Intersectional Statistical Methods and Intimate Partner Violence:
Characterizing IPV reporting delays in Los Angeles, CA (2010-2023)

Sofia Barragan
[1] Department of Biostatistics, University of Washington

UNIVERSITY of WASHINGTON

INTRODUCTION

Intimate partner violence (IPV) is embedded within complex social processes and power structures, resulting in pronounced disparities of victimization and resource utilization across groups.

Black, Native, and Multiracial people exhibit the highest rates of IPV, with over half experiencing victimization at some point in their lives. While lifetime IPV prevalence is higher in females (47.3%) than males (44.2%), transgender people of any sex experience higher rates of victimization, being subjected to physical and sexual IPV 2.2x and 2.5x more than cisgender people.

Previous work has shown that Black women are most likely to report IPV and access services, whereas Latinx women are among the least likely to seek aid despite elevated risks. Multiple studies have shown that class, community health, housing insecurity, disability, and racism are highly tied to IPV victimization and resource utilization.

The adoption of revolutionary and intersectional analytic frameworks in *quantitative* IPV research is scarce. No previous study has researched the *duration* of IPV reporting delays and no study in the field has conducted subgroup analyses using Multilevel Analysis of Heterogeneity and Discriminatory Accuracy (MAIHDA) techniques.

PURPOSE

This study aims to characterize the duration of IPV reporting delays across intersectionally-defined groups and propose a new method of conducting MAIHDA analyses with time-to-event data.

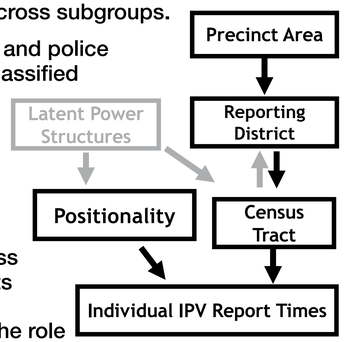
METHODOLOGY

Assault, IPV, and battery crimes perpetrated by the victim's current or former partner/spouse were extracted from geotagged LAPD report records (2010-2023). IPV report delays were computed as the difference between the day of assault and the reporting day. Cases where the victim was a minor or a report was made on the same day were excluded (N=37921).

Information on the victim's age, sex, race/ethnicity, ability status, housing status was extracted from police codes. Tract-level vulnerability measures were extracted from the 2014, 2016, 2018, and 2020 American Community Surveys (ACS) via the CDC's Social Vulnerability Index (SVI) and joined to data.

In line with MAIHDA, demographic variables were collapsed into a positionality variable and used as a second-order strata term in a multilevel model to stabilize estimates across subgroups.

Census tracts, police reporting districts, and police precinct areas were included as cross-classified higher order strata. Due to software limitations, year-specific tract-level measure were averaged across reporting districts to account for multiple membership.



Kaplan-Meier curves were estimated to visualize reporting time differences across subgroups. Variance partition coefficients computed from posterior marginals of hyperpriors were estimated to quantify the role of intersectional identities on IPV report time heterogeneity.

PROPOSED MODELING STRATEGY

The data's complex hierarchy violates Cox frailty assumptions. We exploit the Poisson-Cox relationship, by fitting an approximate-Bayesian Poisson GLMM with interval-exploded offsets to robustly approximate a Cox frailty model with piecewise constant hazards in INLA. Our proportional hazards model is of the form:

$$\tau_{u_q} \sim^{iid} \text{PC}(2.939, 0.01)$$

$$u_{\text{p}(i)}, u_{\text{d}(i)}, u_{\text{a}(i)} \sim^{iid} N(0, \tau_q^{-1})$$

$$\lambda_i\left(t_{ik} \mid \boldsymbol{X}_{ik}, \boldsymbol{Z}_{ik}, \mathbf{U}\right) = \lambda_k \cdot \exp\left(u_{\text{p}(i)} + u_{\text{d}(i)} + u_{a(i)} + \boldsymbol{\beta}\boldsymbol{X}_{ik} + \boldsymbol{\Gamma}\boldsymbol{Z}_{ik}\right)$$

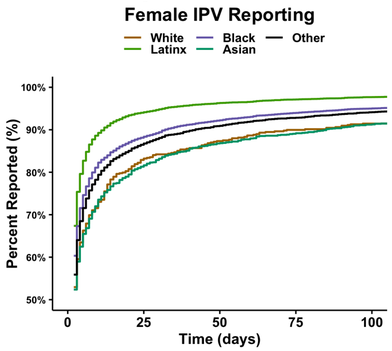
$$\mathcal{L}(\mu_1, \ldots, \mu_m, \boldsymbol{\beta}, \boldsymbol{\Gamma}, \mid \mathbf{U}) \propto \prod_{i=1}^{n}\prod_{k=1}^{m}\left(\lambda_k t_{ik} \exp\left(u_{\text{p}(i)} + u_{\text{d}(i)} + u_{a(i)} + \boldsymbol{\beta}\boldsymbol{X}_{ik} + \boldsymbol{\Gamma}\boldsymbol{Z}_{ik}\right)\right)^{\delta_{ik}} \times \exp\left(-\lambda_k \cdot t_{ik} \cdot \exp\left(u_{\text{p}(i)} + u_{\text{d}(i)} + u_{a(i)} + \boldsymbol{\beta}\boldsymbol{X}_i + \boldsymbol{\Gamma}\boldsymbol{Z}_i\right)\right)$$

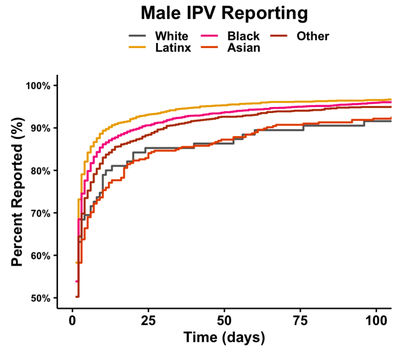
Where t_{ik} is the total time and δ_{ik} is the event indicator of person i in time interval $(t_{k-1}, \text{t}_\text{k}]$ with $k \in \mathbb{N}_{[1,m]}$. λ_k is the interval-specific baseline hazard. The u_j are random frailties of positionality (p_j), precinct area (a_j), and reporting district (d_j) for person i. And $\boldsymbol{\beta}$ and $\boldsymbol{\Gamma}$ are coefficients vectors of the unit and group-level predictors $\boldsymbol{X}_\text{i}$ and $\boldsymbol{Z}_i$.

RESULTS

IPV REPORT DELAYS VARY ACROSS SUBGROUPS

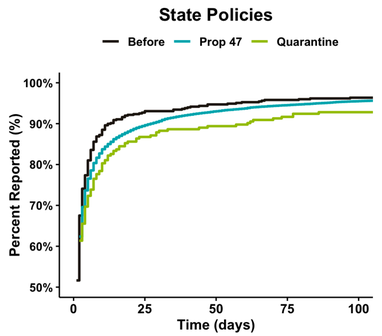
Nearly half of all victims (46.8%) report IPV within one day of their assault, but these trends are not consistent across groups jointly defined by sex and race/ethnicity.



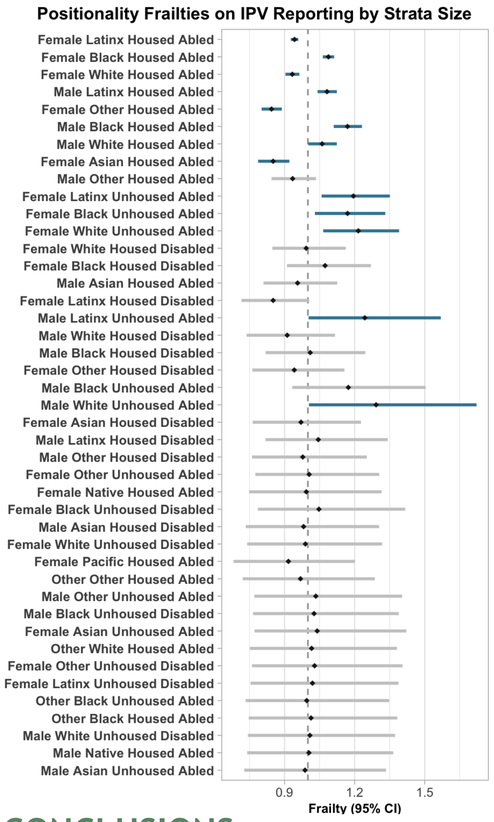


NEIGHBORHOOD FACTORS AND STATE-LEVEL POLICIES AFFECT IPV REPORTING BEHAVIORS

Fixed Effect	E[HR]	95% CI
Weapon Used	0.967	(0.935, 0.999)
Quarantine	0.986	(0.959, 1.013)
Age	0.999	(0.998, 1.000)
Economic Vulnerability Rank	1.000	(0.999, 1.000)
Housing Vulnerability Rank	1.000	(0.999, 1.001)
Poor English Rank	1.024	(0.964, 1.088)
Minor Pop Rank	1.047	(0.999, 1.096)
Minority Pop Rank	1.139	(1.066, 1.217)
Prop 47	1.160	(1.132, 1.186)



FRAILTY MODELS ALLOW FOR SMALL SUBGROUP COMPARISON



Roughly 40%, 25%, 11% of delayed reports occurred in Latinx, Black, and White females that were able-bodied and housed. 7% of report delays occurred in Latinx males that were able-bodied and housed.

Frailty analysis suggests that the baseline hazard was multiplicatively increased for Latinx, White, Asian females and females of other race/ethnicities who were able-bodied and housed, inducing shorter report times.

Report delays were magnified in Black males and females of all other positionalities and nearly all unhoused populations, suggesting greater hesitation to report in these populations.

95% credible intervals of random effects from reporting districts uniformly included 1, while 2.2% (0.923, 5.552) of overall sample variance and 96.47% (85.76, 99.479) of random effect variance was induced by positionality.

CONCLUSIONS

Using an approximate-Bayesian Poisson GLMM approximation of the Cox frailty model, we have shown that IPV reporting behaviors vary across subpopulations, where reporting delays tend to be longer in overpoliced communities.

Greater degree of clustering by identity (VPC=2.2%), than reporting districts (VPC=0.08%), suggesting latent power systems may be more influential on IPV reporting behaviors than police reporting districts and neighborhood factors.

Future MAIHDA methods which directly account for multiple membership and follow-up studies with self-reported demographic information are needed.

IMPACT

Identity-specific experiences of the vectors of oppression— racism, classism, sexism, ableism —may explain observed differences in IPV reporting behaviors.

Observed reporting differences demonstrate the necessity of alternative safety-practices for communities heavily affected by police violence.

Our findings also highlight the necessity of developing new statistical methodologies to more rigorously characterize the social experiences of diverse populations.