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Trauma and Traumatic Stress in a Sample of Pregnant Women

Bizu Gelaye^{1,2,*}, Qiu-Yue Zhong¹, Archana Basu¹, Elizabeth J. Levey^{3,4}, Marta B. Rondon⁵, Sixto Sanchez^{6,7}, Karestan Koenen¹, David C. Henderson⁸, and Michelle A. Williams¹

¹Department of Epidemiology, Harvard T. H. Chan School of Public Health, Boston, MA

²Center for Bioethics, Harvard Medical School, Boston, MA

³The Chester M. Pierce, MD Division of Global Psychiatry, Massachusetts General Hospital; Boston, MA

⁴Institute for Juvenile Research, University of Illinois College of Medicine; Chicago, IL 60608; USA

⁵Department of Medicine, Cayetano Heredia Peruvian University, Lima, Peru

⁶Universidad Peruana de Ciencias Aplicadas, Lima, Peru

⁷Asociación Civil PROESA, Lima, Peru

⁸Department of Psychiatry, Boston University Medical School, Boston, MA

Abstract

Objective—To examine the construct validity of the 9 item Traumatic Events Questionnaire (TEQ) and to evaluate the extent to which experiences of trauma assessed using the TEQ are associated with symptoms of psychiatric disorders among 3,342 pregnant women in Lima, Peru.

Methods—Symptoms of depression were assessed using the Patient Health Questionnaire-9 (PHQ-9) and Edinburgh Postnatal Depression Scale (EPDS) while the PTSD Checklist-civilian (PCL-C) and Generalized Anxiety Disorder-7 (GAD-7) were used to assess symptoms of PTSD and generalized anxiety. Hierarchical logistic regression procedures were used to evaluate relations between TEQ and symptoms of psychiatric disorders.

Results—The majority of participants (87.8%) experienced at least one traumatic event (mean=2.5 events). The trauma occurrence score was moderately correlated with symptoms of PTSD (PCL-C: $\rho=0.38$, $P\text{-value}<0.0001$), depression (EPDS: $\rho=0.31$, $P\text{-value}<0.0001$; PHQ-9: $\rho=0.20$, $P\text{-value}<0.0001$), and GAD (GAD-7: $\rho=0.29$, $P\text{-value}<0.0001$). Stronger

*Corresponding author. Dr. Bizu Gelaye, Department of Epidemiology, Harvard T.H. Chan School of Public Health, 677 Huntington Ave, K505F, Boston, MA 02115 USA. Tel.: 617 432 1071; Facsimile: 617 566 7805. bgelaye@hsph.harvard.edu.

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Conflict of interest

The authors have no competing interests to declare.

Ethical consideration

All participants provided written informed consent and all study procedures were approved by Institutional Review Boards from the Instituto Especializado Materno Perinatal, Lima, Peru and the Human Research Administration Office at the Harvard T. H. Chan School of Public Health, Boston, Massachusetts, USA.

correlations were observed between the trauma intensity score with symptoms of psychiatric disorders (PCL-C: $\rho=0.49$, $P\text{-value}<0.0001$; EPDS: $\rho=0.36$, $P\text{-value}<0.0001$; PHQ-9: $\rho=0.31$, $P\text{-value}<0.0001$; GAD-7: $\rho=0.39$ $P\text{-value}<0.0001$).

Conclusion—Given the high burden of trauma experiences and the enduring adverse consequences on maternal and child health, there is an urgent need for integrating evidence-based trauma informed care programs in obstetrical practices serving Peruvian patients.

1. Introduction

Life-threatening or extreme traumatic events, including child maltreatment, intimate partner violence, and rape, are highly prevalent among women of child-bearing age. (Benjet et al., 2016, Garcia-Moreno et al., 2006) Globally the prevalence of exposure to life-threatening trauma has been estimated to be 70%, with approximately 30% reporting more than one such event. (Benjet et al., 2016) Accumulating epidemiologic evidence shows pregnant women are an especially high-risk group for adverse health outcomes as trauma impacts not only mother's physical and mental health but also her offspring. (Brand et al., 2010, Wosu et al., 2015, Yehuda et al., 2005) For instance, among pregnant women, a history of trauma exposure exacerbates symptoms of mood and anxiety disorders. (Barrios et al., 2015, Chang et al., 2002, Khashan et al., 2009) Furthermore, maternal trauma exposure has been shown to be associated with increased risks of low birth weight, (Meltzer-Brody and Thorp, 2011, Rosen et al., 2007, Seng et al., 2011a), fetal loss (Garcia-Moreno, 2009) increased vulnerability to psychopathology, (Meltzer-Brody and Thorp, 2011) poor maternal-infant bonding, (Muzik et al., 2013) and both infant sleep and behavioral problems at 18 months. (Hairston et al., 2011) Additionally, maternal trauma exposure is associated with dysregulation in offspring neurobiological systems, such as the hypothalamic-pituitary-adrenal axis, (Brand et al., 2010, Brand et al., 2006, Brand et al., 2011, Yehuda et al., 2005) implicated in the development of mental disorders (Leen-Feldner et al., 2013) and other adverse outcomes. Of note, children of women who have experienced trauma are at increased risk of being victims of maltreatment, (Lee, 2009) thus creating a vicious cycle of intergenerational transmission of violence and violence-associated disability. (Leifer et al., 2004, Rada, 2014) Given the adverse maternal, perinatal and child health outcomes associated with trauma exposure, it is important to identify maternal history of trauma that may serve as clinically useful screening indicators for enhancing the precision and effectiveness of maternal and child health care service delivery.

Experiences of trauma rarely occur in isolation; rather different types of traumatic events tend to co-occur within individuals. (Benjet et al., 2016, Finkelhor et al., 2007) For instance, data from the World Mental Health (WMH) surveys has shown that many people with a history of trauma exposure have been exposed to multiple traumatic events (Benjet et al., 2016). A similar finding has been reported in an epidemiologic survey conducted in the US where the average number of lifetime traumatic events endorsed was 3.3. (Sledjeski et al., 2008) Experiences of multiple forms of trauma in childhood have been reported to be highly prevalent in low-and middle- income countries (LAMICs) compared with high-income countries. (Le et al., 2016) For instance, a high burden of childhood trauma has been reported in Latin America where as many as 40 million children under the age of 15 have

experienced violence, abuse, and neglect. (Larraín and Bascuñán, 2009) In addition, humanitarian crises, such as armed conflicts, political violence, and natural or industrial disasters predominantly affect populations in LAMICs.(WHO, 2013) In the few studies that examined the risk of adverse perinatal health outcomes associated with lifetime experiences of trauma, most have assessed only one type of trauma such as childhood abuse (Leeners et al., 2014, Leeners et al., 2010, Seng et al., 2011a) and intimate partner violence. (Barrios et al., 2015, Sarkar, 2008) For many women in lower-income countries, antenatal care is typically the first and only time of interaction with the health care system, providing a unique opportunity to assessing trauma exposure.

Awareness of the ubiquity and pervasiveness of traumatic experiences has led organizations such as the Substance Abuse and Mental Health Services Administration (SAMHSA) to define and promote trauma-informed approaches to care. (SAMSA, 2016) A trauma-informed approach is broadly defined as incorporating awareness of trauma and its impact on all aspects of organizational functioning and clinical practice. The first step for such recognition and integration is examining utility of traumatic event exposure assessments. As such, there is a need for clinical epidemiologic research that assesses the utility of instruments that capture traumatic events. One of the instruments that has been used in non-pregnant populations is the Traumatic Events Questionnaire (TEQ). The TEQ asks participants if they ever experienced any of nine specific types of traumatic or life-threatening events that have the potential to elicit posttraumatic stress symptoms. (Vrana and Lauterbach, 1994) Although several investigators have used the TEQ in studies involving men and non-pregnant women, (Crawford et al., 2008, Maikovich et al., 2009, Vrana and Lauterbach, 1994) relatively fewer studies have included pregnant women. (Maikovich et al., 2009, Schwerdtfeger and Nelson Goff, 2008)

Given (1) the enormous burden of traumatic events among residents in LAMICs; (2) the adverse impact of posttraumatic symptoms on pregnancy outcomes; and (3) that antenatal care represents the first and often only time many women in LAMICs interact with the health care system, we sought to describe the construct validity of the TEQ. Specifically, we sought to characterize traumatic events and to examine the extent to which traumatic experiences assessed on a TEQ are associated with psychiatric disorders among a cohort of pregnant women in Lima, Peru.

2. Methods

2.1 Study participants

This cross-sectional study was a part of the Pregnancy Outcomes, Maternal and Infant Study (PrOMIS) cohort. The PrOMIS cohort was designed to examine maternal social and behavioral risk factors of preterm birth and other adverse pregnancy outcomes. The study population consists of women attending prenatal care clinics at the Instituto Nacional Materno Perinatal (INMP) in Lima, Peru between February 2012 and July 2014. The INMP is the primary reference establishment for maternal and perinatal care operated by the Ministry of Health of the Peruvian government. Our study population is derived from information collected from participants who enrolled in the PrOMIS cohort. During the study period, a total of 3,372 participants completed the structured interview, approximately

81% of eligible women who were approached. Details of the study setting and data collection procedures have been described previously (Barrios et al., 2015). Pregnant women between the ages of 18 and 49 years, with a gestational age ≥ 16 weeks, and who spoke and understood Spanish were eligible for inclusion.

Enrolled participants were invited to take part in an interview where trained research personnel used a structured questionnaire to elicit information regarding maternal socio-demographics, lifestyle characteristics, and traumatic life experiences. The final analysis included 3,342 participants who had complete data traumatic event. Excluded participants ($n=30$) did not differ from the rest of the cohort with regard to sociodemographic variables.

2.2 Instruments

2.2.1 Traumatic events questionnaire (TEQ)—The TEQ (Vrana and Lauterbach, 1994) asks participants if they ever experienced any of nine specific types of traumatic or life-threatening events that have the potential to elicit posttraumatic stress symptoms. These include accidents, natural disasters, crime, child abuse, rape, adult abusive experiences, witnessing the death/mutilation of someone, being in a dangerous or life-threatening situation, receiving news of the mutilation, serious injury, or violent or unexpected or sudden death of a loved one. In addition, two additional categories were included, allowing respondents to report any other very traumatic event not listed and events that are too traumatic to discuss (Vrana and Lauterbach, 1994). For the purposes of this study, we added experiences of pregnancy complication as one category of traumatic event. The question was asked as, “Have you ever experienced pregnancy complications such as still birth, miscarriage, abortion, placenta or serious genetic abnormality?” To assess trauma intensity, for each reported trauma event, participants were asked how traumatic the event was at the time and how traumatic the event is currently (i.e., at the time of the interview) using a 7-point Likert scale. Each item was measured on a 7-point Likert scale anchored by “Not at All” and “Severely/Extremely.” For the 12 items, the responses for how traumatic the event was at the time and how traumatic the event is currently summed to produce a trauma intensity score (TIS) that ranged from 24 to 288. Finally, to obtain a trauma occurrence score (TOS), the number of reported trauma events was summed. Although the TEQ is a multidimensional construct, the Cronbach's alpha in our study sample is 0.53. This is similar to what has been reported by Schwerdtfeger and Goff in their study of pregnant women (Cronbach's alpha=0.66). (Schwerdtfeger and Goff, 2008)

2.2.2 Post-traumatic stress disorder checklist-civilian version (PCL-C)—The Post-Traumatic Stress Disorder Checklist-Civilian Version (PCL-C) is a 17-item screening tool used to assess PTSD symptomatology during the past month. Each item assesses PTSD symptoms experienced over the past month on a 5-point Likert scale, with a total score ranging from 17 to 85. (Weathers et al., 1994) The Cronbach's alpha of PCL-C in our study sample is 0.90. Presence of PTSD symptoms was defined as PCL-C score ≥ 26 .

2.2.3 Generalized anxiety disorder - 7 (GAD-7)—The GAD-7 is a 7-item questionnaire developed to identify probable cases of GAD and measure the severity of GAD symptoms. (Spitzer et al., 2006) The GAD-7 asks participants to rate how often they

have been bothered by each of these 7 core symptoms over the past 2 weeks. Response categories are “not at all,” “several days,” “more than half the days,” and “nearly every day,” scored as 0, 1, 2, and 3, respectively. The Cronbach's alpha of GAD-7 in our study sample is 0.88. Participants with GAD-7 score ≥ 7 were categorized as showing GAD symptoms.

2.2.4 Edinburgh postnatal depression scale (EPDS)—The EPDS is a ten-item screening scale for antepartum and postpartum depression (Cox et al., 1987). The EPDS items ask participants to rate how they felt during the previous 7 days. Response categories were scored 0, 1, 2, or 3 for each item according to increased severity of the symptoms. Items 3 and 5–10 were reversed-scored. The Cronbach's alpha of EPDS in our study sample is 0.83. Participants with EPDS score ≥ 10 were categorized as having depression.

2.2.5 Patient health questionnaire-9 (PHQ-9)—The PHQ-9 is a nine-item depression screening scale based on the criteria from the Diagnostic and Statistical Manual of Mental Disorder-IV (DSM-IV). (Kroenke et al. 2001; Wulsin et al. 2002) The questionnaire assesses 9 depressive symptoms in the 14 days prior to evaluation. The PHQ-9 score is calculated by assigning a score of 0–3 to the response categories “not at all” “several days” “more than half the days” and “nearly every day”. In particular, item 9, “thoughts that you would be better off dead, or of hurting yourself,” assessed suicidal ideation over the last 14 days. Suicidal ideation was defined on the basis of participants' response to item 9. If the response was “several days,” “more than half the days,” or “nearly every day,” suicidal ideation was coded as “yes.” Participants responding “not at all” were classified as “no” for suicidal ideation. (Zhong et al., 2015) The Cronbach's alpha of PHQ-9 in our study sample is 0.82. Participants with PHQ-9 score ≥ 10 were categorized as showing depression.

2.3 Other Covariates

Participants' age was categorized as follows: 18–20, 21–29, 30–34, and ≥ 35 years. Other sociodemographic variables were categorized as follows: maternal ethnicity (Mestizo [mixed European and Indigenous ancestry] vs. others); educational attainment (≤ 6 , 7–12, and >12 completed years of schooling); marital status (married or living with partner vs. others); employment status during pregnancy (employed vs. not employed); access to basic s such as foods (very hard/hard/somewhat hard vs. not very hard); planned pregnancy (yes vs. no); gravidity (multigravida vs. primigravida); gestational age at interview (weeks); and early pregnancy body mass index (<18.5 , 18.5–24.9, 25–29.9, and ≥ 30 kg/m²).

2.4 Statistical Analysis

We examined the frequency distributions of maternal sociodemographic characteristics according to traumatic events status. For participants with and without any traumatic events, we conducted the Chi-square tests for categorical variables and the Student's *t* tests for continuous variables to determine statistically significant differences. We used the Spearman correlation coefficient to assess the direction and magnitude of associations of TOS, TIS, PCL-C, EPDS, PHQ-9, and GAD-7 scores. For each specific traumatic event, we calculated the mean scores for different screening instruments and the proportions of participants who screened positive for different psychiatric disorders. We fit hierarchical logistic regressions with PTSD, generalized anxiety, depression, and suicidal ideation as dichotomous outcome

variables. In the initial block, we included the TOS continuous score and covariates (maternal age, parity, and education). In the second block, we added the quartiles of TIS score. We reported adjusted odds ratio (OR) and the 95% confidence interval (CI) for TOS and TIS quartiles. We also reported the $-2 \log$ likelihood, Nagelkerke R^2 , and χ^2 for each model. We plotted the proportions of women who endorsed each traumatic event within three age groups (18–19, 20–29, and 30 years). We plotted the survival curves for age-of-onset for each traumatic event based on conditional survival probabilities in a one-year period. Statistical analyses were performed using SAS 9.4 (SAS Institute, Cary, NC, USA), R software (R Foundation for Statistical Computing, Vienna, Austria; available at <http://www.R-project.org>) version 3.1.2, and Plot.ly (Plotly Technologies Inc. Collaborative data science. Montréal, QC, Canada; available at <https://plot.ly>). The level of statistical significance was set at P -value < 0.05 , and all tests were two-sided.

3. Results

Sociodemographic and reproductive characteristics of the study population are summarized in Table 1. The mean age of study participants was 28.2 years (standard deviation, $SD = 6.3$ years); the majority of participants were married or living with a partner (80.7%), had at least 7 years of education (95.4%), and self-identified race/ethnicity as Mestizo (75.3%). Approximately, 54.0% of participants were unemployed while 49.6% reported having difficulty paying for the very basics including food items. The average gestational age of participants at interview was 9.2 weeks ($SD = 3.5$ weeks). With respect to reproductive history, 68.3% of the study participants were multigravidas and 34.2% reported having had a prior pregnancy loss. Less than half of the participants (41.9%) reported that the current pregnancy was planned. Nearly half of participants (49.3%) were overweight or obese (early pregnancy $BMI \geq 25 \text{ kg/m}^2$). Only 12.2% of the participants reported having no history of experiencing a traumatic event ($TOS = 0$). The mean score of TOS was 2.5 ($SD = 1.9$). More than a quarter of the participants (26.2%) had a TOS score greater than or equal to 4; 3.8% of the participants had a TOS score greater than or equal to 7 (Supplement Table 1). Women who experienced any of the 12 traumatic events were more likely to be older (P -value = 0.05), multigravid (P -value < 0.0001), and have a prior pregnancy loss (P -value < 0.0001). They were less likely to have difficulty paying for very basic food items (P -value < 0.0001).

Within age group of 18–19 years, the most frequently endorsed traumatic event was “received news of the mutilation, serious injury, or violent or unexpected death of someone close to.”

Within age groups of 20–29 years and 30 years, the most frequently endorsed traumatic event was “pregnancy complications” (Figure 1).

Spearman correlation coefficients of the TOS and TIS with symptoms of psychiatric disorders are presented in Table 2. The TOS and TIS were highly correlated ($\rho = 0.94$, P -value < 0.0001). The TOS were moderately correlated with symptoms of PTSD (PCL-C: $\rho = 0.38$, P -value < 0.0001), depression (EPDS: $\rho = 0.31$, P -value < 0.0001 ; PHQ-9: $\rho = 0.20$, P -value < 0.0001), and generalized anxiety (GAD-7: $\rho = 0.29$, P -value < 0.0001). TIS appeared to be more strongly associated with symptoms of psychiatric disorders. For

instance, the corresponding correlation coefficients between the TIS and symptoms of PTSD (PCL-C: $\rho = 0.49$, $P\text{-value} < 0.0001$), depression (EPDS: $\rho = 0.36$, $P\text{-value} < 0.0001$; PHQ-9: $\rho = 0.31$, $P\text{-value} < 0.0001$), and generalized anxiety (GAD-7: $\rho = 0.39$, $P\text{-value} < 0.0001$).

The results from principal component analysis (Supplement Table 2) indicated a four-factor solution, corresponding to an interpersonal trauma factor, a structural trauma factor, an unspeakable trauma factor, and a pregnancy-related trauma factor. Compared with structural traumatic events (e.g., natural disaster) and pregnancy-related traumatic events, interpersonal traumatic events (e.g., childhood abuse) and unspeakable (reported events that participants refused to identify) traumatic events tended to have higher mean scores for all four screening instruments (Table 3a). Similarly, the proportions of women screened positive for mood and anxiety disorders were higher among women who experienced interpersonal traumatic events or unresolved traumatic events as compared with women who experienced structural traumatic events or pregnancy-related traumatic events (Table 3b).

Table 4 presents the results for hierarchical logistic regressions. In the models including both the TOS and the TIS quartiles (entire models), the TIS was more strongly associated with psychiatric disorders. For example, a one-unit increase in the TOS was associated with 1.5-fold increased odds of PTSD (95% CI: 1.43–1.56). After entering the TIS in the model, the association of each one-unit increase in the TOS with PTSD was attenuated to 1.00 (95% CI: 0.93–1.08). Each quartile increase of the TIS was associated with 2.23-fold increased odds of PTSD (95% CI: 1.95–2.53). Similar results were noted in hierarchical regression models that were fit with PCL-C, GAD-7, EPDS, and PHQ-9 as the continuous outcome variables, respectively (Supplement Table 3).

Survival curves for age-of-onset for each traumatic event are presented in Figure 2. Strikingly, by the age of 10, 16.7% of the study population had experienced sexual or physical abuse. By the age of 30, 20.3% and 7.5% of the study population had experienced adult physical abuse and unwanted sexual experiences, respectively. Some traumatic events such as “rape, robbery, or assault” tended to occur in early adulthood while some traumatic events such as “pregnancy complications” continued to occur in middle adulthood.

4. Discussion

Our findings indicate that the majority of study participants (87.8%) experienced some traumatic events. The two most frequently endorsed traumatic events were “pregnancy complications” and “rape, robbery, or assault.” Compared with structural traumatic events and pregnancy-related traumatic events, interpersonal traumatic events and unspeakable traumatic events tended to have higher mean scores across all screening instruments for psychiatric disorders. Furthermore, we noted that trauma intensity score was more strongly associated with psychiatric disorders than the trauma occurrence score.

A substantial percentage (88%) of our study population had experienced at least one traumatic event. Similarly, using an English language version of the TEQ, in a study conducted among 41 pregnant women seeking prenatal care in the Midwest, investigators

noted that 87.8% of participants reported experiencing one or more traumatic events in their life-time. (Schwerdtfeger and Goff, 2008). Further, investigators reported that 80–84% of college students, reported experiencing traumatic events. (Vrana, 2001, Vrana and Lauterbach, 1994) Bagley et. al found that 94% of Wesleyan missionaries (N = 31) had reported exposure to at least one traumatic event. (Bagley, 2003) The inclusion of an additional question for pregnancy complications tailored for our study population might have contributed to the higher prevalence of traumatic events. Without the pregnancy outcomes, the prevalence of any traumatic events is 79%. Despite ways in which events are accepted as “traumatic” vary across populations, the prevalence of traumatic events is quite high (Dorrington et al., 2014)

Our findings are in agreement with previous findings that reported trauma intensity is more strongly associated with psychiatric disorders including PTSD, generalized anxiety, depression, and suicidal ideation than the number of traumatic events experienced, (Crawford et al., 2008, Vrana, 2001, Vrana and Lauterbach, 1994) highlighting the importance to consider the subjective intensity of traumatic event for trauma victims. Our findings showing TIS is strongly associated with psychiatric disorders indicates that TIS might be important in the etiology of psychiatric disorders. Similar observations have been reported by other investigators. Polanczyk et al in their study of two prospective cohort studies from England and New Zealand found that emotional memories associated with traumatic events were strongly associated with depression. (Polanczyk et al., 2009) Moreover, consistent with previous studies, (Vrana and Lauterbach, 1994, Lauterbach et al., 1997) certain events such as interpersonal traumatic events and events that were too traumatic to discuss openly had a greater psychological impact than exposure to natural disasters. Our finding may have important implications for improving the precision and effectiveness of antepartum care delivered to pregnant women with high levels of traumatic experiences. Namely, screening for trauma exposure and the provision of mental health services to high-risk obstetrical patient populations may be an important first step. Health providers could query antepartum patients about prior trauma exposure, particularly childhood maltreatment and intimate partner violence. The history and intensity of trauma exposure could prompt health care providers to screen for signs of psychopathology and to conduct follow-up diagnostics assessments as needed. Besides, considering the impact of unspeakable traumatic events on psychiatric disorders, pregnant women would benefit from assessments that allow them to report trauma without being required to provide detailed information (Vrana and Lauterbach, 1994). Another important finding that merits discussion is asking for the occurrence of trauma alone may not be sufficient.

Several limitations of our study should be acknowledged. First, psychiatric disorders including PTSD, generalized anxiety, and depression were measured via self-report screening questionnaires and no formal diagnosis of aforementioned disorders was assessed. Use of screening instruments is the most feasible method of data collection for large-scale epidemiologic studies. Second, recall of traumatic events is retrospective and subject to errors in recall, particularly given stigma associated with some events. (Seng et al., 2011b) Therefore, the traumatic events disclosed here may represent an underestimate of participants’ lifetime trauma exposure. Besides, the presence of PTSD, generalized anxiety, and depression during pregnancy might bias the judgments with respect to the intensity

when traumatic events occurred (i.e., mood-congruent recall bias). (Stein et al., 2010) This would inflate the association between reported intensity and symptoms. Third, the current analysis did not take into account the recency and chronicity of trauma experience, which might also affect current mental health status.

Despite these limitations, our study provides evidence for the construct validity of the TEQ among a large sample of pregnant Peruvian women for the first time. Accurately gathering information on type and intensity of trauma using a brief measure such as the TEQ could be helpful in the design and provision of evidence-based trauma-informed programs in obstetrical practices serving low-income Peruvian patients. (Seng et al., 2009) The evidence that trauma intensity and type (sexual and unspeakable) are linked to psychiatric disorders, which in turn increase the risk of poor obstetric outcomes, supports the need to design and implement policies aimed at protecting children and women from traumatic experiences and clinical interventions aimed at identifying trauma victims in order to prevent further damage and the occurrence of trauma-related disorders. In a setting such as Peru, the use of common elements treatment approach (CETA) for adults presenting with mood or anxiety problems developed specifically for use with lay counselors in LAMICs might be the best first approach. (Bolton et al., 2014, Murray et al., 2014) Furthermore, it would be worthwhile for future studies to examine whether clinical and policy interventions aimed at decreasing the occurrence and impact of traumatic events are effective in attenuating the occurrence and burden of psychiatric disorders and adverse pregnancy outcomes among pregnant women.

5. Conclusion

In conclusion, we found a high prevalence of traumatic events among pregnant Peruvian women. Findings from our study support the use of the TEQ as a brief measure of traumatic exposure among pregnant women. Our results affirm the utility of TEQ in perinatal settings and underscore the need to screen pregnant women for the occurrence and intensity of traumatic events during perinatal care. Obviously, screening alone will not lead to improved outcomes. Given the opportune time antenatal care presents in LAMICs, there is an urgent need for designing evidence-based trauma informed care programs and rigorously evaluating their effectiveness.

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Highlights

- We found a high prevalence of traumatic events among pregnant Peruvian women.
- Our results affirm the utility of trauma events questionnaire among pregnant women
- There is an urgent need for designing evidence-based trauma informed care programs in antenatal care settings and rigorously evaluating their effectiveness.

Figure 1.

Traumatic events endorsed on the Traumatic Events Questionnaire by age groups (N = 3,342)

**P*-value < 0.05

Figure 2.
Cumulative age of onset distribution of traumatic events (N = 3,342)

Table 1

Characteristics for women with and without traumatic events (N = 3,342)

Characteristics	All participants (N = 3,342)		Any traumatic events ² (N = 2,933)		No traumatic event (N = 409)		P-value
	n	%	n	%	n	%	
Maternal age (years) ¹	28.2 ± 6.3		28.3 ± 6.3		27.6 ± 6.2		0.05
Maternal age (years)							
18–19	172	5.1	154	5.3	18	4.4	0.13
20–29	1861	55.7	1611	54.9	250	61.1	
30–34	704	21.1	626	21.3	78	19.1	
35	605	18.1	542	18.5	63	15.4	
Education (years)							
6	147	4.4	128	4.4	19	4.6	0.08
7–12	1817	54.4	1575	53.7	242	59.2	
>12	1370	41.0	1223	41.7	147	35.9	
Mestizo Ethnicity	2515	75.3	2206	75.2	309	75.6	0.92
Married/living with partner	2696	80.7	2358	80.4	338	82.6	0.27
Employed during pregnancy	1537	46.0	1348	46.0	189	46.2	0.93
Access to basic foods							
Hard	1659	49.6	1425	48.6	256	62.6	<0.0001
Not very hard	1681	50.3	1507	51.4	152	37.2	
Planned pregnancy	1399	41.9	1217	41.5	182	44.5	0.28
Multigravida	2284	68.3	2084	71.1	200	48.9	<0.0001
Prior pregnancy loss	1143	34.2	1134	38.7	9	2.2	<0.0001 ³
Gestational age (weeks) at interview ¹	9.2 ± 3.5		9.4 ± 3.4		9.2 ± 3.5		0.33
Early pregnancy body mass index (kg/m ²)							
<18.5	63	1.9	53	1.8	10	2.4	0.06
18.5–24.9	1592	47.6	1374	46.8	218	53.3	
25–29.9	1215	36.4	1087	37.1	128	31.3	
30	432	12.9	382	13.0	50	12.2	

¹ mean ± SD (standard deviation);

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Women who indicated that they have experienced any of the 12 traumatic events For continuous variables, P-value was calculated using the Student t test; for categorical variables, P-value was calculated using the Chi-square test or the Fisher's exact test.;

P-value was calculated among women who were multigravida.

Spearman Correlations of Traumatic Events Questionnaire (TEQ) scores and other psychometric instruments (N = 3342)

Table 2

Psychometric instruments	TOS	TIS	PCL-C	EPDS	PHQ-9	GAD-7
TOS ¹	1.000					
TIS ²	0.937	1.000				
PCL-C	0.384	0.486	1.000			
EPDS	0.311	0.356	0.636	1.000		
PHQ-9	0.204	0.308	0.584	0.512	1.000	
GAD-7	0.289	0.386	0.703	0.646	0.623	1.000

Abbreviations: TEQ, Traumatic Events Questionnaire; TOS, Trauma Occurrence Score; TIS, Traumatic Intensity Score; PCL-C, PTSD Checklist-Civilian Form; EPDS, Edinburgh Postnatal Depression Scale; PHQ-9, Patient Health Questionnaire-9; GAD-7, Generalized Anxiety Disorder 7-item

All correlations are significant with P-value < 0.0001.

¹TEQ occurrence score was obtained by summing the number of events the participant experienced.

²TIS was obtained by summing the intensity score when events happened and now for each traumatic events experienced.

Table 3

a. Mean scores on psychometric instruments as a function of reporting the experience of different traumatic events (N = 3,342)

Type of event	Endorsed as traumatic events ¹ (n)	PCL-C (mean ± SD)	GAD-7 (mean ± SD)	EPDS (mean ± SD)	PHQ-9 (mean ± SD)
Any traumatic event	2933	26.8 ± 9.4	6.2 ± 5.2	7.1 ± 5.7	7.9 ± 5.5
1. Serious accident, fire, or explosion	642	27.1 ± 9.4	6.3 ± 4.9	7.5 ± 5.8	7.7 ± 5.2
2. Natural disaster	529	27.1 ± 9.6	6.3 ± 5.1	7.5 ± 5.9	8.0 ± 5.4
3. Rape, robbery, or assault	1134	27.3 ± 9.7	6.3 ± 5.0	7.6 ± 5.7	7.7 ± 5.2
4. As a child, sexual or physical abuse	842	31.3 ± 11.3	8.0 ± 5.9	9.2 ± 6.3	9.5 ± 6.2
5. As an adult, unwanted sexual experiences	252	34.5 ± 12.7	9.3 ± 6.4	11.3 ± 6.7	10.6 ± 6.3
6. Adult physical abuse	651	30.3 ± 11.0	7.6 ± 5.7	9.2 ± 6.2	8.9 ± 5.7
7. Witness a violent death	499	29.4 ± 11.0	7.4 ± 5.6	8.4 ± 6.1	8.8 ± 5.8
8. In serious danger of losing life or of being seriously injured	657	29.6 ± 11.1	7.3 ± 5.6	8.8 ± 6.3	8.7 ± 5.8
9. Received news of the mutilation, serious injury, or violent or unexpected death of someone close to	1111	27.8 ± 10.2	6.7 ± 5.5	7.5 ± 5.8	8.4 ± 5.6
10. Pregnancy complications	1463	27.0 ± 9.5	6.3 ± 5.2	7.2 ± 5.7	7.8 ± 5.5
11. Other traumatic events	191	29.4 ± 10.5	6.8 ± 5.4	9.5 ± 6.1	7.6 ± 5.7
12. Traumatic events, but unwilling to specify	385	33.9 ± 12.0	9.8 ± 6.5	9.1 ± 6.5	11.8 ± 6.2

b. Diagnosis based on psychometric instruments as a function of reporting the experience of different traumatic events (N = 3,342)

Type of event	Endorsed as traumatic events ¹ (n)	PCL-C 26 (%)	GAD 7 (%)	EPDS 10 (%)	PHQ-9 10 (%)	Suicidal ideation ² (%)
Any traumatic event	2933	40.8	35.2	30.3	28.4	17.5
1. Serious accident, fire, or explosion	642	43.6	36.9	33.2	26.6	18.5
2. Natural disaster	529	41.0	35.7	33.1	27.2	21.9
3. Rape, robbery, or assault	1134	43.4	35.4	32.5	25.6	20.5
4. As a child, sexual or physical abuse	842	61.2	49.2	42.8	38.2	26.2
5. As an adult, unwanted sexual experiences	252	71.8	56.3	56.3	44.4	36.1
6. Adult physical abuse	651	56.5	43.9	42.7	33.5	27.2
7. Witness a violent death	499	51.7	41.1	38.1	34.1	23.8
8. In serious danger of losing life or of being seriously injured	657	54.3	42.0	41.2	32.3	25.1
9. Received news of the mutilation, serious injury, or violent or unexpected death of someone close to	1111	44.9	38.1	31.4	32.0	18.0

b. Diagnosis based on psychometric instruments as a function of reporting the experience of different traumatic events (N = 3,342)

Type of event	Endorsed as traumatic events ¹ (n)	PCL-C 26 (%)	GAD 7 (%)	EPDS 10 (%)	PHQ-9 10 (%)	Suicidal ideation ² (%)
10. Pregnancy complications	1463	41.7	35.5	31.3	26.6	17.2
11. Other traumatic events	191	54.5	37.7	48.2	25.1	27.2
12. Traumatic events, but unwilling to specify	385	68.1	59.5	41.6	58.2	25.5

Abbreviations: SD, standard deviation; PCL-C, PTSD Checklist-Civilian Form; EPDS, Edinburgh Postnatal Depression Scale; PHQ-9, Patient Health Questionnaire-9; GAD-7, Generalized Anxiety Disorder 7-item

¹Events are not mutually exclusive.

²Suicidal ideation was defined on the basis of participants' response to item 9 of the PHQ-9. If the response was "several days," "more than half the days," or "nearly every day," suicidal ideation was coded as "yes." Participants responding "not at all" were classified as "no" for suicidal ideation.

Table 4

Hierarchical logistic regression predicting post-traumatic stress disorder, anxiety, depression, and suicidal ideation (N = 3,342)

Psychometric instruments	-2 Log likelihood	Nagelkerke R ²	χ ²	TIS Quartiles	
				TOS	OR (95% CI)
PCL-C 26 (N = 1259)					
Block 1 (TOS)	3952.89	0.16	381.13	1.50 (1.43, 1.56)	
Block 2 (TIS)		0.05	150.09		
Entire model	3802.80	0.21	531.22	1.00 (0.93, 1.08)	2.23 (1.95, 2.53)
GAD 7 (N = 1097)					
Block 1 (TOS)	3976.74	0.08	167.09	1.30 (1.25, 1.36)	
Block 2 (TIS)		0.07	179.52		
Entire model	3797.22	0.15	346.61	0.85 (0.79, 0.92)	2.38 (2.09, 2.71)
EPDS 10 (N = 936)					
Block 1 (TOS)	3676.72	0.11	219.50	1.36 (1.31, 1.42)	
Block 2 (TIS)		0.01	42.77		
Entire model	3633.95	0.12	262.27	1.11 (1.03, 1.19)	1.54 (1.35, 1.76)
PHQ-9 10 (N = 907)					
Block 1 (TOS)	3776.05	0.04	67.78	1.19 (1.14, 1.23)	
Block 2 (TIS)		0.06	150.25		
Entire model	3625.80	0.10	218.03	0.80 (0.74, 0.86)	2.27 (1.99, 2.60)
Suicidal ideation¹ (N = 536)					
Block 1 (TOS)	2730.33	0.10	154.98	1.35 (1.29, 1.42)	
Block 2 (TIS)		0.00	11.70		
Entire model	2718.63	0.10	166.68	1.20 (1.11, 1.30)	1.31 (1.12, 1.53)

Abbreviations: TOS, Trauma Occurrence Score; TIS, Traumatic Intensity Score; PCL-C, PTSD Checklist-Civilian Form; EPDS, Edinburgh Postnatal Depression Scale; PHQ-9, Patient Health Questionnaire-9; GAD-7, Generalized Anxiety Disorder 7-item

¹ Suicidal ideation was defined on the basis of participants' response to item 9 of the PHQ-9. If the response was "several days," "more than half the days," or "nearly every day," suicidal ideation was coded as "yes." Participants responding "not at all" were classified as "no" for suicidal ideation. All χ^2 are significant with P value < 0.05.

All models adjusted for maternal age (continuous), parity (multiparous vs. nulliparous), and education (continuous).