

The Pain of Inequality: How Socioeconomic Status and Healthcare Affordability Shape the Link Between Pain and Depression



Anita Singh¹, Charles J Mazof¹, Caleb Richmond¹, H. Nephi Seo¹, Lynn Foster-Johnson, PhD¹

¹Geisel School of Medicine at Dartmouth

INTRODUCTION

- Chronic pain is widespread and costly, affecting more than 50 million U.S. adults and profoundly impacting quality of life, productivity, and emotional well-being.^{1,4} Depression affects roughly 8–10% of U.S. adults each year and frequently co-occurs with chronic pain through shared biological pathways—such as inflammation, altered neurotransmission, and stress-axis dysregulation—as well as overlapping psychosocial stressors.^{2,4}
- Despite this well-established relationship, access to effective pain and mental health care remains inequitable. Socioeconomic factors, including income, education, employment, and insurance, shape both the prevalence of depression and the ability to obtain treatment.^{1,3,4}
- Study Purpose:
 - This study examines how pain levels, demographic characteristics, and socioeconomic barriers differ across levels of frequent depression, and evaluates whether income, insurance, and cost-related barriers modify the relationship between pain and depression.

METHODS

Data Source: NHIS 2019-2023 (via IPUMS)

- Adults aged ≥ 18 years
- Valid responses to chronic pain and mental health items
- NHIS-provided sampling weights, strata, and clusters were applied to ensure nationally representative estimates
- Complete-case analysis → final analytic unweighted N = 112,154; Weighted N=253,587,303

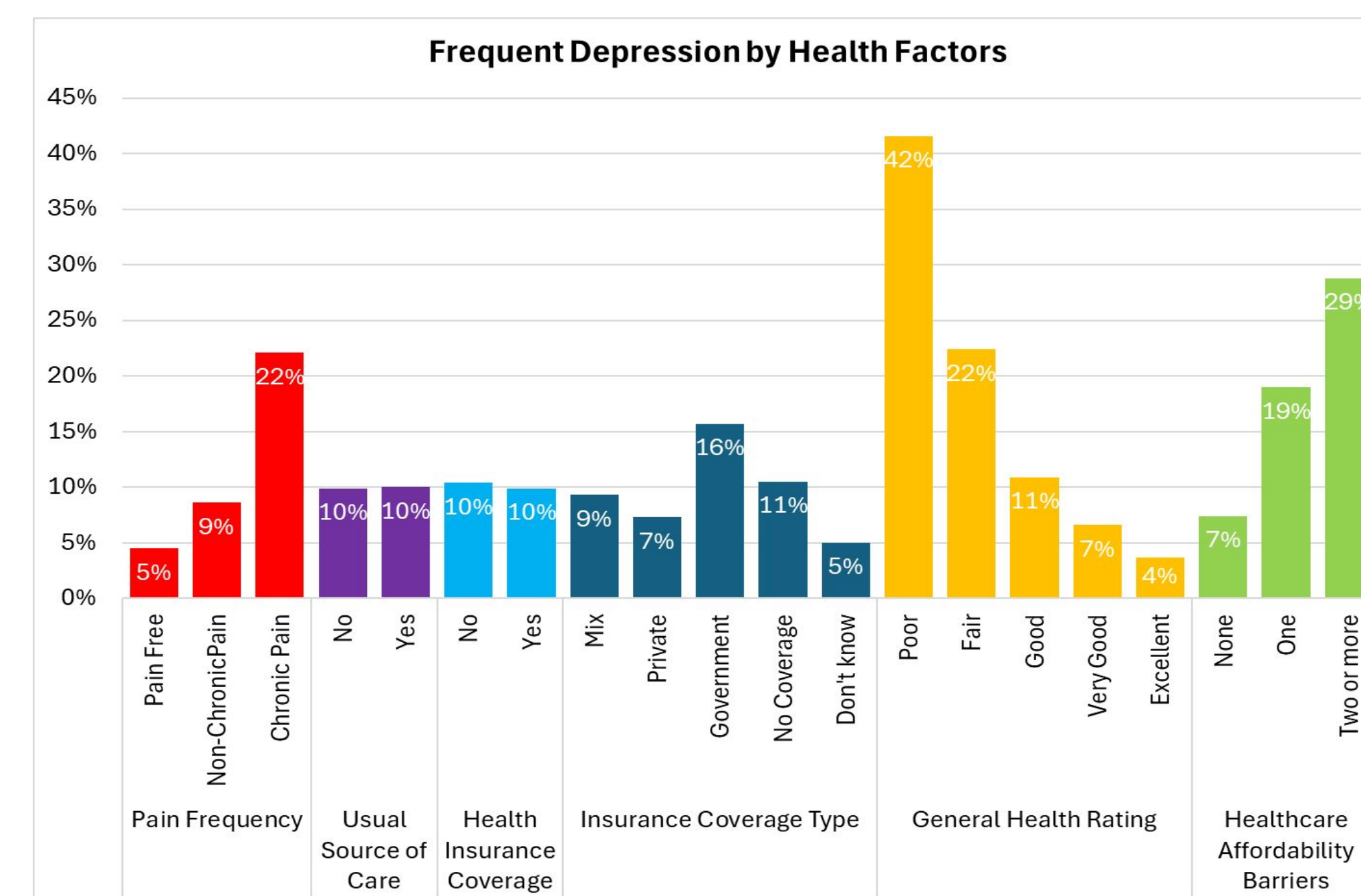
Variable Recoding

- Primary outcomes: Pain frequency (3-level); Depression frequency (3-level recoded into yes/no)
- Modifier variables: Income-to-poverty ratio; Has health insurance (yes/no); Has usual source of care (yes/no), Healthcare cost barriers (affordability)
- Controls: age, sex, race/ethnicity, marital status, education, employment, region, year of survey

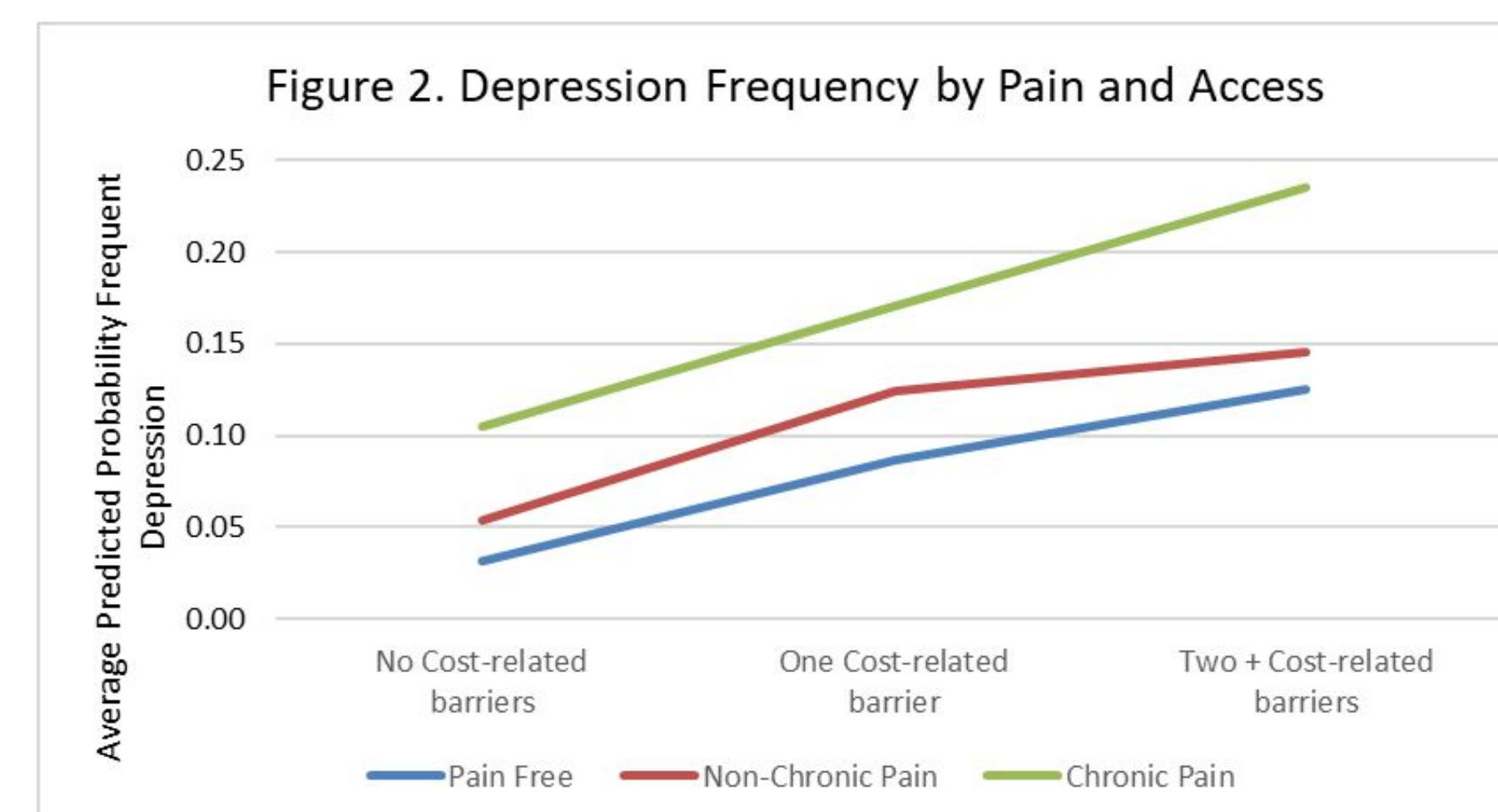
Statistical Analysis

- Descriptives: unweighted counts, weighted %; Chi-square tests of difference
- Logistic regression with adjusted ORs (95% CI); models included main effects and 2-way interactions.

RESULTS

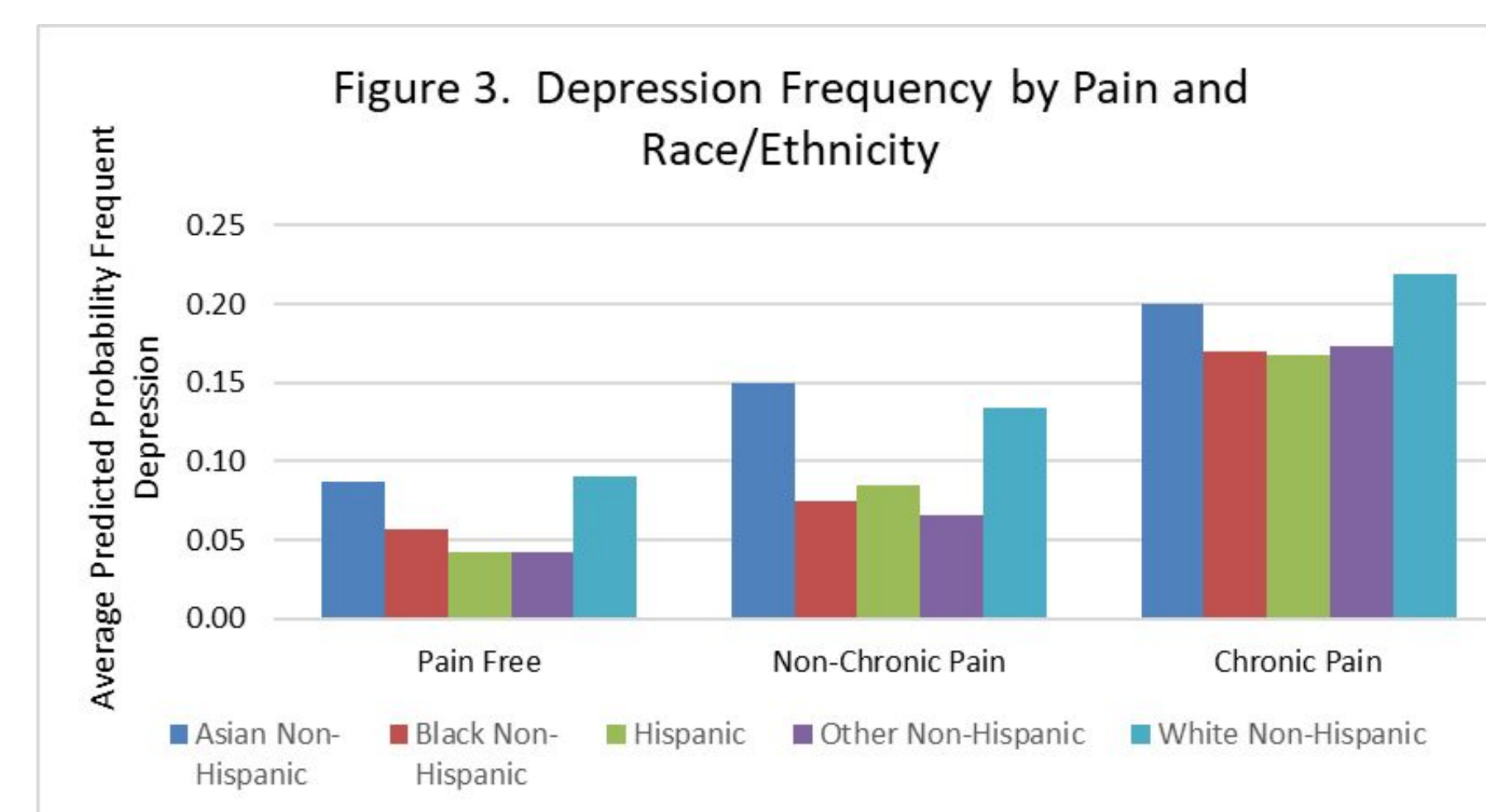


- Depression was defined as daily or weekly (“yes”) versus monthly, a few times a year, or never (“no”).
- Respondent depression was significantly associated with higher frequency of pain ($p < 0.001$), more affordability barriers ($p < 0.001$), and poor health ($p < 0.001$), reaching as high as ~42% among those reporting poor health.
- Respondents with health insurance were more likely to report frequent depression (OR=1.56, $p < 0.001$), while the main effect of usual source of care did not reach statistical depression in logistic models.



- Interaction terms between pain × health insurance, pain × usual source of care, and pain × poverty level were not statistically significant.
- Depression frequency was significantly associated with higher pain and increasing barriers to healthcare (Figure 2, $p < 0.001$).

- The interaction between pain and race/ethnicity was significant. Asian and White Non-Hispanic respondents reported significantly higher levels of depression compared to Black and Hispanic counterparts across all pain strata (Figure 3, $p < 0.001$).



DISCUSSION

1. Interplay of Pain, Depression, and Health Care Barriers

- Depression and pain were significantly linked, especially among respondents who forwent care due to cost barriers.
- Both pain and poverty showed significant main effects: lower-income groups had higher odds of frequent depression, but the interaction between pain and poverty was not significant.
- The consistent pain–depression relationship across income levels suggests influence from structural inequities and cumulative disadvantage rather than short-term financial strain.⁷⁻¹⁰
- Foregone care was strongly associated with more frequent depression, particularly among individuals with chronic pain.^{1,2}

2. Depression Disparities Across Race/Ethnicity

- Race and ethnicity moderated the pain–depression relationship, while poverty did not.
- Depression appears shaped more by structural and cultural contexts than immediate economic hardship.⁸⁻¹⁰
- Foregone care was a stronger predictor of depression than insurance or usual care, reflecting deeper unmet needs.^{1,2}

CONCLUSION

Chronic pain and depression were closely associated, particularly among respondents who reported delaying or forgoing care due to cost barriers. Poverty was not significantly associated with depression, and the interaction between pain and poverty was not significant, indicating that the effect of pain on depression was consistent across income levels. These findings suggest that the pain–depression relationship may be driven more by structural inequities and cumulative disadvantage than by immediate financial strain. Race and ethnicity moderated this relationship, underscoring that cultural and structural contexts influence how depressive symptoms are experienced and expressed. Together, these results highlight the importance of addressing systemic inequities and care barriers to improve mental health outcomes among those living with chronic pain.

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