Clarifying methods and interpretations in law enforcement mortality surveillance: response to Kamal

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We thank Dr. Kamal for his thoughtful commentary on our article, "Mortality among law enforcement officers in the United States: A population-wide analysis of the National Occupational Mortality Surveillance data, 2020–2023."[1] We appreciate the opportunity to clarify several methodological and interpretational considerations raised in his correspondence.[2]

First, we agree that differences between "usual occupation" (as recorded in the National Occupational Mortality Surveillance [NOMS] data) and "current occupation" (as recorded in the American Community Survey [ACS] data) create a potential numerator–denominator mismatch. Reliance on usual occupation leads to two systematic effects: (1) exclusion of decedents newly employed in law enforcement at death and (2) inclusion of decedents no longer employed due to retirement or career change. Because decedents tend to be older, the latter effect likely contributed to inflation of the numerator. Simultaneously, the denominator may also be inflated since newly employed officers will be included but have few counterparts in our numerator. The net direction of this bias is therefore uncertain, though prior research suggests its overall magnitude is small. National surveys have shown high concordance between usual and current occupation, particularly for law enforcement occupations (Kappa's > 0.79).[3] To minimize potential bias, we restricted our analysis to decedents who died within working age (16–64), as concordance rates decline after age 64.[3] This approach aligns with established practices in federal occupational mortality reports.[4–6] Nonetheless, some residual bias may remain.

Second, regarding causal inference, our study was explicitly descriptive and population-based. We did not seek to infer causation between law enforcement employment and mortality outcomes. The analysis was not designed to disentangle effects of occupational exposure from selection effects or post-employment health trajectories. The "healthy worker effect," as Dr. Kamal notes, is an important unmeasured factor that may bias our estimates in either direction. Longitudinal cohort studies incorporating entry, tenure, and exit data are needed to clarify whether excess mortality arises from occupational causes, pre-existing characteristics, or post-service health patterns.

Third, the temporal context (2020–2023) reflects the extraordinary impact of the COVID-19 pandemic. We addressed this through sensitivity analyses that removed COVID-19-related deaths. These analyses demonstrated that while the pandemic amplified mortality rates, particularly in 2021, it did not fundamentally alter the pattern of elevated risk observed across key axes of variation. We agree, however, that estimates from this period should not be interpreted as a stable long-term baseline. As additional NOMS data become available, ongoing analyses will establish whether mortality among law enforcement officers (LEOs) reverts to pre-pandemic levels or remains elevated.

Finally, we appreciate the comment regarding interpretation of sex-specific mortality rates. We agree that both absolute and relative differences are essential for understanding public health implications. However, we suggest adopting different terminology when discussing the mortality differences noted by Dr. Kamal—age-standardized mortality rates (ASMRs) are themselves relative metrics, and discussions of "absolute risk" are best suited to crude mortality rates. We suggest using "between-occupation" and "within-occupation" to describe the comparisons in question. Dr. Kamal correctly noted that our results were generally reported in terms of between-occupation comparisons (i.e., LEOs compared to the population). However, the within-occupation comparison is important, particularly for policymakers and law enforcement agency leadership focused on the mortality landscape within agencies regardless of outside trends. To illustrate the difference in mortality risk highlighted by Dr. Kamal, we present our original results as rate ratios (RRs), comparing ASMRs of male and female LEOs first to their respective population counterparts (between-occupation) and then to each other (within-occupation) (Table 1). We calculated RRs for all-cause mortality and all specific causes (aggregated to the chapter level of the International Classification of Disease, 10th Revision) for which ASMRs for both male and female LEOs were presented in the original manuscript (see

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Cause of death (ICD-10 chapter)	Men: LEOs vs. Pop. RR (95% CI)	Women: LEOs vs. Pop. RR (95% CI)	LEOs: men vs. women RR (95% CI)
All causes	1.08 (1.06, 1.10)	2.21 (2.12, 2.30)	1.05 (1.01, 1.10)
Cancer (2)	1.50 (1.44, 1.56)	2.87 (2.67, 3.08)	0.61 (0.56, 0.66)
Circulatory (9)	1.24 (1.20, 1.29)	2.18 (1.98, 2.41)	1.46 (1.31, 1.62)
Respiratory (10)	0.91 (0.82, 1.01)	2.05 (1.69, 2.49)	0.63 (0.51, 0.78)
Digestive (11)	0.97 (0.90, 1.04)	1.65 (1.38, 1.99)	1.16 (0.96, 1.42)
External (20)	0.69 (0.66, 0.72)	1.81 (1.62, 2.02)	1.38 (1.23, 1.55)

Rate ratios (RRs) and 95% confidence intervals (CIs) were calculated using the age-standardized mortality rates (ASMRs) reported in the main text and Supplementary Material of the original manuscript. For reference, see Table 2 (all-cause mortality) and supplementary Table 9 (cancer), 14 (circulatory), 15 (respiratory), 16 (digestive), and 18 (external). Abbreviations: CI = confidence interval: ICD-10 = International Classification of Disease 10th revision; LEO = law enforcement officer; Pop. = working-age population; RR = rate ratio.

Table 1: **Rate ratios of all-cause and cause-specific mortality rates for between- and within-occupation comparisons.**

Supplementary Material for description of the calculation of RRs and CIs). The within-occupation comparisons made in the last column of Table 1 indicate that male LEOs generally exhibit a greater mortality risk than female LEOs, except for cancer and respiratory mortality.

We appreciate the opportunity to clarify our methodological decisions and acknowledge limitations inherent to population-based mortality studies. Our analysis established a transparent, reproducible baseline of mortality risk for U.S. law enforcement officers using population-wide data—with the understanding that available NOMS data make our findings period-specific. We view this work as a foundation upon which more finely resolved analyses incorporating active-duty indicators, service length, and post-retirement trajectories can build. Constructive engagement such as Dr. Kamal's will help ensure that future investigations continue to refine our understanding of occupational mortality among LEOs in the United States.

Contributors
This manuscript was conceived of and written by PTT and MHM. Editorial review was provided by JCB and JPB. PTT coordinated the submission. PTT, JCB, JPB, and MHM critically reviewed the manuscript and approved the final version.

Declaration of interests
The authors declare no conflict of interest.

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Appendix A. Supplementary data
Supplementary data related to this article can be found at https://doi.org/10.1016/j.lana.2025.101330.

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