

PUBLISHED OR ACCEPTED WORKS

Zajacova, Anna, Hanna Grol-Prokopczyk, and Roger Fillingim. Forthcoming. “Beyond Black vs White: Racial/Ethnic Disparities in Chronic Pain including Hispanic, Asian, Native American, and Multiracial U.S. Adults.” *PAIN*. Selected as the Editor’s Choice Article for the issue.

Abstract:

Previous literature on race/ethnicity and pain has rarely included all major U.S. racial groups or examined the sensitivity of findings to different pain operationalizations. Using data from the 2010-2018 National Health Interview Surveys on adults 18+ (N=273,972), we calculate the weighted prevalence of six definitions of pain to provide a detailed description of chronic pain in White, Black, Hispanic, Asian, Native American, and multiracial groups. We also estimate modified Poisson models to obtain relative disparities, net of demographic and socioeconomic factors (SES) including educational attainment, family income, and home ownership; finally, we calculate average predicted probabilities to show prevalence disparities in absolute terms. We find that Asian Americans have the lowest pain prevalence across all pain definitions or model specifications. In contrast, Native American and multiracial adults have the highest pain prevalence. This pain excess is due to the lower SES among Native Americans but remains significant and unexplained among multiracial adults. White, Black, and Hispanic adults fall in between. In this trio, Hispanics have the lowest prevalence, an advantage not attributable to immigrant status or SES. While most prior research focuses on Black-White comparisons, these two groups differ relatively little. Blacks report lower prevalence of less severe pain definitions than Whites, but higher prevalence of severe pain. Net of SES, however, Blacks have significantly lower pain across all definitions. Overall, racial disparities are larger than previously recognized once all major racial groups are included, and these disparities are largely consistent across different operationalizations of pain.

Zachary Zimmer, Kathryn Fraser, Hanna Grol-Prokopczyk and Anna Zajacova. Forthcoming. A global study of pain prevalence across 52 countries: Examining the role of country-level contextual factors. *PAIN*. Selected as the Editor’s Choice Article for the issue.

Abstract:

There is wide variation in population-level pain prevalence estimates in studies of survey data around the world. The role of country-level social, economic, and political contextual factors in explaining this variation has not been adequately examined. We estimated the prevalence of unspecified pain in adults aged 25+ across 52 countries using data from the World Health Survey 2002-2004. Combining data sources and estimating multi-level regressions, we compared country-level pain prevalence and explored which country-level contextual factors explain cross-country variations in prevalence, accounting for individual-level demographic factors. The overall weighted, age and sex standardized prevalence of pain across countries was estimated to be 27.5%, with significant variation across countries (range from 9.9-50.3%). Women, older persons, and rural residents were significantly more likely to report pain. Five country-level variables had robust and significant associations with pain prevalence: the Gini Index (Gini), population density, the Gender Inequality Index (GII), life expectancy (LE), and global region. The model including GII explained the most cross-country variance. However, even when accounting for country-level variables, some variation in pain prevalence remains, suggesting a complex interaction between personal, local, economic, and political impacts, as well as inherent differences in language, interpretations of health, and other difficult to assess cultural idiosyncrasies. Results give new

insight into the high prevalence of pain around the world and its demonstrated association with macro factors, particularly income and gender inequalities, providing justification for regarding pain as a global health priority.

Yang Yulin, and Hanna Grol-Prokopczyk. Forthcoming. “Chronic Pain and Friendship among Middle-Aged and Older U.S. Adults.” *Journal of Gerontology: Social Sciences*. PMID pending. Online first: <https://doi.org/10.1093/geronb/gbaa185>

Abstract:

This study examines how chronic pain affects friendship in later life. We test whether onset of pain leads to social network activation, as suggested by research on other health conditions, or whether pain—an unverifiable and often stigmatizing condition—functions as a “threat to the social self”. Using longitudinal data from the Health and Retirement Study (HRS; N = 4,598; 2006/2008 as Time 1 and 2010/2012 as Time 2), we conducted OLS regressions with a lagged dependent variable approach to assess how new-onset chronic pain predicted (a) respondents’ number of close friends and (b) their frequency of in-person meetings with friends, controlling for sociodemographic variables and health conditions. New-onset severe pain predicted a decrease in number of friends. New-onset moderate pain, in contrast, predicted more friends and more frequent in-person meetings. (Findings were significant or marginally significant depending on model specifications.) Mild pain showed no significant association with either outcome. Pain had a greater effect on men’s friendship outcomes than women’s. Discussion: The effects of chronic pain on later-life friendships appear to depend on pain severity, and to differ between men and women. Onset of severe pain serves as a “threat to the social self,” while onset of moderate pain contributes to social network activation; both associations are significantly more pronounced among men. These findings highlight the complex associations between health and social outcomes.

Zimmer, Z., Fraser, K., Grol-Prokopczyk, H. & Zajacova, A. Forthcoming. “A Global Study of Pain Prevalence Across 52 Countries: Examining the Role of Country-level Contextual Factors.” *PAIN*

Abstract

There is wide variation in population-level pain prevalence estimates in studies of survey data around the world. In addition, the impact of country-level social, economic, and political contextual factors on global pain prevalence, and variation in pain prevalence between countries, has not been adequately examined. We estimated the prevalence of unspecified pain in adults aged 25+ across 52 countries using data from the World Health Survey 2002-2004. Combining data sources and estimating multi-level regressions, we explored which country-level contextual factors may explain cross-country variations in prevalence, accounting for individual-level demographic factors. The overall weighted, age and sex standardized prevalence of pain across countries was estimated to be 27.5%, with significant variation across countries (range from 9.9-50.3%). Women, older persons, and rural residents were significantly more likely to report pain. Five country-level variables had robust and significant associations with pain prevalence: the Gini Index (Gini), population density, the Gender Inequality Index (GII), life expectancy (LE), and global region. The model including GII explained the most cross-country variance. However, even when accounting for country-level variables, some variation in pain prevalence remains, suggesting a complex interaction between personal, local, economic, and political impacts in pain prevalence, as well as inherent differences in language, interpretations of health, and other difficult to assess cultural idiosyncrasies. Results give new insight into the high prevalence of pain around the world and its demonstrated association with macro factors, particularly levels of income and gender inequality, providing justification for regarding pain as a global health priority.

Yang, Yulin, Hanna Grol-Prokopczyk, M. Carrington Reid, and Karl Pillemer. Forthcoming. “The Relationship between Pain and Psychological Distress during the COVID-19 Pandemic: Is Social Technology Use Protective?” *Pain Medicine*. PMID pending. Online first: <https://doi.org/10.1093/pm/pnab262>

Abstract:

The COVID-19 pandemic and resulting shelter-in-place orders have profoundly changed the everyday social environment. This study examines the relationship between pain and psychological distress (depression, anxiety, and loneliness) among U.S. adults ages 54 and older during the pandemic. We also test whether use of technology for social purposes moderates the association between pain severity and psychological distress. Using cross-sectional data on 1,014 adults ages 54 and older (pain free, n = 637; mild pain, n = 106; moderate pain, n = 227; and severe pain, n = 64) from the 2020 Health and Retirement Study COVID-19 Project (Early, Version 1.0), we conducted regression analyses to test the association between pain severity and psychological outcomes and to assess social technology use frequency as a moderator. Compared with their pain-free peers, participants with mild-to-moderate pain reported more depressive symptoms and greater loneliness; those with severe pain reported higher levels of depression, anxiety, and loneliness. Social technology use was associated with lower levels of depression and loneliness. However, interaction analyses show that social technology use predicted an increase in depression for individuals with pain but a decrease in depression among pain-free individuals. For anxiety and loneliness, no significant effects of social technology use were observed. Conclusion: Older adults with pain are at high risk of depression, anxiety, and loneliness during the pandemic. Although social technologies have become a common alternative to face-to-face interactions during the COVID-19 crisis, and overall they can provide mental health benefits, our results suggest that social technologies can be detrimental to psychological well-being among people with pain. These findings can inform technology-based interventions aiming to promote well-being among older adults with pain.

Yang, Yulin, M. Carrington Reid, Hanna Grol-Prokopczyk, and Karl Pillemer. “Racial-Ethnic Disparities in Pain Intensity and Interference among Middle-Aged and Older U.S. Adults.” *Journal of Gerontology: Medical Sciences*. Special issue: *Minority Health and Health Disparities in Aging*. PMID pending. Online first: <https://doi.org/10.1093/gerona/glab207>

Abstract:

This study aims to better understand differing pain experiences across U.S. racial/ethnic subgroups by estimating racial-ethnic disparities in both pain intensity and domain-specific pain-related interference. To address this issue, we use a nationally representative sample of non-Hispanic White, non-Hispanic Black, and Hispanic adults ages 50+ who report recently experiencing pain. Using data from the 2010 wave of the Health and Retirement Study (HRS; N = 684), we conducted a series of multivariate analyses to assess possible racial/ethnic disparities in pain intensity and 7 domains of pain interference, controlling for relevant sociodemographic variables and other health problems. Black and Hispanic participants reported higher pain intensity than White participants after controlling for socioeconomic status (SES) and other health conditions. Both Black and Hispanic individuals reported more domain-specific pain interference in bivariate analyses. In multivariate analyses, Black (vs White) participants reported significantly higher levels of pain interference with family–home responsibilities, occupation, sexual behavior, and daily self-care. We did not find significant Hispanic-White differences in the 7 pain interference domains, nor did we find Black-White differences in 3 domains (recreation, social activities, and essential activities). Conclusions: Our findings highlight the need for using multidimensional measures of pain when

assessing for possible pain disparities with respect to race/ethnicity. Future studies on pain interventions should consider contextualizing the pain experience across different racial subgroups to help pain patients with diverse needs, with the ultimate goal of reducing racial/ethnic disparities in pain.

Anna Zajacova, Zachary Zimmer and Hanna Grol-Prokopczyk. 2021. “Pain trends among American adults 2002-2017: patterns, disparities, and correlates.” *Demography* 58(2): 711-738. DOI.org/10.1215/00703370-8977691.

Abstract

Determining long-term trends in chronic pain prevalence is critical for evaluating and shaping U.S. health policies, but little research has examined such trends. This study (1) provides estimates of pain trends among U.S. adults across major population groups; (2) tests whether sociodemographic disparities in pain have widened or narrowed over time; and (3) examines socioeconomic, behavioral, psychological, and medical correlates of pain trends. Regression and decomposition analyses of joint, low back, neck, facial/jaw pain, and headache/migraine using the 2002–2018 National Health Interview Survey for adults aged 25–84 (N = 441,707) assess the trends and their correlates. We find extensive escalation of pain prevalence in all population subgroups: overall, reports of pain in at least one site increased by 10%, representing an additional 10.5 million adults experiencing pain. Socioeconomic disparities in pain are widening over time, and psychological distress and health behaviors are among the salient correlates of the trends. This study thus comprehensively documents rising pain prevalence among Americans across the adult life span and highlights socioeconomic, behavioral, and psychological factors as important correlates of the trends. Chronic pain is an important dimension of population health, and demographic research should include it when studying health and health disparities.

Andrew C. Stokes, Wubin Xie, Dielle J. Lundberg, Katherine Hempstead, Anna Zajacova, Zachary Zimmer, Dana A Gleib, Ellen Meara and Samuel H Preston. 2020. “Increases in BMI and chronic pain for US adults in midlife, 1992 to 2016.” *Social Science and Medicine: Population Health*. 12(Dec): 1-8. DOI: 10.1016/j.ssmph.2020.100644.

Abstract: Recent unprecedented increases in mortality and morbidity during midlife are often ascribed to rising despair in the US population. An alternative and less often examined explanation is that these trends reflect, at least in part, the lagged effects of the obesity epidemic. Adults in midlife today are more likely to live with obesity and have a greater cumulative exposure to excess adiposity during their lifetime than any previous generation. Prior work has demonstrated a link between obesity and mortality risk at midlife, but the mechanisms remain unclear. Pain may represent one important pathway linking obesity to mortality trends. Pain is a debilitating condition that has increased significantly over recent decades and is associated with both morbidity and mortality, including suicide and opioid-related mortality. Evidence suggests obesity and pain may be linked, but there is little evidence of an association at the population level. In this paper, we examine to what extent increases in overweight and obesity explain the rising trends in chronic pain observed among middle-aged adults in the US from 1992 to 2016. We assess trends in both mild/moderate nonlimiting pain and severe and/or limiting pain. In doing so, we draw attention to one mechanism through which overweight/obesity may have contributed to recent population health trends. Our analysis found that increases in BMI from 1992 to 2016 may account for up to 20% of the upward trend in mild/moderate nonlimiting pain and 32% of the trend in severe and/or limiting pain for women, and 10% and 19% of the trends respectively for men.

Zachary Zimmer, Anna Zajacova and Hanna Grol-Prokopczyk. 2020. “Trends in Pain Prevalence among Adults 50 and Older across Europe, 2004 to 2015.” *Journal of Aging and*

Health. 32(10): 1419-1432. DOI:10.1177/0898264320931665.

Abstract:

Objectives: We examine recent trends in pain prevalence among adults aged 50+ across Europe. Methods: Data for 15 countries from the Survey of Health, Ageing, and Retirement in Europe are examined for two periods: 2004–2011 and 2013–2015. Trends are shown descriptively, using a multilevel modeling strategy controlling for covariates, and modeled on a country-specific basis. Results: Population-level pain prevalence ranges from about 30% to about 60% depending on the country and year. Pain is more prevalent in women and generally increases with age. There is an increase in prevalence over time, net of age, and other predictors. Prevalence increased with an annual average of 2.2% between 2004 and 2011 and 5.8% between 2013 and 2015, in fully adjusted models. Discussion: Trends in pain prevalence have implications for disability, healthcare utilization, productivity, and population health. These findings are not optimistic but align with other population-wide studies, suggesting a global trend of rising pain prevalence.

Zajacova, Anna, Hanna Grol-Prokopczyk, and Zachary Zimmer. “Sociology of Chronic Pain.” *Journal of Health and Social Behavior* 62(3): 302-317. Special issue: *Medical Sociology: Findings, Challenges, and Future Directions.*
<https://doi.org/10.1177/00221465211025962>

Abstract

Chronic pain is a common, costly, and consequential health problem. However, despite some important analytic contributions, sociological research on pain has not yet coalesced into a unified subfield. We present three interrelated bodies of evidence, and illustrative new empirical findings using 2010-2018 NHIS data, to argue that pain should have a central role in sociological investigations of health. Specifically, we contend that (1) pain is a sensitive barometer of population health and wellbeing; (2) pain is emblematic of many contested and/or chronic conditions; and (3) pain and pain treatment reflect, and have wide-ranging implications for, public policy. Overall, whether we analyze pain quantitatively or qualitatively—focusing on its distribution in the population, its social causes and consequences, or its subjective meanings for individuals—pain reflects the social conditions, sociopolitical context, and health-related beliefs of a society. Pain is thus an important frontier for future sociological research.

CURRENTLY UNDER REVIEW

Zajacova, Anna, Jinhyung Lee, and Hanna Grol-Prokopczyk. “The Geography of Chronic Pain in the United States and Canada.” Under review. Preprint:
<https://www.medrxiv.org/content/10.1101/2021.09.15.21263635v1>

WORKS IN PREPARATION

Zachary Zimmer, Kathryn Fraser, Daniel Powers, Anna Zajacova and Hanna Grol-Prokopczyk. Inequality Within Inequalities: A Multi-Country Comparative Study of the Effects that Education and Wealth have on Pain Prevalence. In progress and accepted for presentation to the Population Association of America Meetings, April 6-9, 2022, Atlanta Georgia.

Grol-Prokopczyk, Hanna. “Why Are There So Many Ways to Measure Pain?” In progress; manuscript available.

Grol-Prokopczyk, Hanna, Anna Zajacova, and Zachary Zimmer. “Have American Pain-

Reporting Styles Changed Over Time? An Assessment Using Objective Measures of Function.” In progress; manuscript available.

Grol-Prokopczyk, Hanna, Wei Luo, Rui Huang, Yu-An Chen, Inna Belfer, Penney Cowan, Roger B. Fillingim, Jennifer S. Gewandter, Ian Gilron, Adam T. Hirsh, Salimah H. Meghani, Kushang V. Patel, Ellen L. Poleshuck, Shannon M. Smith, Eric C. Strain, Frank J. Symons, Ursula Wesselmann, Kate A. Yeager, Anna Zajacova, Zachary Zimmer, Dennis C. Turk, and Robert H. Dworkin. “Fifty Years of Research on Social Disparities in Pain and Pain Treatment: A Scoping Review of Reviews.” In progress.

Feinuo Sun and Zachary Zimmer. “Life expectancies with/without pain: educational disparities”.

Feinuo Sun, Zachary Zimmer, and Anna Zajacova. “Pain and disability transitions among older Americans: The role of education”.

Feinuo Sun, Anna Zajacova, and Hanna Grol-Prokopczyk. “The geography of arthritis-attributable activity limitation and pain: a county-level spatial analysis”.

CONFERENCE AND INVITED (*) PRESENTATIONS

Feinuo Sun, Zachary Zimmer, and Anna Zajacova. Pain and disability transitions among older Americans: The role of education. Accepted for the Population Association of America Meetings in Atlanta, GA, April 6, 2022.

Zimmer, Zachary, Kathryn Fraser, Hanna Grol-Prokopczyk (presenting author), and Anna Zajacova. “Contextual Factors Explaining Cross-National Differences in Chronic Pain Prevalence: A Comparative Study.” Annual Meeting of the Interdisciplinary Association for Population Health Science (IAPHS), Baltimore, MD. (Online due to Covid pandemic.)

Grol-Prokopczyk, Hanna. “Unseen Forces: The Demography of Chronic Pain.” Napa Pain Conference, Napa, CA.

Grol-Prokopczyk, Hanna. “The Demography of Chronic Pain: Trends, Disparities, and the Ever-Present Challenge of Measurement.” Multidisciplinary Research in Gerontology Colloquium Series, University of Southern California. (Online due to Covid pandemic.)

Anna Zajacova, Zachary Zimmer and Hanna Grol-Prokopczyk. Disparities in pain: How they are changing over time? Presented online at the annual meeting of TRENDS, May 3, 2020.

Zachary Zimmer, Anna Zajacova and Hanna Grol-Prokopczyk. Trends in pain prevalence among adults 50 and older across Europe. Accepted for the cancelled Population Association of America Meetings in Washington D.C. April 24, 2020.

Anna Zajacova, Zachary Zimmer and Hanna Grol-Prokopczyk. Chronic pain: Powerful summary measure of population health. Interdisciplinary Association for Population Health Sciences. Seattle, WA, USA, October 3, 2019.

Zachary Zimmer, Anna Zajacova and Hanna Grol-Prokopczyk. Trends in the prevalence of pain among adults aged 50+ across Europe, 2004 to 2015. Joint SHARE User Conference and Budapest Pension Seminar, Budapest, Hungary, September 19, 2019.

* Zachary Zimmer. A demographic look at pain. Institute of Population and Social Research, Mahidol University, Bangkok, Thailand, May 22, 2019.