et al. (2011) also asks the number of times each event was experienced to distinguish between occasional and chronic exposures.

The LSC-R has been found to be stable in the assessment of trauma in women (kappa 0.52 to 0.97; percent item agreement 79% to 98%) (Norris & Hamblen 2004). A study of the construct validity and cultural appropriateness of the Spanish translation of the LSC-R found the instrument to be valid, easily understood, and culturally appropriate in a community-based sample of Colombian women (Humphreys et al. 2011). Although this instrument was not specifically designed for the assessment of childhood trauma, we created a childhood trauma sub-score of the number of reported traumatic events that occurred between ages 0-16. Both the total score and the childhood trauma sub-score were scored out of a total of 30 points. Because of the personal nature of the questions and the potential to produce distress, the LSC-R was the last instrument completed during our interviews.

Data Analysis

Descriptive statistics were used to describe sample characteristics including means and standard deviations (for quantitative variables) and frequencies and percents (for categorical variables). The LSC-R was scored to produce a total score and a childhood trauma sub-score of traumatic events that occurred or began at age 16 or younger. The CES-D was scored using the cutoff of ≥ 24 as indicative of clinically significant depression. Crosstabs and Chi-squares were used to compare the demographic, health and trauma characteristics of women with CES-D scores ≥ 24 versus women with CES-D total score < 24. Potential covariates were initially assessed against the linear LSC-R sub-score using t-tests.

We examined both unadjusted and adjusted logistic (using the cutoff of ≥ 24) and linear (using the CES-D as a continuous outcome) regression models to assess associations between

variables of interest with the CES-D as the dependent measure. Variables that were either significantly related to the dependent and/or the independent variables at p < .10 were included in the final multiple logistic and linear regression models. The Hosmer–Lemeshow goodness of fit test was conducted to check adequacy of the final logistic model. The instruments described above were scored and analyzed in SPSS version 22.

V. Findings

The sample included 100 Mexico City women. Participant ages ranged from 18 to 82, with a mean age of 48.5 years (SD = 17.0). The majority (92%) were mothers, and half (51%) were employed outside of the home. Reported monthly income ranged from 200 to 90000 Mexican pesos ($15.52-6983.37 US dollars), with a mean income of 8241 pesos (SD = 12458), and 25 participants declining to provide information. Most participants reported being previously diagnosed with chronic medical conditions, with 72% reporting 3 or more comorbidities. The most common medical conditions reported were back pain (59%), depression (53%), ulcers or stomach problems (51%). Twenty-nine percent reported hypertension, 25% reported kidney disease, and 17% reported diabetes. The mean number of medical conditions was 3.81 (SD = 2.16, range 0-8) and 60% described suffering from chronic pain (Table 1). Of the fifty-three women reporting a history of depression, just 33% reported having ever received treatment for depression.

All participants reported experiencing at least one of the traumas described on the LSC-R. The mean number of lifetime traumas experienced by participants was 9.46 (SD = 4.18, range 3-25). Twenty-two percent of participants had five or fewer traumas, while 47% had more than ten. Five types of lifetime traumas were reported by more than half of participants: death of person close to participant (88%), serious disaster such as earthquake or fire (73%), serious

financial problems (57%), being robbed, mugged or attacked (55%), and sudden, unexpected death of person close to participant (53%).

The LSC-R Childhood Trauma sub-score included traumas that occurred before 16 years of age. The average number of childhood traumas reported by participants was 2.76 (SD = 2.34), and the range was between 0 and 10 childhood traumas. The most common childhood traumas experienced by participants are listed in Table 2. Notably, five of the top ten childhood traumas were forms of interpersonal violence, abuse, or neglect.

The CES-D scores reported by participants ranged from 2 to 52. Participants had a mean CES-D score of 18.9 (SD = 12.0). Fifty-one percent had a CES-D score ≥ 16. Thirty-six percent had a score ≥ 24. Chi-square tests were performed to analyze the relationship between demographic and health factors and participants' depression scores on the CES-D, using two cutoffs, CES-D scores of ≥ 16 and ≥ 24. Compared to non-depressed women, women with elevated CES-D scores had more total traumas and more childhood traumas, were less likely to have completed post-secondary education, and reported more comorbid medical conditions. Participants' depression scores were not significantly correlated with their age, employment status, marital status, number of children, and neighborhood socioeconomic level. Depression scores were correlated with LSC-R total score and childhood trauma sub-score, self-reported history of depression, employment type, education level and number of comorbidities (Table 1).

A logistic regression model was developed using the covariates described above. Since prior work using the CES-D has used various cut-points for depression screening, a sensitivity analysis was conducted using cut-off scores of ≥ 16 and ≥ 24, and the more specific threshold for depression using the cut-off of ≥ 24 was chosen. The logistic model shows that, when controlled for number of children, education level, and number of comorbidities, every additional childhood

trauma experienced by participants increased the likelihood of clinically significant depressive symptoms (CES-D ≥ 24) by 50% (95% CI: 16 - 93%) (Table 3).

A linear regression model was also constructed with continuous CES-D score as dependent variable. The covariate "type of employment" was removed due to collinearity with income. The covariate "number of children" did not improve linear model fit and was thus removed. The model shows that, when controlling for number of children, education level, and number of comorbidities in the model, every additional childhood trauma experienced by participants increased the CES-D score by 1.7 units (95% CI = .91-2.61) (Table 4).

VI. Discussion

Our results support the hypothesis that exposure to past childhood traumatic events increases the likelihood of current clinically significant depressive symptoms in adult women in urban Mexico. The greater number of traumas women experienced, the more likely they were to be depressed, even after factoring in education level, number of children and number of comorbid medical conditions. For each additional childhood traumatic event, the odds of depression increased by 51%. These findings are consistent with previous studies of childhood trauma and mental health-related morbidities found in large epidemiologic surveys in Mexico. (Norris et al. 2003; Baker et al. 2009). We found a strong relationship between the number of diagnosed medical conditions and the likelihood of depression. Poor physical health was associated with poor mental health; women with a higher number of comorbidities reported higher rates of depressive symptoms. This relationship is also germane to Groër's women's health adaptation of allostatic load theory, which posits a common pathway for chronic medical conditions that includes behavioral and physiological responses to chronic stress (Groër 2010).

Our study is the first to be published on childhood trauma in Mexico City. It is also the first to adapt the LSC-R, an instrument designed specifically for women, to examine childhood traumatic events. Although our sample size of only 100 participants was small, we found statistically significant relationships between variables of interest in a highly depressed group of women with high exposures to early childhood trauma. This pilot study demonstrates the feasibility of community-based research when conducted by trained local nurses. Using a trauma-informed perspective that proved acceptable to female participants, trained female nurses conducted in-home interviews using an instrument designed specifically for the sensitive assessment of trauma in women.

Because participants were recruited by nurses who went door-to-door during daytime hours, we cannot generalize our findings to the greater population of women living in Mexico City. The rate of clinically significant depressive symptoms in our sample, measured by a well-validated self-report tool, was 31%, which greatly exceeds population-based estimates of major depressive disorder in Mexico; 51% of participants reported a prior history of depression (Medina-Mora et al. 2007; Slone et al. 2006). As in prior studies, the majority of our subjects had exposure to multiple traumas, with 78% reporting 6 or more lifetime traumas and 62% reporting 2 or more childhood traumas. Only women who endorsed lifetime traumatic experiences were recruited for the study, which provides a potential source of bias; resulting in the exclusion of 25% of interested participants, which makes our sample comparable to the 76% rate of lifetime trauma exposure found in Mexico by Norris et al. (2004). Although a strong correlation was found between self-reports of childhood trauma and current depression, the results of this cross-sectional study are vulnerable to recall bias. Some of the traumas occurred decades before the interview, and because women suffering from depression may perseverate on childhood traumas,

they may have remembered more traumas than women who were not depressed. Conversely, stigma related to childhood trauma and abuse may have led to underreporting of traumatic events among women in our sample.

Both educational attainment and type of employment were associated with depressive symptoms in our sample. The two variables were correlated and educational attainment was a slightly better predictor of CES-D score. In our sample, women who had any post-secondary education or who were employed in a professional, technical or administrative job were unlikely to report depressive symptoms. Women with less than a high-school education and women who were marginally employed (such as street vendors and domestic workers) were more likely to be depressed. This suggests that education, agency and empowerment are positively associated with women's mental health.

Our model does not include marital status and socioeconomic level, two important factors that influence depression, but which were not found to be significantly associated with depressive symptoms among our participants. Prior work has suggested that, while trauma exposure is similar in individuals from all socioeconomic strata, mental health sequelae such as PTSD are more prevalent among Mexicans of low socioeconomic status (Norris et al. 2003). In our study, data on socioeconomic status were collected in two ways: respondents were asked to report their monthly household income and the sample was stratified based on residential neighborhood (low, medium and high). Because over one-third of respondents either declined or didn't know their household income, the income data was not included in the models. There was no difference in prevalence of depressive symptoms between women living in low, middle, and high SES neighborhoods.

In summary, our study builds on large population-based studies in Mexico and demonstrates the feasibility of conducting collaborative nurse-led research among community-based women in Mexico City. By using an instrument designed specifically for the assessment of trauma in women, we found that the number of childhood trauma exposures contributes greatly to depression in an urban population. These findings suggest that the relationship between childhood trauma and adult depression is generalizable to urban, Mexican women. The high rates of depression and childhood trauma found in this pilot study should prompt further investigation into the scope of mental health disorders in Mexico City women. Future work should also explore the availability and acceptability of treatment for mental health disorders. Treatment access and design should be targeted towards women of low socioeconomic status and low levels of formal education who may be disparately impacted by childhood trauma. Our results provide clear evidence supporting the need for trauma-informed care and interventions to reduce depression in this setting.

VII. Tables and Figures

Figure 1. "An allostatic model of women's health." Adapted from Groër (2010).
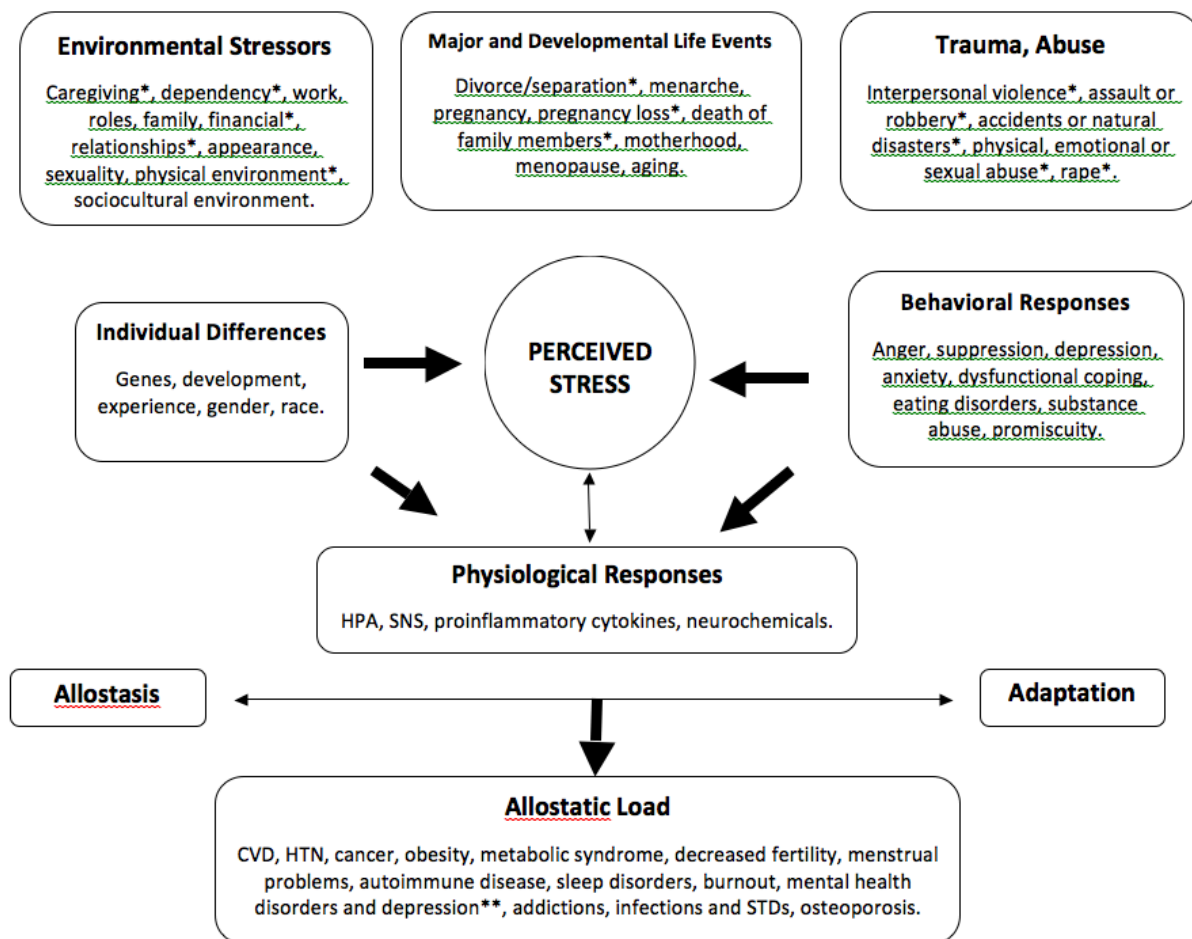
* Traumatic events measured by the LSC-R.
** Depressive symptomatology, the outcome of interest for this study
HPA = hypothalamic-pituitary-adrenal axis
SNS = sympathetic nervous system
CVD = cardiovascular disease
HTN = hypertension
STD = sexually transmitted disease

Table 1. Demographic Characteristics and Relationship to Depressive Symptoms

		CES-D score ≥ 24	
	Mean (SD)	Odds Ratio EXP(B)	95% CI
Age	48.5 (17.0)	1.01	[0.98 – 1.03]
Self-Reported Health Score (0-10)	7.19 (2.05)	0.79	[0.63 – 0.97]
Number of Children	2.69 (2.08)	1.20	[0.98 – 1.47]
Number of Comorbidities	3.00 (1.71)	1.67	[1.25 – 2.23]
LSC-R Sub-score, Childhood trauma (# traumas age 16 or under)	2.76 (2.34)	1.47	[1.18 – 1.81]
LSC-R Total Score (total traumas)	9.46 (4.18)	1.33	[1.16 – 1.52]

		CES-D score		
	Percent	≥ 24 (%)	χ^2	*p-value*
Employment Status*			6.00	*.050*
SINCO Class 1, 2, 3	14	7.1		
SINCO Class 4-9	35	42.9		
Unemployed	51	39.2		
Neighborhood SES			1.64	*.44*
High	34	32.4		
Medium	35	31.4		
Low	31	45.2		
Education Level			6.06	*.048*
None or Primary	33	51.5		
Secondary	22	36.4		
Any Post-Secondary	45	24.4		
Marital Status			.01	*.99*
Single	30	36.7		
Married/Partnered	53	35.8		
Divorced, separated or widowed	17	35.3		

* Employment type was categorized using Mexico's National System for Classification of Occupations (SINCO). The categories include: Functionaries, directors and chiefs (1); Professionals and technicians (2); Auxiliary administrative workers (3); Salespersons (4); Personal and security workers (5); Agricultural, farming, forestry, hunting and fishing workers (6); Artisans (7); Industrial machine operators, assemblers, drivers and conductors (8); Elementary and Support Activity Workers (9).

Table 2. Most Common Childhood Traumas Reported by Participants

Rank	Type of Trauma Occurring < age 16	% Exposed
1	Witnessed family violence	35
2	Personal abuse/physical attack by known individual	26
3	Forced sexual touching	23
4	Parental separation/divorce	21
5	Sexually harassed/bothered at work or school	19
6	Emotional abuse/neglect	18
6	Physical neglect	18
8	Serious disaster (earthquake, hurricane, large fire, explosion)	15
9	Serious financial problems (i.e. food/housing instability)	14
10	Death of person close to you (not sudden)	11

Table 3. Multiple logistic regression of LSC-R Childhood Trauma Score as Predictor of CES-D score

	Odds Ratio and 95% CI for LSC-R Childhood Trauma Sub-Score		
	Model 1	Model 2	Model 3
Likelihood of CES-D Score ≥ 16	1.50 (1.19 – 1.89)	1.60 (1.22 – 2.09)	1.54 (1.16 – 2.06)
Likelihood of CES-D Score ≥ 24	1.47 (1.18 – 1.81)	1.57 (1.22 – 2.02)	1.51 (1.16 – 1.95)

Model 1 is simple logistic regression.
Model 2 is adjusted for: number of children, education level, and employment type.
Model 3 is adjusted for: number of children, education level, employment type, and number of comorbidities (excluding depression).

Table 4. Multiple linear regression of LSC-R Childhood Trauma Score as Predictor of CES-D score

	CES-D Score		
	B(SE)	adjusted R²	95% CI
		.352	
LSC-R Childhood Trauma Subscore	1.76 (.43)		.911-2.617
Education (reference: any post-secondary)			
Primary or less	8.44 (2.27)		3.933-12.947
Some or all secondary	5.53 (2.55)		.474-10.593
Number of comorbidities (excluding depression)	2.17 (.60)		.989-3.358

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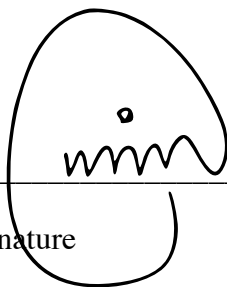
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