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# The impact of the Great Recession on California domestic violence events, and related hospitalizations and emergency service visits

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## ABSTRACT

**Objective:** Explore the impact of the Great Recession on domestic violence (DV) related hospitalizations and emergency department (ED) visits in California.

**Methods:** Hospital and ED data were drawn from California's Office of Statewide Health Planning and Development (OSHPD). DV-related hospitalizations and ED visits in California were analyzed between January 2000 and September 2015 (53,596), along with total medical costs. Time series were divided into pre-recession (Jan 2000–Nov 2007) and recession/post-recession (Dec 2007–Sept 2015) periods.

**Results:** The medical cost of DV-related hospitalizations alone was estimated as \$1,136,165,861. A dramatic increase in DV episodes was found potentially associated with the Great Recession. The number of ED visits per month tripled from pre- to post-recession (104.9 vs. 290.6), along with an increased number of hospitalizations (77.1 vs. 95.6); African Americans and Native Americans were disproportionately impacted. In addition, psychiatric comorbidities, severe DV episodes, in-hospital mortality and charge per hospitalization escalated. The rise in DV hospitalizations and ED visits beginning in December 2007 was mainly attributable to physical abuse episodes in adults; minors had no change in DV trends.

**Discussion:** Recessions are frequent in modern economies and are repeated cyclically. Our study provides critical information on the effects of the 2007 financial crisis on DV-related healthcare service utilization in California. Given the current financial crisis associated with COVID-19, which expert predict could extend for years, the results from this study shine a spotlight on the importance of DV-related screening, prevention and response.

## 1. Background

Domestic violence (DV) is a national public health problem, affecting 10 million people in the U.S. annually (Huecker and Smock, 2019). The scope and effects of DV cross the lifespan. One in seven U.S. children suffers from child abuse and/or neglect annually (Finkelhor et al., 2009); one in four U.S. women will experience physical, sexual, and/or stalking violence by an intimate partner during their lifetime (Smith et al., 2018); and nearly one in ten older adults in the U.S. will experience abuse in domestic settings (Pillemer et al., 2016). The combined economic impact from healthcare costs and lost wages surpasses three trillion dollars in the U.S. (Peterson et al., 2018a; Peterson et al., 2018b)

DV is strongly associated with financial stress and financial dependence on family members (Pillemer et al., 2016; Renzetti, 2009; Schneider et al., 2016; Schneider et al., 2017; Berger et al., 2011). Moreover, the most vulnerable groups in society (non-white, low-income and low-educated) are disproportionately affected by DV (Office of Women's Health, 2012); for example, the 2007 Great Recession disproportionately impacted women and the most vulnerable populations in this manner (Margerison-Zilko et al., 2016). Moreover, many California families were adversely affected by the mortgage market crisis (the majority of subprime loans were issued in California) before the technical beginning of the 2007 Great Recession (Irons, 2009; DHUD, 2010); therefore, California residents were highly vulnerable to DV.

Recessions are frequent in modern economies and are cyclical.

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Repeated periods during which economic growth falls are called recessions and depressions, whether mild or more severe, respectively. One of the most well-known is the Great Depression, which occurred during the 1930s. The U.S. has experienced 11 recessions during the post-World War II era (including the recessions of 1949, 1953, 1958, 1960, 1969, 1973, 1980, 1981–1982, the early 1990s and 2000s recessions and the Great Recession in 2007), and the novel coronavirus (COVID-19) is leading to widespread financial crisis which experts predict could extend for years (Semuels, 2020; RT, 2020; Menickella, 2020). The Great Recession began with a crisis in the mortgage market during which remarkable increases in foreclosure numbers were reported beginning in the second quarter of 2006; California, Arizona, Nevada and Florida experienced the sharpest rise in foreclosures (DHUD, 2010). While the Great Recession officially lasted less than two years, from December 2007 to June 2009, during which the GDP contracted, the economic crisis produced long-lasting consequences for individuals as well as society as a whole (Irons, 2009).

Studies suggest that the scale and effects of DV worsen in children (Schneider et al., 2017; Berger et al., 2011) and adults (Renzetti, 2009; Schneider et al., 2016) during economic recessions, and yet, the impact of economic recessions on DV in the U.S. is poorly understood. The present study explores the extent to which the Great Recession impacted the number of reported DV hospitalizations and emergency department (ED) visits in California across various domains.

Victims of DV frequently interact with healthcare services (Huecker and Smock, 2019). Therefore, healthcare data is a unique resource that can be used to identify and study DV trends (Schafer et al., 2008). However, few studies on DV hospitalization trends and risks factors have been published, especially in relation to recessions. In the present paper, we describe the impact of the Great Recession on DV-related hospitalizations and ED visits in California from 2000 to 2015 (pre-recession through post-recession). Our study sample comprised 53,596 DV-related episodes, which encompassed intimate partner violence (IPV), as well as violence against elders and children. Data were drawn from California's Office of Statewide Health Planning and Development (OSHPD), which provides a large representative dataset that includes all DV-related hospitalizations and ED visits in California. DV-related hospitalizations and visits to EDs represent the most dramatic and severe violence episodes in domestic settings.

## 2. Methods

### 2.1. Data source

DV-related hospital and ED morbidity rates in California were examined. Data on service utilization were drawn from the OSHPD hospital dataset, a government-sponsored healthcare register that includes records from all licensed hospitals and EDs in California. The OSHPD data provides anonymized information from hospitals and EDs, including patient characteristics (residential ZIP code, sex, age, ethnicity/race), expenses and source of payment, principal diagnosis (the condition established to be the chief cause of the admission or ED encounter) and up to 24 coexisting diagnoses (comorbidities). Not all patients' comorbidities are coded; rather, only chief cause of service and contributing condition for the hospitalization or ED admission are reported. Therefore, co-existing conditions that did not contribute to the cause of the service are not included in the dataset. The International Classification of Diseases, 9th version (ICD9) was used to code service utilization between January 2000 and September 2015, while the ICD10 was used to code service utilization records between October 2015 and December 2017; the transition from ICD9 to ICD10 codes, which allows reporting for both suspected/confirmed cases, in October 1st, 2015, abruptly increased the number of reported DV episodes. Therefore, the ICD10 code period (October 2015 to December 2017) was excluded from analysis.

The term DV refers to physical, sexual and emotional/psychological

violence in a domestic setting and includes a range of behaviors, from intimate partner violence (IPV) to violence against elders and children. The study sample comprised all records (53,596) for which DV-related codes (ICD9 codes 995.5, 995.8) were established as chief cause or contributing condition for hospitalizations and ED encounters from January 2000 to September 2015. ICD9 codes for DV defined in previous studies (Schafer et al., 2008; Rudman, 2000) include: Adult (ICD9 codes 995.80–995.85) and Child (ICD9 code 995.5) abuse/maltreatment. Sub-categories identify five types of abuse: emotional/psychological, sexual, physical abuse, neglected (nutritional) and other/unspecified abuse. E-Codes and Y07 codes, which identify who committed the act of violence, were not available in the dataset. V-Codes were not used to identify patients with a history of DV, as only episodes for ongoing abuse were analyzed. For comparability, all hospital charge data were inflation-adjusted using the medical care consumer price index (Bureau of Labor Statistics, 2020) to 2015 dollars, representing the dollar value at the end of the study period.

### 2.2. Data analysis

Descriptive and time series analysis were conducted to analyze trends in DV episodes. Descriptive statistics for the analyzed sample (Table 1) were examined for the pre-recession period (January 2000 to November 2007) and the recession and post-recession period (December 2007 to September 2015). This was done to identify possible changes in DV-hospitalization characteristics in different time periods, including in-hospital mortality ratio, hospital charge, scope of injuries and co-existing conditions (including psychiatric conditions) associated with DV-related episodes. In addition, racial categories included in the OSHPD dataset were used to estimate age-adjusted rates for five races/ethnicities (White, Hispanic, African American, American Indian/Alaska Native, Asian and Native Hawaiian/other Pacific Islander), and the “2000 US standard population” was used for calculating age-adjusted rates (Klein and Schoenborn, 2001). Age-adjusted rates are rates we would have obtained if the study population had the same age distribution as the standard population. Age-adjusted rates are usually estimated when comparing populations with different age structures (for example, White and Hispanic populations) to eliminate differences in crude rates that result from differences in the populations' age distributions (Klein and Schoenborn, 2001). Time series analysis comprises methods to extract meaningful statistics of the data involving temporal measurements. A given time series consists of four systematic components including level (average value in the series), trend (long term direction), noise (unsystematic, short term fluctuations) and seasonality (systematic, calendar related movements). Noise and seasonality can obscure the impact of events and changes in level and temporal trend. Seasonal adjustment, usually done in trend analysis, is a statistical method for removing noise and the seasonal component of a time series from level and trend (Length, 2016; Shumway and Stoffer, 2010). Seasonally adjusted time series were estimated to identify changes in level or trend and analyze the number of DV hospitalizations and ED visits and the overall number of DV episodes as well as the overall number of DV episodes in minors and adults separately and by type of abuse (physical, sexual, emotional, neglect and unspecified). Differences in slope and mean values were assessed using t-ratio and t-test, respectively, to compare trends and level in time series. Microsoft Excel 2016 and R statistical software (“lsmmeans”, and “zoo” R packages) (Length, 2016) were used to generate the graphs and conduct all analyses.

## 3. Results

All DV-related hospitalizations and visits to EDs in California between January 2000 and September 2015 (53,596), including IPV, child and elder abuse, were analyzed. Table 1 reports descriptive statistics for DV variables for the pre-recession (January 2000 to

**Table 1**  
Descriptive statistics on domestic violence (DV) variables for two time periods: pre-recession (January 2000–November 2007), recession and post-recession (December 2007–September 2015).

			Pre-recession: Jan 2000 – Nov 2007	Recession and post- recession: Dec 2007–Sept 2015	
			Number (column %)	Number (column %)	Diff
Emergency department visits	Admissions per month		104.9	290.6	185.7; p < 0.001
	Abuse type	Physical	5471 (54.9%)	16,843 (61.7%)	6.8%; p < 0.001
		Emotional psychological	99 (1%)	562 (2.1%)	1.1%; p < 0.001
		Neglect	540 (5.4%)	882 (3.2%)	–2.2%; p < 0.001
		Sexual	2741 (27.5%)	6499 (23.8%)	–3.7%; p < 0.001
		Unspecified/others	1188 (11.9%)	2843 (10.4%)	–1.5%; p < 0.001
		Causes of healthcare assistance for DV-related episodes	Injuries or psychiatric conditions	6361 (63.8%)	20,702 (75.8%)
	Injuries		5206 (52.2%)	13,505 (49.4%)	–2.8%; p < 0.001
	Psychiatric conditions		412 (4.1%)	2789 (10.2%)	6.1%; p < 0.001
	Injuries and psychiatric cond.		743 (7.5%)	4408 (16.1%)	8.6%; p < 0.001
	Other diseases and health cond.		3609 (36.2%)	6616 (24.2%)	–12%; p < 0.001
	Average number of co-existing condition		1.9	2.9	1; p < 0.001
	Mortality		6 (0.06%)	21 (0.08%)	0.02%; p = 0.596
	Sex: female		7951 (80.1%)	22,088 (80.9%)	0.8%; p = 0.088
	Average age		25.9	29.9	4%; p < 0.001
	Age groups	Minors	3366 (33.8%)	6523 (23.9%)	–9.9%; p < 0.001
		0–4	1288 (12.9%)	2264 (8.3%)	–4.6%; p < 0.001
		5–17	2078 (20.8%)	4259 (15.6%)	–5.2%; p < 0.001
		Adults	6604 (66.2%)	20,795 (76.1%)	+9.9%; p < 0.001
		18–34	3572 (35.8%)	11,089 (40.6%)	4.8%; p < 0.001
		35–64	2803 (28.1%)	8592 (31.5%)	3.4%; p < 0.001
		65+	229 (2.3%)	1114 (4.1%)	1.8%; p < 0.001
	Total		9970 (100%)	27,318 (100%)	0%; p < 0.001
Hospitalizations	Admissions per month		77.1	95.6	18.5; p < 0.001
	Abuse type	Physical	3566 (48.7%)	4011 (44.6%)	–4.1%; p < 0.001
		Emotional psychological	333 (4.5%)	527 (5.9%)	1.4%; p < 0.001
		Neglect	1636 (22.3%)	2358 (26.2%)	3.9%; p < 0.001
		Sexual	549 (7.5%)	725 (8.1%)	0.6%; p = 0.187
		Unspecified/others	1472 (20.1%)	1715 (19.1%)	–1%; p0.099
		Cause of healthcare assistance for DV-related episodes	Injuries or psychiatric conditions	6032 (82.4%)	7657 (85.2%)
	Injuries		2630 (35.9%)	2692 (29.9%)	–6%; p < 0.001
	Psychiatric conditions		1809 (24.7%)	2559 (28.5%)	3.8%; p < 0.001
	Injuries and psychiatric cond.		1593 (21.8%)	2406 (26.8%)	5%; p < 0.001
	Other diseases and health cond.	1288 (17.6%)	1332 (14.8%)	–2.8%; p < 0.001	
	Average number of co-existing condition		6.8	10.2	3.4; p < 0.001
	Mortality		0 (0%)	21 (0.23%)	0.2%; p < 0.001
	Length of stays		7.6	8.3	0.7; p < 0.001
	Charge per admission		\$56,534	\$77,092	\$20,557; p < 0.001
	Total charge		\$415,157,884	\$721,007,977	N/A
	Payment category	Invalid/blank	1 (0%)	1 (0%)	0%; p = 1
		Medicare	1927 (26.3%)	2654 (29.5%)	3.2%; p < 0.001
		Medi-Cal	3085 (42.1%)	3752 (41.7%)	–0.4%; p = 0.602
		Private coverage	1257 (17.2%)	1399 (15.6%)	–1.6%; p = 0.006
		Workers' compensation	3 (0%)	5 (0.1%)	0.1%; p = 0.738
		County indigent programs	266 (3.6%)	248 (2.8%)	–0.8%; p = 0.002
		Other government	299 (4.1%)	457 (5.1%)	1%; p = 0.003
Other indigent		39 (0.5%)	35 (0.4%)	–0.1%; p = 0.197	
Self-pay		417 (5.7%)	400 (4.4%)	–1.3%; p < 0.001	
Other payer		26 (0.4%)	38 (0.4%)	0%; p = 0.529	
Sex: female			4878 (66.6%)	6106 (67.9%)	1.3%; p = 0.084
Average age		35.2	38.0	2.8; p < 0.001	
Age groups	Minors	3009 (41.1%)	3378 (37.6%)	–3.5; p < 0.001	
	0–4	2231 (29.7%)	2392 (26.6%)	–3%; p < 0.001	
	5–17	855 (11.4%)	986 (11%)	–0.5%; p = 0.33	
	Adults	4310 (58.9%)	5611 (62.4%)	+3.5; p < 0.001	
	18–34	978 (13%)	1127 (12.5%)	–0.6%; p = 0.289	
	35–64	1476 (19.7%)	1990 (22.1%)	2.3%; p = 0.014	
	65+	1960 (26.1%)	2494 (27.7%)	1.7%; p < 0.001	
Total		7319 (100%)	8989 (100%)		

November 2007) and the recession/post-recession period (December 2007 to September 2015). The number of ED visits substantially exceeded the number of hospitalizations during the recession/post-recession period (75.2%, 27,318 out of 8989) and to a lesser extent during the pre-recession (57.7%, 9970 out of 7319).

The number of ED visits per month for all-forms of DV nearly tripled during the recession/post-recession period as compared to the pre-recession period (290.6 vs. 104.9, respectively); a less pronounced increase in DV episodes per month was found in DV-related hospitalizations (95.6 vs. 77.1). The average number of co-existing conditions per ED patient also increased in both, EDs (1.9 vs. 2.9 during the pre-recession, and recession/post-recession period, respectively) and hospitals (6.8 vs. 10.2). This included the percent of episodes associated with psychiatric conditions (psychiatric conditions alone or together with injuries and fractures). In-hospital mortality increased during the recession/post-recession period as compared to the pre-recession period (0.23% vs. 0%, respectively). There was no increase in mortality in EDs (0.06% vs. 0.08%,  $p = 0.596$ ). The percent of DV-related patients that were adults, rather than minors, increased in the recession/post-recession period as compared to the pre-recession period in the ED (76.1% vs. 66.2%) and hospitals (62.4% vs. 58.9%). Similar percentages of female patients were found over time in EDs (80.1% vs. 80.9% during the pre-recession, and recession/post-recession period, respectively;  $p = 0.088$ ) and hospitals (66.6% vs. 67.9%;  $p = 0.084$ ).

The estimated total cost for all DV hospitalizations for January 2000 to September 2015 was \$1,136,165,861. We found a relative slight increase in hospital length of stay during the recession/post-recession as compared to the pre-recession period (7.6 vs. 8.3;  $p < 0.001$ ) (Table 1). However, the inflation-adjusted charge per hospitalization increased dramatically over time (\$56,534 vs. \$77,092). Together, the percent of “private coverage” and “self-pay” hospital payment slightly decreased for the recession/post-recession compared to the pre-recession (22.9% vs. 20.0%, respectively), while the combination of “Medicare”, “Medi-Cal” and “Other Government” slightly increased (72.6% vs. 76.3%, respectively). No data on length of stay, cost or payment was available for ED visits.

Fig. 1 displays DV-related visits to the ED and hospitalizations as an

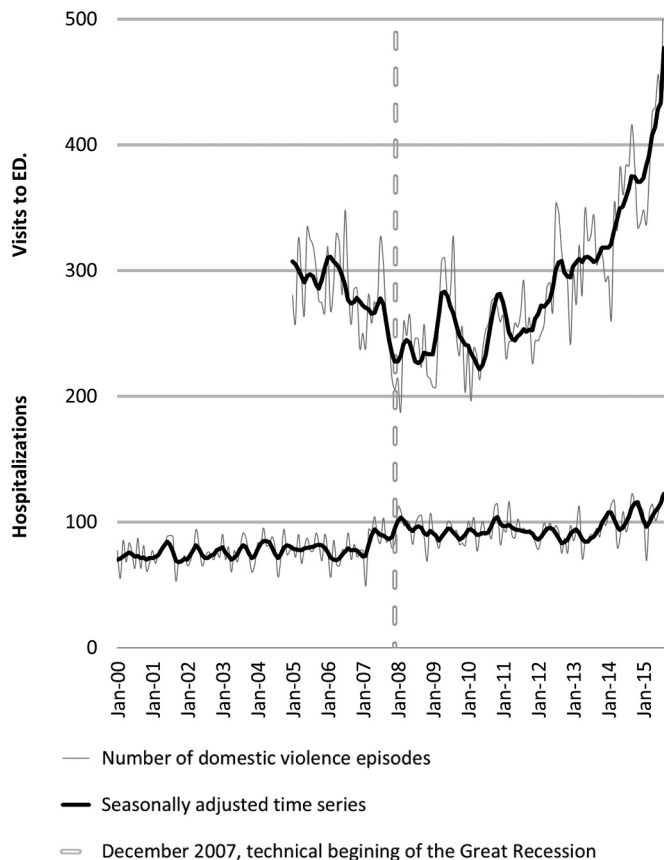


Fig. 2. Domestic violence-related visits to emergency departments (ED) and hospitalizations in California, January 2000 – Sept 2015.

age-adjusted rate per 100,000 California residents estimated for all Californians and five ethnic/race groups in the two analyzed time periods. The rates of DV-related visits among African Americans is over

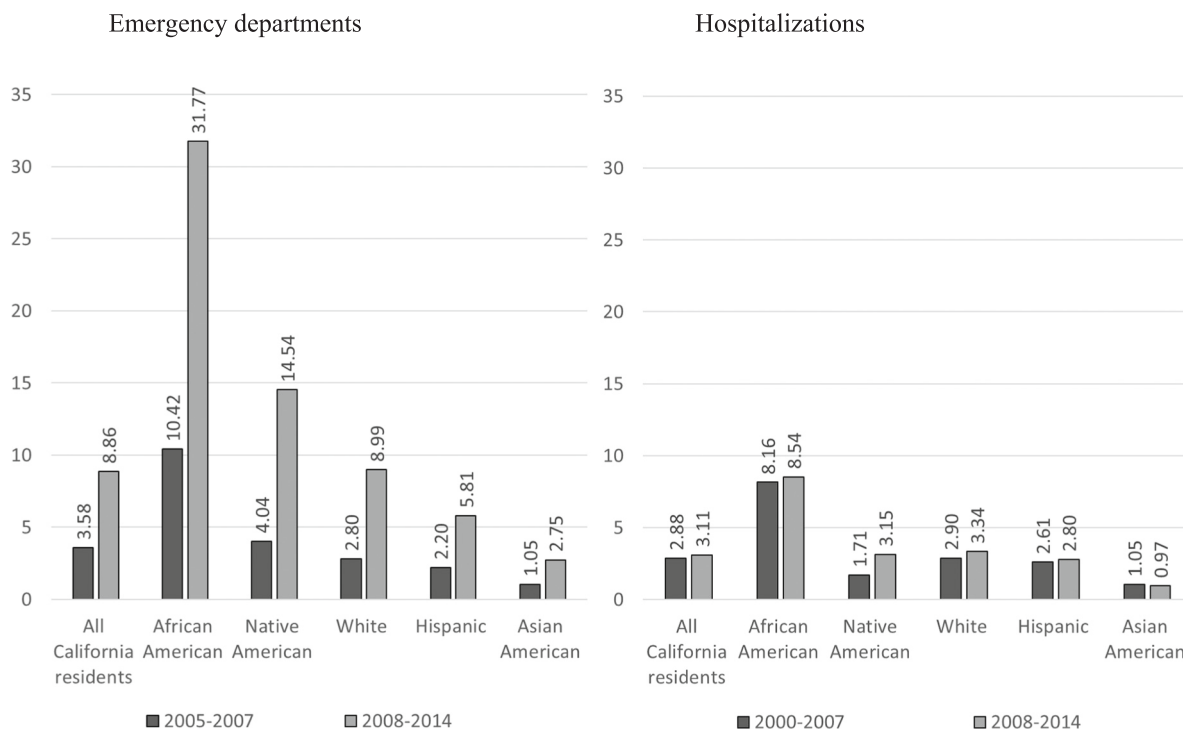


Fig. 1. Domestic violence-related hospitalizations and visits to emergency departments (ED). Ethnic/race age-adjusted rates per 100,000 inhabitants.



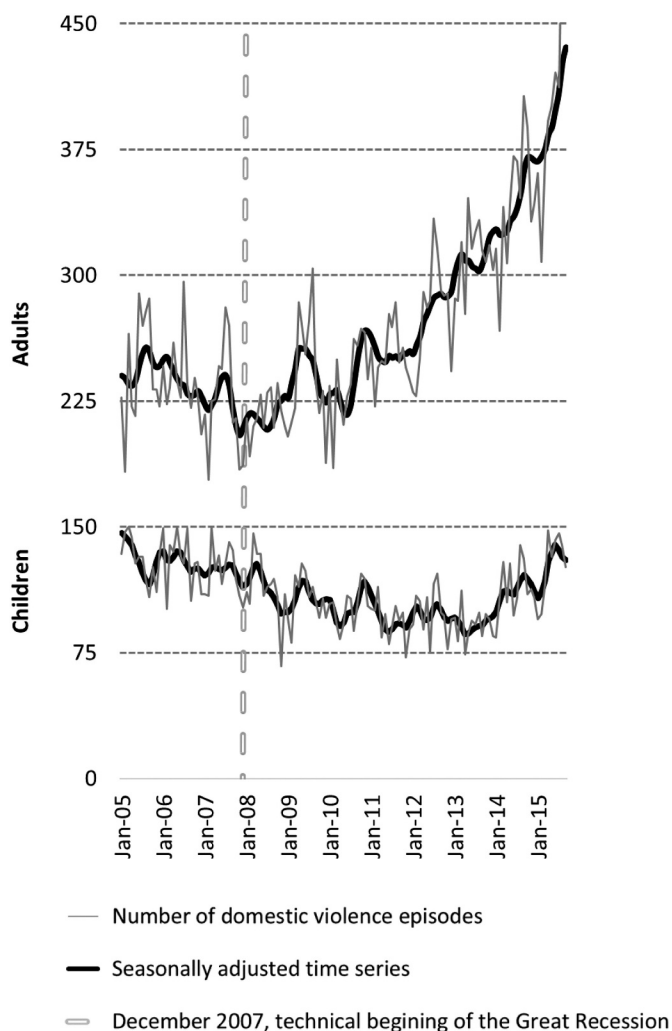


Fig. 3. Domestic violence-related episodes in adults and children in California, January 2005 – Sept 2015.

three times the rates for all California residents in EDs (3.58 vs. 10.42 ED visits per 100,000 in all California residents and African Americans, respectively, during the pre-recession period; 8.86 vs. 31.77 during the recession/post-recession period) and hospitals (2.88 vs. 8.16 during the pre-recession period; 3.11 vs. 8.54 during the recession/post-recession period). ED rates increased for all Californians in the recession/post-recession period compared to the pre-recession; however, Native Americans were disproportionately affected. Hospitalization rates remained fairly similar from the pre-recession as compared to the recession/post-recession period except for Native Americans, which nearly doubled.

Fig. 2 shows the monthly number of DV episodes in hospitals and EDs. An abrupt turning point was found for ED visits in December 2007, during the technical beginning of the Great Recession; ED visits decreased 1.48 episodes per month during the pre-recession period and then increased 0.35 episodes per month during the recession/post-recession period (slope increase 1.83 (−1.48 vs. +0.35),  $df = 66$ ,  $t$ -ratio = −5.35,  $p < 0.0001$ ). The number of DV-related hospitalizations per month began a slow but steady step increase in April 2007 [mean difference = 15.5 (77.5 vs. 93.0);  $df = 114$ ,  $t$ -test = −13.9,  $p < 0.0001$ ], during the mortgage market crisis.

Fig. 3 displays the monthly overall number of DV episodes (services in hospitals and EDs combined) for adults and minors between January 2005 and September 2015 (no available ED data prior to January 2005). There was no statistically significant change for minors between

the pre-recession and recession/post-recession time periods. However, DV-related episodes in the adult population began to rise starting December 2007, the technical beginning of the Great Recession [slope increase 1.57 (−0.80 vs. 0.77);  $df = 66$ ,  $t$ -ratio = −15.249,  $p = 0.0001$ ].

The monthly number of DV episodes in the adult population by type of abuse is displayed in Fig. 4. Both neglect (nutritional) and emotional/psychological abuse began to increase pre-recession ([June 2006; slope increase 0.38 (−1.2 vs. −0.82);  $df = 32$ ,  $t$ -ratio = −2.91,  $p = 0.0065$ ] and [December 2006; slope increase 0.17 (−0.08 vs. +0.09);  $df = 44$ ,  $t$ -ratio = −3.995,  $p = 0.0002$ ]), respectively. Physical abuse increased beginning December 2007 [slope increase 2.234 (−0.9 vs. +1.33);  $df = 66$ ,  $t$ -ratio = −15.249,  $p = 0.0001$ ], and other/unspecified abuse began to rise December 2008 [slope increase 0.62 (−0.31 vs. +0.32);  $df = 90$ ,  $t$ -ratio = −13.987,  $p = 0.0001$ ]. Adult sexual abuse remained unchanged until the beginning of February 2014 [slope increase 2.5 (+0.12 vs. +2.62);  $df = 34$ ,  $t$ -ratio = −9.725,  $p = 0.0001$ ]. This time point was also associated with an uptick in cases of minor abuse (Fig. 3, [slope increase 1.41 (−0.01 vs. +1.4);  $df = 34$ ,  $t$ -ratio = −3.773,  $p = 0.0006$ ]).

#### 4. Discussion

We conducted one of the first studies, to date, to examine the impact of a modern recession on DV rates and hospital and ED visits. Our findings show that the number of DV episodes per month dramatically increased from 182.0 to 386.2 between the pre- and post-recession and was mainly attributable to physical abuse episodes in adults, with African American and Native American persons disproportionately impacted. Co-existing psychiatric conditions and in-hospital mortality ratios also increased over time, along with charges per hospitalization. Our findings corroborate existing studies showing a correlation between financial stress and DV-related events (Pillemer et al., 2016; Renzetti, 2009; Schneider et al., 2016; Schneider et al., 2017; Berger et al., 2011).

For the period analyzed (2000–2015), the estimated total charge for all analyzed DV hospitalizations (data not available for EDs) was over one billion dollars (\$1,136,165,861). Length of hospital stays slightly increased during the recession/post-recession period as compared to the pre-recession period, yet the inflation-adjusted charge per hospitalization dramatically increased over time. It is important to note that the described increase in DV-related hospitalizations during the recession does not correspond to a general trend in healthcare in California. For example, California cancer hospital rates dropped during the recession (OSHPD, 2020; Gomez et al., 2017). However, an increasing demand for emergency care during the recession and post-recession period has been reported and may reflect limitations in accessing care in other parts of the healthcare system (Hsia et al., 2018). The number of co-existing conditions and in-hospital mortality ratios increased over time, suggesting a rise in the number of more severe DV episodes during the recession/post-recession period. Increases were also seen in the number of DV-related hotline calls during the recession (Renzetti, 2009) and police reports (Becerra, 2018; Harris, 2009). Moreover, the number of California police calls for weapon-involved DV episodes steadily increased from 2008 to 2014 (65,219 vs. 75,102, respectively); the percentage of murders that involved DV with respect to the total murders committed in California was relative stable between 2000 and 2007 (8.4% vs. 8.3%, respectively), but abruptly increased from 2008 to 2010 (8.1% vs. 12.3%, respectively) (Becerra, 2018; Harris, 2009). An increasing number of co-existing psychiatric conditions was found in both ED and hospital admissions. Psychiatric comorbidity, including substance abuse, was found in approximately 50% of DV patient. Importantly, the true number of co-existing conditions, including psychiatric conditions, could be much higher because not all coexisting conditions are reported; as a standard rule only those that contribute to explaining the health care service must be reported.

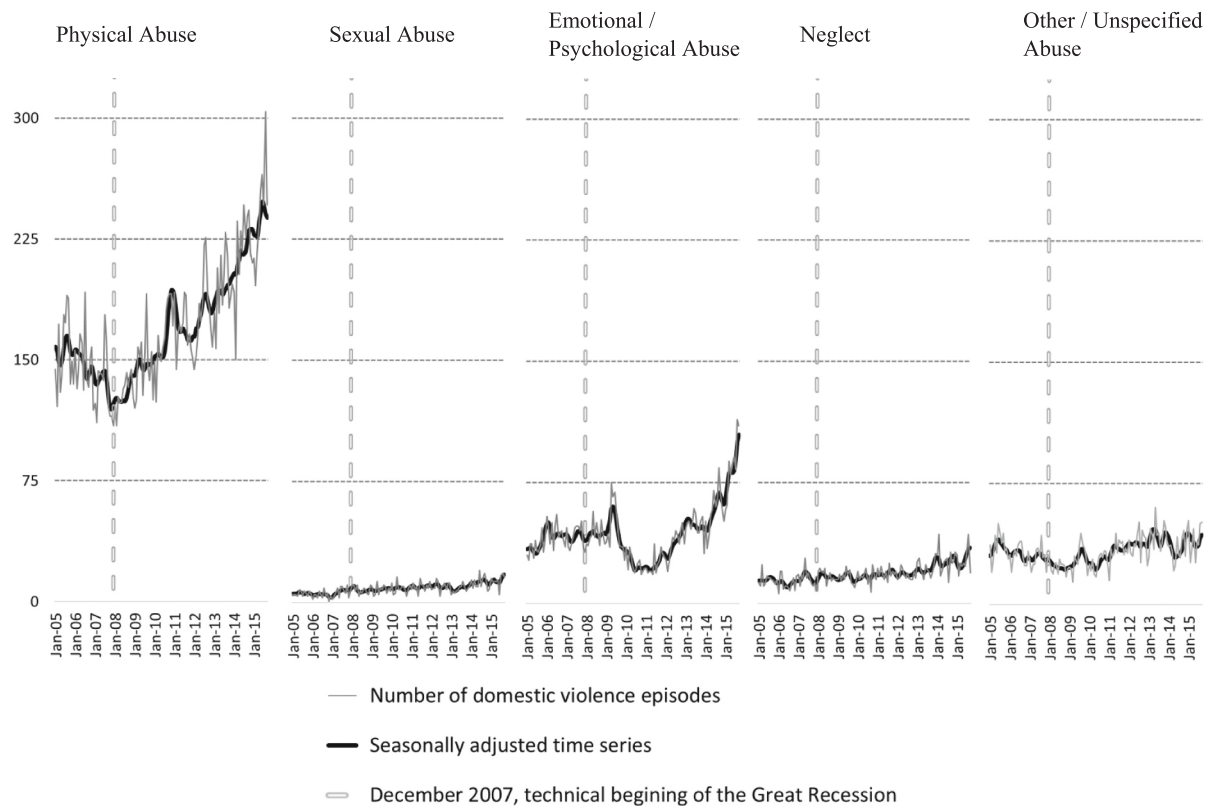


Fig. 4. Domestic violence-related episodes in the adult population (18+) by type of abuse in California, January 2005 – Sept 2015.

DV is among the most underreported crimes worldwide (Strong et al., 2010), and DV-related hospitalizations and visits to EDs represent particularly severe cases. Therefore, DV-related health services are generally considered to be only the tip of the epidemiologic iceberg, with minoritized people and populations highly impacted (Office of Women's Health, 2012). Our study findings showed that ED visits and hospitalizations were disproportionately higher in African American and Native American persons as compared to others.

Our findings bear important information for health care providers and systems in preparing for future recessions. Screening for DV in health care settings is important and can be done successfully (O'Doherty et al., 2015; Feltner et al., 2018). Drawing from our early learning in the novel coronavirus (COVID-19) era – which has had widespread economic ramifications (Semuels, 2020; RT, 2020; Menickella, 2020) – health care providers and systems should establish systematic partnerships with community-based partners specializing in DV service provision and should implement safe, proactive outreach to persons experiencing domestic violence and/or at high risk for domestic violence. Bonomi and Martin (2020) recently described professional advocacy models that involve safely and proactively connecting with DV victims via text message to buffer against abusers' manipulation strategies. Viveiros and Bonomi (2020) suggest such safe, proactive outreach is especially needed for minoritized people, who may be especially isolated, experiencing disconnections from services, and facing extreme financial stress.

In line with our results, intimate partner violence increased during the 2007 Great Recession in the U.S. (Schneider et al., 2016). We found an abrupt turning-point for the overall number of DV episodes that began in December 2007, mainly attributable to physical abuse in the adult population. There is also scientific evidence that child abuse increased during the 2007 Great Recession in the U.S (Schneider et al., 2017; Berger et al., 2011). However, we found no significant increasing trends for the overall number of DV episodes in minors in California during the economic recession. We do not have a plausible reason that

can explain why the recession had a dramatic impact on hospitalizations and visits to EDs by adults while no impact on services utilization was found for minors.

Many of the DV hospital episodes studied here involved emotional abuse, and neglect, among others, rather than physical abuse. One-third of U.S. women experience intimate partner emotional/psychological abuse during their lifetime (Smith et al., 2018). While the links between economic insecurity and economic abuse are emerging, the need to include financial abuse (often hidden and invisible) as a form of DV has garnered great attention in the scientific literature (Postmus et al., 2020). Importantly, the Trump administration made significant changes to the definition of DV and sexual assault in April 2019. The new definition only considers physical harm that constitutes a felony to be DV. Therefore, those experiencing psychological/emotional or economic harms may no longer fall under the U.S. Department of Justice's definition of DV. Narrowing the definition of DV is inconsistent with scientific knowledge (Postmus et al., 2020). According to experts, the new definition will have significant repercussions for millions of victims of DV; narrowing the definition will lead to victims not being able to access protection and DV services and the number of trials for domestic and sexual violence will be reduced (Oppenheim, 2019; Nanasi, 2019).

Our study has strengths and limitations. The main strength is the use of a large representative dataset. A core limitation is that the study design precluded establishing causal relationships between the recession and DV-related service use. A second limitation is the potential for omitted variables bias; we did not have access to data representing the full range of variables that could influence DV-related correlates. Finally, many health settings fail to screen for domestic violence adequately (Schafer et al., 2008; Rudman, 2000). Therefore, a significant portion of DV-hospitalizations could be missed. On the other hand, there has been a significant effort over the past decades to expand and improve DV evidence-based screening processes in healthcare settings, which could explain the increase in DV observed over time in California.



Our findings provide evidence for the impact of economic recessions on DV episodes, and DV-related ED visits and hospitalizations. Given the impending economic recession due to the novel coronavirus, and future recessions, we urge improving DV screening, prevention and response and expanding research. Such research should focus on the most economically and socially vulnerable populations, including systematic strategies for proactive outreach (Bonomi and Martin, 2020; Viveiros and Bonomi, 2020).

#### CRedit authorship contribution statement

**Alvaro Medel-Herrero:** Conceptualization, Data curation, Funding acquisition, Methodology, Formal analysis, Writing - original draft. **Martha Shumway:** Data curation, Funding acquisition, Methodology, Writing - review & editing. **Suzette Smiley-Jewell:** Data curation, Funding acquisition, Methodology, Writing - review & editing. **Amy Bonomi:** Data curation, Funding acquisition, Methodology, Writing - review & editing. **Dennis Reidy:** Data curation, Funding acquisition, Methodology, Writing - review & editing.

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#### Declaration of competing interest

We have no conflicts of interest to declare.

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