Citation

11. Korinek, Kim, Yvette Young, Nhung Tran, Miles Kovnick, and Nguyen Thi Kim Chuc. Gender, Exposure to Wartime Stressors and PTSD in Late Life – An Analysis of the Vietnam Health and Aging Study. (preliminary results – manuscript in preparation)

Abstract

Growing shares of women in militaries around the world, coupled with vast segments of women within war-affected populations globally, raise questions about gender as it structures trauma exposure, posttraumatic stress disorder (PTSD) and other mental health consequences of war. Critical questions for theory, policy and practice concern women's and men's responses to stress exposures in war and how these exposures differentially manifest in late-life mental health. Additionally, major life transitions and stressors related to aging, such as financial hardship and personal loss, may contribute to enduring PTSD symptoms into late adulthood. Our analyses rely upon the 2018 Vietnam Health and Aging Study (VHAS), which details multiple dimensions of health and wartime stress exposures within a population-based sample of over 2,400 Vietnamese older adults who occupied military, militia and civilian roles during the Vietnam War. We estimate Poisson regression models to assess the gendered associations between wartime stress exposures and PTSD symptoms in older adulthood. Our analyses demonstrate that among both men and women, the severity of recent PTSD symptoms is significantly and positively associated with the severity of wartime stress exposure. Stress exposure indices that distinctly assess exposure to death, dying and life threat; displacement; and malevolent environment each demonstrate a significant, positive association with recent PTSD symptoms. We further find that women experience a greater PTSD penalty associated with their war-time stress exposures as compared to men with parallel wartime stress exposure levels. Finally, we find that, net of wartime stressors, PTSD symptoms are significantly greater among respondents who have experienced more numerous recent stressful life events, such as major illness, financial hardship, or the death of a loved one. We conclude that women who've survived major wars, as soldiers and as civilians, carry a significant burden of the long-lasting mental health burden of armed conflict.

Citation

10. Zimmer, Zachary, Kim Korinek, Yvette Young, Bussarawan Teerawichitchainan, and Tran Khanh Toan. Does war hasten aging? The long-term association between war exposure and frailty among older adults in Vietnam. (preliminary results – manuscript under review at *The Lancet*)

Abstract

Rapid population aging in low- and middle-income countries underlies growing populations of moderately and severely frail older adults globally. Building upon past research which demonstrates the long lasting consequences early life stress for frailty in older adulthood, our study considers how frailty associates with extensive, heterogeneous and oftentimes severe exposures to diverse war-related stressors experienced by men and women who were civilians, militias and military members during the American War in Vietnam. We analyze data from the Vietnam Health and Aging Study (2018) to examine the association between war experiences earlier in life and frailty in old-age in Vietnam, a country with a rapidly aging population that lived through particularly long and harsh wartime periods. We use

characterize wartime stress exposure through a Latent Class Analysis (LCA) strategy that structurally divides VHAS participants into groups exposed to greater versus fewer numbers of traumatic experiences, while also considering the patterning of stressor experiences into clusters. We then use fractional regression models to examine associations between wartime exposure classes and a deficit-accumulation measure of frailty. Our study results support the notion that wartime trauma significantly ages people. We observe the highest levels of frailty highest levels in exposure classes with high probability of living in intensely bombed regions and having witnessed death first-hand, among other possible exposures, suggesting that these may be particularly consequential experiences for pronounced frailty in late life. Our results suggest that high levels of frailty may affect other aging population cohorts globally that have engaged in traumatic conflict within economically developing settings.

Citation

9. Yvette Young, Kim Korinek, Zachary Zimmer, Tran Khan Toan. Forthcoming. "Assessing Exposure to War-related Traumatic Events in Older Vietnamese War Survivors." Conflict and Health.

Abstract

Background: Though studies measuring war-related stressors and resultant trauma among U.S. military veterans are abundant, few studies address how wartime stressors affect military veterans native to warzones. Even fewer assess the stress exposure and resulting trauma experienced by civilians. This study aimed to construct a scale to evaluate wartime stress exposure relevant for civilians and military veterans who survived the American War in Vietnam.

Methods: The study analyzed data from a novel source, the Vietnam Health and Aging Study, which surveyed older men and women residing in central and northern Vietnam. We used a combination of exploratory and confirmatory factor analysis with posthoc tests of reliability and validity to derive measures for assessing exposure to war-related traumatic events.

Results: We found that a mix of exposure to death, combat, inhospitable living conditions, and forced displacement comprises the traumatic events that potentially contribute to posttraumatic stress disorder and other mental health problems. However, the particular mix of stressful experiences constituting war trauma differs for civilians, veterans of the formal military, and former members of paramilitary organizations.

Conclusions: These findings suggest the need for distinct, but parallel approaches to measuring war-related stressors for populations of veterans and civilians exposed to war in their home countries, and the need for greater public attention to the potential lingering trauma of noncombatants.

Keywords: combat, nearness to death, inhospitable conditions, displacement, posttraumatic stress disorder, aging, Vietnam

Citation

8. Yvette Young, Kim Korinek, and Nguyen Huu Minh. A Life Course Perspective on the Wartime Migrations of Northern Vietnamese War Survivors. (preliminary results – manuscript under review at *Asian Population Studies*)

Abstract

Research addressing conflict and migration has made great strides in explaining the relationship between violence and migration. However, it lacks individual-level data on exposure to war. We use survey data from the 2018 Vietnam Health and Aging Study to examine the associations between war-related violence exposure during the American War and the wartime migrations of northern Vietnamese war survivors. We investigate three groups of factors influencing migration — war-related events, economic circumstances, and demographic and life course factors — to explore the relationship between war exposure and migration, inclusive of deployments, economic moves, and displacements. Our findings indicate that the effects of war exposure, socioeconomic status, and demographic characteristics diverge for different types of migration. These findings, framed within the life course and historical context, suggest the need to thoughtfully delineate both war exposures and traditional causes of migration to understand the diverse types of mobility occurring during periods of armed conflict.

Keywords: agency, displacement, gender, historical context, economic migration, timing

Citation

7. Kim Korinek, Zachary Zimmer, Bussarawan Teerawichitchainan, Yvette Young, Miles Kovnick, Cao Long, and Tran Khanh Toan. Cognitive Function in the Context of Early Life Wartime Stress Exposure: An Analysis of Cognitive Decline in a Cohort of Vietnamese Older Adults. (preliminary results – manuscript in preparation)

Abstract

Alzheimer's disease is considered a leading cause of death in a number of lower- and middle-income countries, but literature on correlates of later-life cognitive decline in these contexts is sparse. This is particularly the case in several rapidly aging Asian nations. According to a life course framework, different episodes in early life such as the "hidden variables" of military service and stress-laden experiences can result in psychological and physical scars that exert long-reaching impacts on one's later-life health including cognitive. Therefore, extending the current literature, this study utilizes a novel source of data from the Vietnam Health and Aging Study (VHAS) to examine associations between early-life war-related stressors and later-life cognitive disorder in a cohort of older Vietnamese adults whose transition to adulthood took place during the American war (or widely known as the Vietnam War). Our study considers cognitive function, as assessed by a modified format Mini Mental State Examination (MMSE) score, in a sample of 2,447 older adults living in four districts of Northern and Central Vietnam that were differentially exposed to wartime bombing. Results of survey-adjusted OLS regression analyses indicate some specific types of war-related trauma relate to later life cognitive function, but effects are mediated through PTSD, late life physical health, recent major stressful life events, and emotional support. These forms of mediation present opportunities for intervention to mitigate cognitive decline in Vietnamese older adults and potentially within other post-conflict settings.

Citation

6. Korinek, Kim, Jefferson Schmidt, Eleanor Brindle, Tran Khanh Toan, Yvette Young, and Zachary Zimmer. Subjective Age in a Post-Conflict Context: An analysis of Biological, Psychosocial and Life Course Stressors in the Vietnam Health and Aging Study, Manuscript in Progress. (preliminary results – manuscript in preparation)

Abstract

Background
Extensive research documents subjective ages' association with numerous chronic diseases. Extending analyses to biological, sociological and psychosocial characteristics in culturally and materially diverse low-middle income populations will enrich understanding of the underpinnings of subjective age.

Study Methods
We utilize data from the 2018 Vietnam Health and Aging Study (VHAS) to analyze a series of biological, psychosocial, and sociodemographic correlates of subjective age. The VHAS sample (N=2,447) comprises older adults experiencing diverse early-midlife war-related stressors, recent life event stressors, and livelihood conditions, which jointly influence physical and mental health. Biomarkers include anthropometry (weight, height, middle-upper arm and calf circumference), physical performance tests (peak expiratory flow and grip strength), HbA1c and hematology measures obtained through point-of-care assays of capillary blood. Key psychosocial covariates include recent psychological distress, life event stressors and war-related stressful events and living conditions. Models are adjusted for a series of demographic, socioeconomic, and self-reported health outcomes. Our outcome variable is a categorical assessment of subjective age (feeling older, younger, or approximately one's age).

Results
Nearly half of the VHAS sample reports feeling older than their chronological age. Multinomial logistic regression analyses demonstrate that old subjective age is more likely among subjects with middle-upper arm and calf circumference below established thresholds and low BMI. Hematocrit levels are inversely associated with subjective age. Among the strongest predictors of older subjective age are recent life event stress, psychological distress, multiple ADLs and comorbidities.

Discussion
Biomarkers of undernutrition, in particular mid-upper arm circumference, calf circumference, BMI and hematocrit, demonstrate significant associations with subjective age in this middle-income, post-conflict setting. The toll of difficult, post-conflict living conditions, manifest in psychological distress and recent life event stressors, leads many to feel older than their chronological age. Additional analyses can illuminate how lifetime food insecurity and undernutrition influence subjective age and chronic disease.

Citation

5. Kovnick, Miles, Yvette Young, Nhung Tran, Bussarawan Teerawichitchainan, Tran Khanh Toan, and Kim Korinek. The Impact of Early Life War Exposure on Mental Health among Older Adults in Northern and Central Vietnam, (Revise and Resubmit, *Journal of Health and Social Behavior*).

Abstract

Most older Vietnamese who experienced the American War in Vietnam as young adults were exposed to war-related violence, which can exert a lifelong impact. We analyze survey data collected among

Vietnamese older adults in the 2018 Vietnam Health and Aging Study (*N* = 2,447) to examine the association between various war traumas, psychological distress and suicidal ideation. Informed by life course and stress process perspectives, we use structural equation models with multiple mediators to analyze the relationship between mental health outcomes and five types of wartime stress exposure: loss of family and friends; witnessing death; malevolent living conditions; life threat; and moral injury. Our findings reveal enduring mental health impacts of war among survivors. Wartime stress exposure's influence on mental health is mediated by recent comorbidities and stressful life events. Loss of family members, witnessing death, and malevolent living conditions during war are particularly salient risks for psychological distress.

Keywords: late life mental health, psychological distress, suicide ideation, recent life stress, war stress exposure, Vietnam War

Citation

4. Teerawichitchainan, B., Korinek, K., Zimmer, Z., & Nguyen, H. M. (n.d.). Vietnam's Long Shadows of War: Trauma Exposure, Social Support, and Later-life Health among Vietnamese Survivors (preliminary results – manuscript in preparation)

Abstract

Social support has been reliably linked to lower morbidity and mortality rates among older persons. Nevertheless, little is known about the importance of social support in moderating extreme stress such as those experienced during wartime and its long-term health consequences among surviving populations in less-developed settings. Vietnam provides a uniquely illustrative setting to address the research gap. The country witnessed protracted military conflicts with the French and Americans over much of the 20th century and bore a heavy societal toll, including not only death and injuries but also severed social fabrics. Based on the 2018 Vietnam Health and Aging Study, this paper examines the associations between war trauma exposure, social support, and old-age health outcomes among Vietnamese war survivors aged 60 and older. We assess how social support—including social relationships with family and community members, as well as those with military comrades—varies by gender and war trauma exposure. We further examine the extent to which social support is associated with older persons' current health status, particularly how it matters for the deleterious effects of war stress. Preliminary findings show little variation in familial and community social support among war survivors, regardless of their wartime experience, although male and female veterans demonstrate significant differences in military social support. Importantly, we find that while social support, particularly close relationships with children, is protective of ill health in old age, war trauma exposure in early life has enduring negative effects on later-life health that operate primarily through post-traumatic stress disorder.

Citation

3. Zachary Zimmer, Kathryn Fraser, Kim Korinek, Mevlude Akbulut-Yuksel, Yvette Marie Young, Tran Khanh Toan, War across the life course: examining the impact of exposure to conflict on a comprehensive inventory of health measures in an aging Vietnamese population, *International Journal of Epidemiology*, dyaa247, https://doi.org/10.1093/ije/dyaa247

Abstract

Background

The majority of evidence indicates that exposure to war and other traumatic events continue to have negative impacts on health across the life course. However, existing research on health effects of war exposure primarily concentrates on short-term impacts among veterans in high-income countries sent elsewhere to battle. Yet, most wars situate in lower- and middle-income countries, where many are now or will soon be entering old age. Consequently, the current burden of exposure to war has ignored an important global population.

Methods
The Vietnam Health and Aging Study (VHAS) is a longitudinal study designed to examine historical exposure to highly stressful events during the American War. Two modes of data collection, involving a sample of 2447 individuals aged 60+ years in northern Vietnam, took place between May and August 2018. Using this first wave of data, we generate indexed measures of war exposure and analyze their associations with a set of 12 health outcomes, accounting for confounding variables.

Results
Results indicate that greater exposure to three types of war exposure (death and injury, stressful living conditions, and fearing death and/or injury) in earlier life is associated with worse health in later-life across a large number of health outcomes, such as number of diagnosed health conditions, mental distress, somatic symptoms, physical functioning, post-traumatic stress symptoms and chronic pain.

Conclusions
Findings support a life course theory of health and point to long-term effects of war on health that require detailed attention.

Citation

2. Korinek, K., Young, Y., Teerawichitchainan, B., Chuc, N. T. K., Kovnick, M., & Zimmer, Z. (2020). Is war hard on the heart? Gender, wartime stress and late life cardiovascular conditions in a population of Vietnamese older adults. *Social Science & Medicine*, *265*, 113380. doi: 10.1016/j.socscimed.2020.113380

Abstract

Populations in the global south are disproportionately exposed to the stressors of development, disaster and armed conflict, all of which heighten cardiovascular disease (CVD) risk. We consider how war-related stressors exert a lasting influence upon population health, in particular the cardiovascular health of war survivors now entering older adulthood. Data come from the 2018 Vietnam Health and Aging Study conducted among 2447 northern Vietnamese adults age 60 and older. We conduct survey-adjusted logistic regression analyses to examine the associations among respondents' wartime exposure to combat and physical threat, malevolent environment conditions, and four CVD conditions (hypertension, dyslipidemia, heart disease, and stroke). We examine posttraumatic stress disorder (PTSD) as it mediates the association between wartime stress exposures and late life CVD, and gender as it moderates the relationship between wartime stressors and CVD. We find that exposure to wartime combat and violence, as well as malevolent living conditions, exhibit significant, positive associations with cardiovascular conditions. These associations are mediated by the severity of recent PTSD symptoms. For certain CVD conditions, particularly hypertension, the associations between wartime stressors and late life cardiovascular conditions diverge across gender with women experiencing a greater penalty for their exposure to war-related stressors than their male counterparts. We conclude that the stressors of war and resultant PTSD, widespread in this cohort of Vietnamese older adults who endured myriad forms of war exposure during their young adulthood, exhibit modest, yet significant associations with late-life

cardiovascular conditions. Women, especially those exposed to wartime violence and combat, bear this CVD burden alongside men.

Citation

1. Korinek, K., Teerawichitchainan, B., Zimmer, Z., Brindle, E., Nguyen, T. K. C., Nguyen, H. M., & Tran, K. T. (2019). Design and measurement in a study of war exposure, health, and aging: protocol for the Vietnam health and aging study. *BMC public health*, *19*(1), 1-11. doi: 10.1186/s12889-019-7680-6

Abstract

Background

Survivors of war throughout the world experience illnesses and injuries that are crucial to understand, given the ongoing treatment and adaptation they demand. In developing countries like Vietnam, where population aging and chronic disease burdens are rapidly rising, aging populations have seen a disproportionate share of armed conflict and related casualties. This paper describes the Vietnam Health and Aging Study (VHAS), a unique resource for investigating mechanisms of association between diverse exposures to armed conflict during the Vietnam War and multiple dimensions of older adult health among survivors of that war.

Methods

The VHAS utilizes a longitudinal design, the first wave of data collection conducted in 2018 among 2447 older adults. A second wave of follow-up data collection, scheduled to take place in 2021, will examine life course, social relational and health and mortality transitions. The VHAS was conducted in four northern Vietnamese districts purposively selected to represent a spectrum of war exposure as indicated by intensity of bombings. Additionally, VHAS uses random sampling within gender and military service subdomains to permit unique gender-specific analyses of military service, trauma exposure and health. The VHAS' face-to-face interviews include modules detailing war and military service experiences; warzone stressors; and multiple dimensions of health such as chronic disease, functional limitation, disability, health behaviors, cognition and psychological health. Biomarker data collected for the full VHAS sample includes anthropometric and functional tests such as grip strength and blood pressure, hair samples for cortisol assay, and capillary blood samples to assay C-reactive protein, cholesterol, HbA1c, and other markers of interest for cardiovascular and other disease risks and for testing the impact of early life stressors on later life health. Blood samples will also permit epigenetic analysis of biological aging.

Discussion

Future VHAS investigations will examine dynamic linkages between war exposure, mortality and morbidity, while taking into account the selective nature of each of these processes. Longitudinal analyses will examine late-life health transitions and war-related resiliency.