How Does Exposure to War Influence Late Life Health? An Examination of Self-Rated Health and Health Pessimism Among Vietnamese Older Adults with Diverse Exposures to Early Life War Stressors

Kim Korinek, University of Utah
Robert Tennyson, University of Utah; University of Washington
Sahlil Ahmed, University of Utah

Abstract: The toll of war on populations is far more devastating when we account not only direct casualties on the battlefield, but also mortality and morbidity that occurs year later. Accordingly, we ask: 'How does the long arm of war and its associated violence and deprivation extend from early adulthood to affect the health of war survivors in older adulthood?' Using a life course logic, we examine both direct and indirect pathways between early life war exposure and late life self-rated health, and consider physical, functional, and mental health pathways of influence. We analyze survey and biomarker data from the Vietnam Health and Aging Study, conducted in 2018 among 2,447 men and women age 60 and older in four northern Vietnamese districts that experienced widely variant exposure to the American War in Vietnam. Our focal dependent variables are self-rated health (ordinal) and health pessimism (continuous), our focal independent variables are indices of exposure to violence and malevolent environmental conditions during the American War, and mediating variables include counts of current physical health problems and ADLs, and an index of psychological distress (SRQ-10). Generalized structural equation models are used to estimate ordered logistic regression analyses of SRH and Poisson regression analyses of health pessimism. Preliminary results suggest that the effects of wartime exposure to violence and malevolent environments on late life SRH are mediated through their effects on physical health conditions, SRQ-10 scores, and ADLs (all p's<0.01). The direct effects of the war exposure indices are not significant in preliminary model estimates.

Introduction: War exerts a costly, enduring, and difficult to quantify toll upon population health globally, and the UN Security Council estimates that at the start of 2023 a quarter of humanity –2 billion people – live in places affected by violent conflict (UN 2023; Bendavid et al., 2021; Levy & Sidel 2016). With several major wars waging at the present moment, inducing mass casualties and displacement, the timing is critical for social and population scientists to ascertain the social and biological pathways of influence through which exposure to war damages health over the life course. A significant body of research finds that exposure to violence in early life exerts enduring effects upon health into late adulthood. This is particularly true among those who have witnessed the violence and destruction of war in childhood (Ramirez and Haas, 2021; Akbulut-Yuksel, 2016). However, past research on violence exposure in the life course and late life health has rarely examined the specific psychosocial and physiological mechanisms which underlie associations between violence exposure and health. In this paper we bring the significant case of the American War in Vietnam to bear on questions about pathways of influence between early life exposure to war and late life health. Moreover, we utilize a unique data source, the Vietnam Health and Aging Study (2018), which collected one-of-a-kind biomarker data and life history data on war exposure in a cohort of war survivors, to delineate physiological and psychological mediators linking war exposure and health.

Research on self-rated health (SRH) has proliferated due to the concept's ease of measurement and predictive validity for overall health status, mortality, and a host of morbidities (Pan et al., 2022). Amidst the explosion of scholarship examining health disparities through the lens of SRH (Dowd, 2012), a parallel body

of research has emerged which critically examines the social and contextual factors that influence SRH's validity, and its concordance with more objective measures of health status, given significant heterogeneity across individuals and groups in their health reporting behaviors (Ibid). The current study will examine health pessimism in the context of Vietnam, thereby extending the cultural and geographic coverage of scholarship on health reporting while also looking across the life course for early life impacts upon pessimistic versus optimistic orientations toward health assessment.

Theoretical Framework: This study follows the tradition of "long arm" scholarship, informed by life course perspectives seeking to understand the mechanisms through which the effects of early life exposures to stress and adversity persist to impact health in later adulthood (Hayward and Gorman, 2004). An important segment of this broader literature has examined the long arm of armed conflict and the risk of myriad morbidities, such as cardiometabolic disease, frailty, and somatic conditions, which are exacerbated as a result of enduring exposure to war stressors in childhood and adolescence (Glass et al., 2023; Haas & Ramirez, 2022; Ramirez & Haas, 2021; Zimmer et al. 2022).

To derive an explanatory framework for SRH among war survivors, we begin by considering how the deprivations and stressors of war may impact or damage physiological systems. In this way, these experiences may heighten the risk for disability and disease (Danese & McEwen 2012; Taylor 2010) or elevate somatic symptoms and physiological "weathering" (Glass et al., 2023), thereby worsening self-appraisals of health in older adulthood. Like Ramirez and Haas (2021), in their investigation of WWII survivors, we consider a host of mediating pathways between early life exposures and late life SRH. While many studies focus upon relatively recent exposures to violence among adolescents and young adults (e.g., Boynton-Jarrett et al., 2008; Almeida Bentes et al., 2017), we adopt a life course perspective and contemplate mechanisms through which early life exposures influence SRH into late adulthood.

In the case of SRH, a combination of biological and psychosocial factors come into play as individuals differentially draw upon a host of cues to arrive at a subjective assessment of general health. Thus, we also question whether the unique, often severely stressful, experiences enduring in wartime create particular attitudes or perspectives within survivors that influence assessments of their health. Here, research on health congruence and health optimism provides a valuable starting point for examining the meaning of SRH in the Vietnamese older adult population and ascertaining whether populations that were distinctly affected by war take a unique approach to appraising their own health. The health congruence literature (Chipperfield et al. 1993; Borawski et al. 1996) explores the meaning and significance of congruence/discongruence in global health appraisals relative to "objective" measurements of health status. Numerous studies have identified significant differences in objective and subjective health concordance across social contextual settings, sociocultural backgrounds, and socioeconomic status (e.g., Abdulrahim and El Asmar 2012; Bell et al. 2018; Dowd & Zajacova 2010; Liu and Zhang 2004). Although certain studies have posited explanations for the objective-subjective health status gap (e.g., greater health knowledge in well-educated populations versus underdiagnoses in marginalized and underserved populations; Dowd & Zajakova 2010; Bell et al. 2018), empirical evidence substantiating the origins of evaluations and perceptions driving the subjective aspects of SRH remain limited. Several recent studies of health pessimism and optimism have identified psychological characteristics, such as loneliness and social anxiety, as contributors to more pessimistic assessments of SRH than are warranted by objective health conditions (Calvey et al., 2022). While studies of health pessimism

and health reporting more broadly are growing more theoretically and methodologically sophisticated, nonetheless more culturally and geographically diverse investigations are warranted to gain insights from outside of the largely western populations which have dominated the field (e.g., Calvey et al., 2022; Spencer et al. 2009; Boardman 2004).

In the current study, we look over the life course, centering experiences of stress exposure in early life, for clues to older adults' health pessimism and optimism. Studies investigating a diverse range of violent experiences, including intimate partner violence, physical abuse in childhood, and war violence, have repeatedly shown that increased exposure is a significant predictor of relatively poor SRH (Chartier et al., 2007; Ramirez and Haas, 2021; Lown and Vega, 2001). Others demonstrate that the mere perception of one's risk of violence victimization impacts SRH. For example, among young women in urban Brazil the perceived risk of being assaulted or the victim of police violence increases the risk of poor SRH (Almeida-Bentes et al., 2017). Unfortunately, rarely do such studies disentangle the direct and indirect pathways through which violence exposure influences SRH. Even more rarely are these associations, and their direct and indirect pathways, examined in a nonwestern conflict-affected population.

Data: We analyze data from the Vietnam Health and Aging Study (VHAS), collected in 2018 in a multistage probability sample of 2,447 men and women age 60 and older residing in four districts of northern Vietnam that were purposively selected to represent a spectrum of exposure to U.S. aerial bombardment (Korinek et al., 2019). Study participants completed an in-person interview and a clinic-based biomarker data collection (full details available at www.vhas.edu/documentation). VHAS, which unites in-depth information on early life war exposure and a host of survey and biomarker measures of health status, is uniquely equipped to extend knowledge of violence exposure over the life course as a determinant of SRH and to delineate degrees of discordance across SRH and objective measures of health status.

Measures and Methods: Our dependent variable, SRH, is based upon a singular question asked of all VHAS participants, specifically, if they assess their current health as very good, good, fair, poor, or very poor. Because very few respondents assessed their health as very good (n=7), we recoded SRH into a four-category ordinal variable: Very good/good, fair, poor, and very poor. Our explanatory variables of interest assess exposure to violence and malevolent conditions during the peak 1965-75 decade of the American War. Specifically, we include two standardized indices of exposure to war-related violence and malevolent environmental conditions (Young et al., 2021). The former includes items such as exposure to dead and severely injured people, knowing people who were injured, and being wounded in the warzone. The latter is comprised of items such as displacement due to bombings or evacuations, experiencing food and water shortages, disrupted sleep linked to noise or other inhospitable conditions, and fear of being injured or killed.

We assess chronic conditions, psychological wellbeing, and functional health as mediators through the following three variables: the sum of 14 diagnosed physical health conditions, such as heart disease, COPD, and diabetes; the weighted sum of affirmative responses regarding 10 psychological distress symptoms derived from the SRQ-10 screening instrument (Beusenberg, Orley, and WHO. 1994; Giang et al., 2006); and the sum of affirmative responses to five questions regarding ADLs, such as difficulty dressing, difficulty bathing.

Preliminary findings: Using generalized structural equation models, we estimate ordered logistic regression analyses with current comorbidities, psychological distress, and limitations in activities of daily living as

mediators of the association between early life war stress exposures and late-life SRH (see Figure 1). Initial models controlled for gender, age at time of interview, place of residence, an index of household assets, and an index of education level within the household. Models are estimated with Stata 17.0. Preliminary results are shown in Figure/Table below. Briefly, in line with our expectations, the effects of both our exposure to violence index and malevolent environment index on late life SRH were mediated through their effects on physical health conditions, SRQ-10 scores, and sum of ADLs (all p's<0.01). The direct effects of the war exposure indices were not significant. Our presentation will include models of the effects of war exposure on health pessimism and optimism. Initial results suggest that increased scores of each war exposure index predict increased health pessimism in late life.

Figure 1. Diagram of generalized structural equation model of early life war exposure indices and self-reported health score as mediated by number of physical health conditions, psychological condition (SRQ-10 score), and number of ADLs.

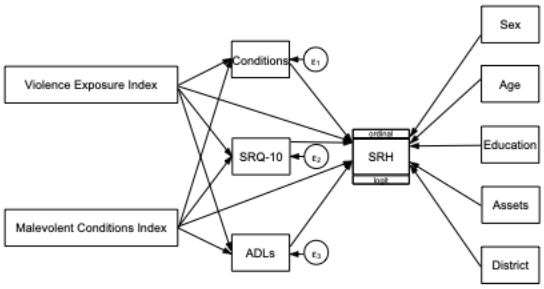

Table 1. Selected direct and indirect effects of war exposure indices on self-reported health scores calculated by generalized structural equation models. (OLS regression coefficients shown)

War exposure items	Indirect through health conditions (%TE)[a]	Indirect through SRQ-10 (%TE)	Indirect through ADLs (%TE)	Direct Effect
Exposure to Violence Index	0.071*** (36%)	0.055** (27%)	0.051*** (26%)	0.02
Malevolent Environment Index	0.039** (21%)	0.094*** (52%)	0.039** (21%)	0.01

Note: TE = Total Effect

[a]Indirect effect as a percentage of the total effect

*p<0.05, **p<0.01, ***p<.001

References:

Abdulrahim, S., & El Asmar, K. (2012). Is self-rated health a valid measure to use in social inequities and health research? Evidence from the PAPFAM women's data in six Arab countries. *International Journal for Equity in Health*, *11*(1), 53. https://doi.org/10.1186/1475-9276-11-53

Akbulut-Yuksel, M. (2017). War during childhood: The long run effects of warfare on health. *Journal of Health Economics*, *53*, 117–130. https://doi.org/10.1016/j.jhealeco.2017.02.005

Almeida Bentes, A., Comini César, C., Coelho Xavier, C., Teixeira Caiaffa, W., & Proietti, F. A. (2017). Self-rated health and perceived violence in the neighborhood is heterogeneous between young women and men. *BMC Public Health*, *17*(1), 967. https://doi.org/10.1186/s12889-017-4969-1

Bell, C. N., Thorpe, R. J., & LaVeist, T. A. (2018). The Role of Social Context in Racial Disparities in Self-Rated Health. *Journal of Urban Health*, *95*(1), 13–20. https://doi.org/10.1007/s11524-017-0211-9

Bendavid, E., Boerma, T., Akseer, N., Langer, A., Malembaka, E. B., Okiro, E. A., Wise, P. H., Heft-Neal, S., Black, R. E., Bhutta, Z. A., Bhutta, Z., Black, R., Blanchet, K., Boerma, T., Gaffey, M., Langer, A., Spiegel, P., Waldman, R., & Wise, P. (2021). The effects of armed conflict on the health of women and children. *The Lancet*, *397*(10273), 522–532. https://doi.org/10.1016/S0140-6736(21)00131-8

Beusenberg, M, J Orley, and WHO. 1994. "A User's Guide to the Self Reporting Questionnaire (SRQ)."

Boardman, J. D. (2004). Health pessimism among black and white adults: The role of interpersonal and institutional maltreatment. *Social Science & Medicine*, *59*(12), 2523–2533. https://doi.org/10.1016/j.socscimed.2004.04.014

Borawski, E. A., Kinney, J. M., & Kahana, E. (1996). The Meaning of Older Adults' Health Appraisals: Congruence with Health Status and Determinant of Mortality. *The Journals of Gerontology: Series B*, *51B*(3), S157–S170. https://doi.org/10.1093/geronb/51B.3.S157

Boynton-Jarrett, R., Ryan, L. M., Berkman, L. F., & Wright, R. J. (2008). Cumulative Violence Exposure and Self-Rated Health: Longitudinal Study of Adolescents in the United States. *Pediatrics*, *122*(5), 961–970. https://doi.org/10.1542/peds.2007-3063

Calvey, B., McHugh Power, J., & Maguire, R. (2022). Expecting the best or fearing the worst: Discrepancies between self-rated health and frailty in an ageing Irish population. *British Journal of Health Psychology*, *27*(3), 971–989. https://doi.org/10.1111/bjhp.12585

Chartier, M., Walker, J., & Naimark, B. (2007). Childhood Abuse, Adult Health, and Health Care Utilization: Results from a Representative Community Sample. *American Journal of Epidemiology*, *165*(9), 1031–1038. https://doi.org/10.1093/aje/kwk113

Danese, A., & McEwen, B. S. (2012). Adverse childhood experiences, allostasis, allostatic load, and age-related disease. *Physiology & Behavior*, *106*(1), 29–39. https://doi.org/10.1016/j.physbeh.2011.08.019

Dowd, J. B., & Zajacova, A. (2010). Does Self-Rated Health Mean the Same Thing Across Socioeconomic Groups? Evidence From Biomarker Data. *Annals of Epidemiology*, *20*(10), 743–749. https://doi.org/10.1016/j.annepidem.2010.06.007

Dowd, J. B. (2012). Whiners, deniers, and self-rated health: What are the implications for measuring health inequalities? A commentary on Layes, et al. *Social Science & Medicine*, *75*(1), 10–13. https://doi.org/10.1016/j.socscimed.2012.01.036

Giang, Kim Bao, et al. "The Vietnamese version of the Self Reporting Questionnaire 20 (SRQ-20) in detecting mental disorders in rural Vietnam: a validation study." International Journal of Social Psychiatry 52.2 (2006): 175-184.

Glass, D. J., Young, Y. M., Tran, T. K., Clarkin, P., & Korinek, K. (2023). Weathering within war: Somatic health complaints among Vietnamese older adults exposed to bombing and violence as adolescents in the American war. *Journal of Psychosomatic Research*, *165*, 111080. https://doi.org/10.1016/j.jpsychores.2022.111080

Hayward, M. D., & Gorman, B. K. (2004). The long arm of childhood: The influence of early-life social conditions on men's mortality. *Demography*, *41*(1), 87–107. https://doi.org/10.1353/dem.2004.0005

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), 1351. https://doi.org/10.1186/s12889-019-7680-6

Levy, B. S., & Sidel, V. W. (2016). Documenting the Effects of Armed Conflict on Population Health. *Annual Review of Public Health*, *37*(1), 205–218. https://doi.org/10.1146/annurev-publhealth-032315-021913

Lown, E. A., & Vega, W. A. (2001). Intimate Partner Violence and Health: Self-Assessed Health, Chronic Health, and Somatic Symptoms Among Mexican American Women. *Psychosomatic Medicine*, *63*(3), 352.

Pan, Y., Pikhartova, J., Bobak, M., & Pikhart, H. (2022). Reliability and predictive validity of two scales of self-rated health in China: Results from China Health and Retirement Longitudinal Study (CHARLS). *BMC Public Health*, *22*(1), 1863. https://doi.org/10.1186/s12889-022-14218-1

Ramirez, D., & Haas, S. A. (2021). The Long Arm of Conflict: How Timing Shapes the Impact of Childhood Exposure to War. *Demography*, *58*(3), 951–974. https://doi.org/10.1215/00703370-9114715

Spencer, S. M., Schulz, R., Rooks, R. N., Albert, S. M., Thorpe, R. J., Jr, Brenes, G. A., Harris, T. B., Koster, A., Satterfield, S., Ayonayon, H. N., & Newman, A. B. (2009). Racial Differences in Self-Rated Health at Similar Levels of Physical Functioning: An Examination of Health Pessimism in the Health, Aging, and Body Composition Study. *The Journals of Gerontology: Series B*, *64B*(1), 87–94. https://doi.org/10.1093/geronb/gbn007

Taylor, Shelley E. "Mechanisms linking early life stress to adult health outcomes." Proceedings of the National Academy of Sciences 107.19 (2010): 8507-8512.