Published in final edited form as:

Public Health. 2015 May ; 129(5): 594–596. doi:10.1016/j.puhe.2015.01.012.

Socioeconomic patterning in adulthood and depressive symptoms among a community sample of older adults in the United States

Vicki Johnson-Lawrence, PhD¹, George Kaplan, PhD², and Sandro Galea, MD, PhD³

Vicki Johnson-Lawrence: vickij@umich.edu; George Kaplan: gkaplan@umich.edu; Sandro Galea: sgalea@columbia.edu

¹University of Michigan-Flint, Assistant Professor, Department of Public Health and Health Sciences, 3124 William S White Building, 303 East Kearsley St, University of Michigan-Flint, USA, Flint, MI 48502, Phone: 810-424-5628

²University of Michigan, Thomas Francis Collegiate Emeritus Professor of Public Health, Emeritus Professor, Epidemiology, Research Professor, SRC, Department of Epidemiology, University of Michigan, Ann Arbor, MI 48109, USA

³Columbia University, Professor and Chair, Epidemiology, 722 West 168th Street, 15th floor, Room 1508, New York, NY 10032, USA

Abstract

Objective—Variation in socioeconomic position (SEP) over the life course may influence mental health later in the life course. This study sought to document the associations between patterns of SEP over the adult life course in relation to depressive symptoms among older adults.

Methods—Data were collected from 2100 Alameda County Study participants between 1965-1999. Group-based trajectory models were used to identify income trajectories over the life course. Logistic regression models tested associations between trajectory group membership and experiencing 5+ depressive symptoms.

Results—Six trajectories of SEP over the life course were identified: low increasing, low decreasing, moderate decreasing, moderate increasing, continuously increasing, and consistently high groups. Compared to the consistently high trajectory, the odds of multiple depressive symptoms were higher for the low-decreasing (OR=3.6, 95% CI=1.7-7.8) and moderate-decreasing (OR=2.3, 95% CI=1.2-4.5) trajectories. The associations were attenuated after controlling for having a history of depressive symptoms.

© 2015 The Royal Society for Public Health. Published by Elsevier Ltd.

Correspondence to: Vicki Johnson-Lawrence, vickij@umich.edu.

We have no competing interests to declare.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Discussion—Declines in income over the adult life course may be negatively related to depressive symptomatology in later life. Future work should continue to evaluate life course SEP variability in relation to health.

Cross-sectional¹ and prospective studies² have shown that depressive symptoms are more common for individuals with lower socioeconomic position (SEP) in the United States. These studies have largely utilized SEP at a single point in time³, or focused on the cumulative effects of SEP over time¹. However, SEP may change over time, reflecting normative or idiosyncratic patterns, and life events that diminish or enhance SEP. These patterns can reflect SEP increases or decreases during various periods of the life course. The timing, frequency, and duration of these SEP increases and decreases may influence access to health care resources and subsequently influence health outcomes. Few studies have examined associations between SEP patterning over time in relation to subsequent mental health outcomes.

Some evidence suggests that there are long-term effects of SEP over time on health outcomes, including depression⁴. Other research suggests that patterns of change in SEP are also associated with health⁵. These studies suggest that increases in SEP are associated with more positive health outcomes later in adulthood. Few studies however have examined patterning of SEP in relation to mental health outcomes in adulthood, and we are not aware of studies that examined patterning of SEP during adulthood in relation to depressive symptoms in later life. This study has two aims: (1) to describe the patterning of SEP, categorized into trajectory groupings, over the adult life course using group-based discrete mixture models; and (2) to examine the associations between adulthood income trajectory patterns and depressive symptoms among aging adults included in the Alameda County Study from 1965-1999.

Logistic regression analyses using SAS version 9.3 (The SAS System, Cary, NC) were performed using data from the Alameda County Study- a population-based longitudinal study (n=6928; 86% response rate) from 1965-1999 (5 waves) to study psychological, social, and health characteristics of adults aged 20 and older (or 16 and older if married)⁶. The response sample in 1999 (n=2123) represented 78% of the respondents interviewed in the previous wave (in 1994). Respondents were included if they had complete data in 1999 on the study variables of interest (n=2100). Depressive symptoms were assessed based on a set of 12 items³ from the validated self-report version of the primary care evaluation of mental disorders (PRIME-MD)⁷. This set of items was designed to capture the diagnostic criteria for a major depressive disorder based on the Diagnostic Statistical Manual for Mental Disorders Third Edition (DSM-III), and has been used previously with the Alameda County Study data³. We used the same “case” definition as in previous studies with these data. Our study identified “cases” as those individuals who reported experiencing five or more depressive symptoms almost every day for the past two weeks (n=205; 9.76%).

Household income was reported in categories in the survey. Demographic data available in both the Alameda County Study and Current Population Surveys of the same year, including age, education, gender, race, marital status, occupation, and household size, were used to impute continuous measures of household income to reduce misclassification due to

fluctuations in the income categories. These continuous measures were constrained to the bounds of the individuals' initially reported income category. All respondents in the analytic sample were required to have at least three waves of data for household income. The continuous measure of household income was adjusted for household size and standardized to 1999 dollars using the Consumer Price Index.

Income trajectories were created using a group-based trajectory modeling approach within the PROC TRAJ procedure in the SAS System⁸. The procedures within PROC TRAJ are performed under the assumption that a mixture of trajectory groups, captured through a parametric model, describes the household income data. Likelihood of certain household incomes throughout the study period is then modeled using a latent variable modeling linkages between time and household income. We selected the model of the trajectories with the most negative Bayesian Information Criterion (BIC) calculated within PROC TRAJ, holding the polynomial order of the trajectories constant. Posterior probabilities of group membership were computed for each sample respondent, and individuals were assigned membership to the group for which they had the greatest probability. All probabilities were greater than 90%.

Six trajectories emerged from the analyses for household income from 1965-1999 (Figure 1): low-increasing, low-decreasing, moderate- decreasing, moderate- increasing, continuously increasing, and high groups. Income patterns were variable over the study period, but comparable in absolute dollar figures for the bottom four trajectories. The high and increasing trajectories displayed curvilinear and increasing patterns over time.

Income patterning over the adult life course was significantly associated with odds of experiencing multiple depressive symptoms in later adulthood. Individuals with declines in household income over the life course were more likely to experience multiple depressive symptoms than individuals within household incomes that remained high and consistent over the study period. Controlling for age, race/ethnicity, and marital status, indicated higher odds of multiple depressive symptoms for those with membership in the low- decreasing trajectory (Odds ratio (OR)=3.6, 95% confidence interval (CI)=1.7-7.8) and moderate-decreasing (OR=2.3, 95% CI= 1.2-4.5) compared to those in the high trajectory. These findings suggest that declines in household income may have additional negative influence on depressive symptomatology that extend beyond having low absolute income.

The observed trajectories may reflect changes in life circumstances, including but not limited to additional household members (i.e. through marriage), which could increase household income, as well as early death or loss of loved ones, job related changes (including job loss), changes in health status, or retirement, which may have been forced due to health. The patterns of the trajectories broadly suggest significant variability in both absolute dollar amount and relative increases or decreases over time in the trajectory patterns at higher levels of household income (greater than \$40,000) over the life course, and also suggests that population subgroups may have differential experiences over the life course, and these experiences can influence SEP in later life. Income trajectories of lower average value across the life course (less than \$40,000) reflected more similar levels of absolute dollar values over the life course, but the trajectories patterns revealed marked

increases and decreases over the study period, even within the \$0-\$40,000 range. The differences in the income ranges for those with membership in the higher trajectories (average values greater than \$40,000) compared to those in the lower trajectories (average values less than \$40,000) may be attributable to the limited sample size of the two higher trajectories, which represented less than 20% of the total sample. The similar absolute values over the study period for those of lower SEP are consistent with studies of social mobility in the life course literature have found patterns of SEP to include groups that maintain consistent SEP (including income specifically) or exhibit changing patterns over time, such as increasing or decreasing patterns over the life course⁹. The divergent income patterns for the moderate-decreasing and moderate-increasing trajectories groups (representing 72.5% of the sample likely reflects compositional differences in the sample (moving toward retirement versus being retired).

The results observed likely represent both a direct effect of income and the presumed associated material resources on the likelihood of depression and an indirect effect, characterized by factors such as loss of social interactions and a history of depressive symptoms over the study period that may result in an increased likelihood of depression-related outcomes in later life. Our subsequent analyses that controlled for having 5+ depressive symptoms in 1965 based on the Human Population Laboratory 18- item index¹⁰ resulted in non-significant associations between income patterning and depressive symptoms in 1999. This result may indicate no association between income patterning and depressive symptoms independent of having depressive symptoms earlier in life, but also points to the need to examine income patterns beginning earlier in the life course to evaluate whether earlier declines in SEP based on income predict the onset of having multiple depressive symptoms. These data also include information on social isolation and social support over the study period, and can be integrated as covariates in future analyses. Our limitations include the number of data collection points and distribution of the population over the trajectories, which may have limited the precision of the estimates. We also note that additional time-varying factors, both earlier (e.g. employment) and later (e.g. wealth) in the life course, may influence both income trajectories and health outcomes among older adults.

Our study is a preliminary examination of the relationships between income trajectories and depressive symptoms among a community sample of older adults in the United States. We found modest evidence of an association between household income declines in addition to lower absolute levels of income and experiencing multiple depressive symptoms, but the association was attenuated after controlling for depressive symptoms reported at the baseline wave in 1965. Income declines at various periods of the adult life course can contribute to extended periods of excess stress, which is frequently cited as a mechanism by which disadvantage negatively affects health¹¹. Future work should consider whether variation in SEP, potentially as an indicator of repeated exposure to chronic stress, conveys similar risk for poor mental health as longterm socioeconomic disadvantage among older adults.

Acknowledgments

These data are publicly available from the Inter-university Consortium for Political and Social Research at the Institute for Social Research at the University of Michigan, in which the data undergo confidentiality reviews, and were reviewed by the University of Michigan IRB Council in April 2006. These data were deemed to not require

additional IRB approval. This work was supported by the National Institutes of Health (5R37AG011375 and R24 HD047861 to G.A.K.) and the Rackham Merit Fellowship, University of Michigan (V.D.J.L.).

References

1. Zimmerman FJ, Katon W. Socioeconomic status, depression disparities, and financial strain: what lies behind the income-depression relationship? *Health Econ.* 2005; 14:1197–215. [PubMed: 15945040]
2. Harper S, Lynch J, Hsu WL, Everson SA, Hillemeier MM, Raghunathan TE, et al. Life course socioeconomic conditions and adult psychosocial functioning. *International Journal of Epidemiology.* 2002; 31:395–403. [PubMed: 11980802]
3. Roberts RE, Kaplan GA, Shema SJ, Strawbridge WJ. Does growing old increase the risk for depression? *American Journal of Psychiatry.* 1997; 154:1384–90. [PubMed: 9326820]
4. Gilman SE, Kawachi I, Fitzmaurice GM, Buka SL. Socioeconomic status in childhood and the lifetime risk of major depression. *Int J Epidemiol.* 2002; 31:359–67. [PubMed: 11980797]
5. Johnson-Lawrence V, Kaplan G, Galea S. Socioeconomic mobility in adulthood and cardiovascular disease mortality. *Annals of epidemiology.* 2013; 23:167–71. [PubMed: 23453385]
6. Berkman, LF.; Breslow, L. *Health and Ways of Living: The Alameda County Study.* New York: Oxford University Press; 1983.
7. Spitzer RL, Kroenke K, Williams JB. Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study. Primary Care Evaluation of Mental Disorders. Patient Health Questionnaire. *JAMA : the journal of the American Medical Association.* 1999; 282:1737–44.
8. Jones BND, Roeder K. A SAS procedure based on mixture models for estimating developmental trajectories. *Sociological Methods Research.* 2001; 29:19.
9. McDonough P, Duncan GJ, Williams D, House J. Income dynamics and adult mortality in the United States, 1972 through 1989. *American Journal of Public Health.* 1997; 87:1476–83. [PubMed: 9314800]
10. Roberts RE, Kaplan GA, Camacho TC. Psychological distress and mortality: evidence from the Alameda County Study. *Soc Sci Med.* 1990; 31:527–36. [PubMed: 2218634]
11. Adler, NE.; Stewart, J. Preface to *The Biology of Disadvantage: Socioeconomic Status and Health.* In: Adler, NE.; S, J., editors. *Biology of Disadvantage: Socioeconomic Status and Health.* 2010. p. 1-4.

Household income trajectories over the adult life course reflect life circumstances, including financial, social, and health related changes

Trajectories were relatively stable for individuals with income under \$40,000 at the onset of the follow up period

Decreasing income patterns over the life course were modestly associated with depressive symptoms in later life, but not after controlling for baseline depressive symptoms. This may be explained by health, social, and financial experiences over the longer periods of the life course.

Figure 1.

Household income trajectory patterns for the sample of 2100 adults of the 1999 Wave of the Alameda County Study. Low Increasing: n=47 (2.24%), mean age = 63.98 years; : Low Decreasing n=136 (6.48%), mean age = 70.75 years; Moderate Decreasing: n=638 (30.38%), mean age = 71.85 years; Moderate Increasing: n=885 (42.14%), mean age=65.20 years; Increasing: n=176 (8.38%), mean age=62.10 years; High: n=218 (10.38%), mean age=66.59 years.