



Subjective Social Status and Functional Decline in Older Adults

Bonnie Chen, MD¹, Kenneth E. Covinsky, MD^{2,3}, Irena Stijacic Cenzer, MA², Nancy Adler, PhD^{4,5}, and Brie A. Williams, MD, MS^{2,3}

¹Department of Medicine, University of California, San Francisco, CA, USA; ²Department of Medicine, Division of Geriatrics, University of California, San Francisco, CA, USA; ³San Francisco VA Medical Center, Health Services Research and Development Research Enhancement Award Program, San Francisco, CA, USA; ⁴Departments of Psychiatry and Pediatrics, University of California, San Francisco, CA, USA; ⁵Center for Health and Community, University of California, San Francisco, CA, USA.

BACKGROUND: It is unknown whether subjective assessment of social status predicts health outcomes in older adults.

OBJECTIVE: To describe the relationship between subjective social status and functional decline in older adults.

DESIGN: Longitudinal cohort study.

SETTING: The Health and Retirement Study, a nationally representative survey of community-dwelling older adults (2004-2008).

PARTICIPANTS: Two thousand five hundred and twenty-three community-dwelling older adults.

MAIN MEASURES: Self-report of social status (SSS), categorized into three groups, reported by participants who marked a 10-rung ladder to represent where they stand in society. Four-year functional decline (new difficulty in any of five activities of daily living, mobility decline and/or death)

KEY RESULTS: Mean age was 64; 46% were male, 85% were white. At baseline, lower SSS was associated with being younger, unmarried, of nonwhite race/ethnicity, higher rates of chronic medical conditions and ADL impairment ($P < 0.01$). Over 4 years, 50% in the lowest SSS group declined in function, compared to the middle and highest groups (28% and 26%), P -trend < 0.001 . Those in the lowest rungs of SSS were at increased risk of 4-year functional decline (unadjusted RR=1.91, CI 1.9-2.46). The relationship between a subjective belief that one is worse off than others and functional decline persisted after serial adjustment for demographics, objective SES measures, and baseline health and functional status (RR 1.36, CI 1.08-1.73).

CONCLUSIONS: In older adults, the belief that one is in the lowest rungs of social status is a measure of socioeconomic distress and of significant risk for functional decline. These findings suggest that self-report of low subjective social status may give clinicians additional information about which older adults are at high risk for future functional decline.

KEY WORDS: health disparities; functional decline; geriatrics; socioeconomic status; determinants of health.

J Gen Intern Med 27(6):693-9

DOI: 10.1007/s11606-011-1963-7

© Society of General Internal Medicine 2011

INTRODUCTION

Socioeconomic status (SES) is among the strongest predictors of health outcomes.¹⁻⁵ This association has been demonstrated for over a century and for numerous objective measures of SES, including net worth or wealth, income, educational attainment, and occupation.⁶⁻⁸ Recently, there has been an emerging interest in the relationship between *subjective* social status (SSS) and health.⁹⁻¹⁴ This is because a person's assessment of where they stand in relation to others may capture intangible factors of SES that influence health but that traditional measures of SES fail to ascertain.¹⁵ Subjective reports of social status may concisely integrate a person's experience of stress, social position, and perception of inequality, or even the cumulative effect of changing SES over a lifetime. In this way, subjective assessment of social status might be akin to subjective assessment of health ("self-rated health"), which captures multiple domains of health and has a predictive value for health outcomes that is beyond the objective measure of a person's medical conditions alone.⁷

Early evidence suggests that subjective measures of social status may be particularly strong predictors of health in older adults. In Taiwanese older adults, lower SSS is associated with more Instrumental Activity of Daily Living (IADL) difficulty and less physical activity.¹² In older Americans, the stress-marker cortisol rise is more closely associated with subjective social status than with objective measures of SES.¹⁶ In studies of adults of all ages, lower SSS is associated with worse baseline self-rated health and health status.^{11-14,17-19} While some studies find that the associations between subjective social status and health remain after accounting for objective measures of SES,^{11,18} others do not.¹⁹ To our knowledge, the only longitudinal study of subjective social status and health was conducted in British civil servants ages 35-55 years¹⁰ and found that

Received November 16, 2011

Revised November 16, 2011

Accepted December 5, 2011

Published online January 4, 2012

SSS was significantly associated with worse 3-year scores in psychological distress, the SF-36, and self-rated health.

Subjective social status might be an important and easy-to-use predictor of health outcomes. However, longitudinal studies have not been conducted to examine whether older persons who view themselves at the lowest rungs of social status are at most risk for poor health outcomes. Since decline in functional status is one of the greatest predictors of poor quality of life, morbidity, health care utilization and mortality^{20,21} among older adults, the goals of this study were (1) to assess the association between subjective social status, and baseline functional and health status in older adults, and (2) to determine whether older adults with lower subjective social status are more likely to experience four-year functional decline or death.

METHODS

Study Design and Sample

This longitudinal cohort study includes men and women aged 50 or older who participated in the Health and Retirement Study (HRS) in 2004 and completed the “Participant Lifestyle Questionnaire” portion of the survey. The HRS is a nationally-representative longitudinal study of community-dwelling older adults. HRS conducts interviews in person and by telephone every 2 years. In 2004, 3,841 HRS participants from the core interview were selected to receive a leave-behind self-administered “Participant Lifestyle Questionnaire.” Of those, 3,005 (78.2%) completed and returned the questionnaire.

We excluded 390 individuals who were missing data on subjective social status in 2004 and 92 individuals who were missing data on activities of daily living (ADLs) (eating, dressing, transferring, toileting, bathing), mobility (ability to walk several blocks, ability to climb one flight of stairs), or vital status in 2008. This resulted in a sample size of 2,523.

MEASURES

Predictor Variable

Our predictor was subjective social status (SSS), assessed using the MacArthur Scale of Subjective Social Status (Fig. 1). Briefly, subjects were shown a picture of a 10-rung ladder and asked: “Think of this ladder as representing where people stand in our society, including having more money, more education and better jobs. Higher rungs represent higher social standing.” We divided responses into 3 groups: low SSS (rungs 1–3), middle SSS (rungs 4–7) and high SSS (rungs 8–10). We chose this categorization to identify groups that clearly were worse off or better off in comparison to others and we established these cutoffs conceptually. Other studies have also reported



Figure 1. The MacArthur Scale of Subjective Social Status. This figure demonstrates the ladder shown to participants when asked to rate their subjective social status^{9–12} with the following question: “Think of this ladder [diagram of ladder is presented] as representing where people stand in our society. At the top of the ladder are the people who are the best off—those who have the most money, most education, and best jobs. At the bottom are the people who are the worst off—who have the least money, least education, and the worst jobs or no jobs. The higher up you are on this ladder, the closer you are to the people at the very top and the lower you are, the closer you are to the people at the very bottom. (Please mark a cross on the rung on the ladder where you would place yourself).”

subjective social status as a categorical variable, although no standardized cutoffs have been established.^{11,12,18} Subjective social status has been validated in a large multiethnic sample examining test-retest reliability and predictive utility.⁹

Outcome Variable

Our outcome of interest was 4-year functional decline defined as a decline in either the ability to complete basic activities of daily living (ADL) or mobility. For baseline ADL function, each participant was classified as “independent,” “having difficulty,” or “dependent” in each of the five ADLs (eating, dressing, transferring, toileting, bathing). Participants were classified as “independent” in an ADL if they reported no difficulty performing that ADL, as “having difficulty” in an ADL if they reported difficulty but did not require help with the activity, and as “dependent” in an ADL if they reported difficulty and required help. Each participant’s mobility was also classified according to whether or not they had difficulty in the ability to walk several blocks and/or climb one flight of stairs.

Four-year functional decline was defined as ADL decline, mobility decline, or death by 2008. Subjects were classified as having ADL decline if they reported increased difficulty in any of five ADLs compared to baseline (e.g. any ADL change from “independent” to “having difficulty” or “dependent” and/or death; and any ADL change from “having difficulty” to “dependent” and/or death). Mobility decline was defined as the development of new difficulty in the ability to walk several blocks and/or climb one flight of stairs and/or death compared to baseline. We included death in our definition of functional decline because research shows that most older persons decline in functional status prior to death.^{22,23} HRS assesses mortality using family reports and the National Center for Health Statistics National Death Index.

Other Variables

We considered other variables that, based on previous literature, might confound the association between subjective social status and functional decline. These included age, race/ethnicity, gender, marital status, and baseline health and functional status, as well as objective measures of SES (education, income and net worth). In multivariate analyses, age was used as a continuous variable. Race/ethnicity was based on self-identification from two questions: (1) “Do you consider yourself primarily white or Caucasian, black or African American, American Indian or Asian or something else?” and (2) “Do you consider yourself Hispanic or Latino (“Latino”)?” All participants who answered “yes” to being Latino were categorized as Latino, regardless of race.

We also included three traditional measures of objective SES: education, income and net worth. We categorized education as less than a high school education, high school graduate/GED, or greater than high school education. Income was determined by self-report and net worth was calculated by the HRS using all assets (real estate, business, stocks, bonds, checking, savings, vehicles, and retirement funds), minus debts (mortgages, other home loans and all other debt). We entered net worth and income into the model as continuous rather than categorical variables to minimize the number of variables in our adjustment model, thus improving its efficiency and accuracy. The accuracy of the income and net worth calculations in HRS are considered robust because the HRS is designed to use innovative strategies to ascertain the economic status of participants. All missing wealth data are imputed by RAND Corporation.²⁴

Statistical Analysis

We compared characteristics across subjective social status using chi-square tests for categorical variables and tests for trend for binary and continuous variables. To describe the health of participants in each category of subjective social status, we compared the prevalence of ADL and mobility impairment and medical conditions at baseline. We then determined the percent of participants who experienced functional decline between the 2004 and 2008 interviews.

Next, we conducted a sequential series of modified Poisson regression models to determine if lower SSS identifies persons at greater risk for functional decline. First, we compared the proportion of subjects in each of the three categories of SSS who declined over 4 years. We then examined whether SSS predicted decline after accounting for demographic differences (age, race, gender, marital status) using modified Poisson regression. We then added traditional measures of SES (education, income, and net worth) to the model. Next, to determine if SSS predicted decline even after accounting for all sociodemographic factors and differences in health, we adjusted for co-morbidities and baseline functional status, and then additionally for self-rated health. In order to determine if the association between SSS and 4-year functional decline differed by race/ethnicity, we tested the interaction between these factors in the multivariate model. We also repeated our analyses, first using SSS as a continuous variable and then categorized into statistical quartiles. All reported analyses were weighted for the differential probability of selection and to account for the complex design of HRS.

Subjects who were excluded from this study based on missing data about the main predictor (SSS) or main outcome (functional status) were more likely to be non-white, not married, less educated, older and have lower income and assets compared to those who were included. As a sensitivity analysis, we imputed subjective social status and the main outcome using multiple imputation

methods, and the results of the analyses on the imputed dataset were similar. The results reported in this manuscript are based on the sample with complete data.

This study was approved by the Committee on Human Research at University of California, San Francisco and the San Francisco VA Medical Center. The statistical analyses were performed using STATA10.1 software (StataCorp. 2007. Stata Statistical Software: Release 10. College Station, TX: StataCorp LP.), and SAS 9.2 software (SAS software, Version 9.2 of the SAS System for Windows, Copyright 2008, SAS Institute Inc., Cary, NC, USA).

RESULTS

Subject Characteristics

The mean age of the subjects was 64 years (range 50–104 years), 46% were male, 85% were white, and 31% had a baseline functional impairment. Median income was \$43,980, median net worth was \$181,000, and 16% had less than a high school education. Overall, 8.3% reported a low SSS (rungs 1-3), 66.6% reported a middle SSS (rungs 4–7), and 25.1% reported a high SSS (rungs 8–10).

There were significant differences in participants' demographics, objective SES, medical conditions, and baseline functional status according to subjective social status (Table 1). For example, lower SSS was associated with being younger (63 years vs. 64 years vs. 66 years), unmarried (50% vs. 32% vs. 25%), and of a nonwhite race (30% vs. 16% vs. 9%) (all $P < 0.01$). Lower SSS was also associated with objective SES, including having less than a high school education (41% vs. 15% vs. 11%), lower median income (\$19 K vs. \$43 K vs. \$61 K) and lower median net worth (\$28 K vs. \$161 K vs. \$405 K) (all $P < 0.001$). Those with a lower SSS had higher rates of many medical conditions and baseline functional impairment (58% vs. 31% vs. 24%, $P < 0.001$) (Table 1).

Discrepancies Between Subjective and Objective Social Status

We compared the three-level subjective social status variable with the objective measure of wealth (using wealth as a three-level variable based on statistical tertiles). Overall, 43.9% of the participants "agreed" between ladder and wealth categories, 51.2% had slight disagreement (off by one category) and

Table 1. Subjective Social Status* is Associated with Sociodemographic Characteristics, Functional Status and Health Status (N=2,523)

Characteristic	Low SSS (N=216)	Middle SSS (N=1645)	High SSS (N=662)	p-value
Sociodemographics				
Age, yrs (mean±SD)	62.9±10.8	63.6±10.7	65.7±11.1	0.006
Male, %	48.9	43.8	51.0	0.044
Married, %	50.0	67.6	74.5	<0.001
Race / Ethnicity[‡], %				
White	70.0	83.8	91.4	<0.001
Black	13.9	9.3	3.1	
Latino	11.7	5.5	4.7	
Other	4.4	1.4	0.8	
Education, %				
Less than high school	41.0	15.2	10.7	<0.001
High school or GED	35.7	37.8	23.9	
Some college or higher	23.3	47.0	65.5	
Net worth, thousands, median (IQR) ¹	28K (650-90K)	161K (57K-406K)	401K (166K-863K)	<0.001
Income, median (IQR) ¹	19K (10K-31K)	43K (23K-70K)	61K (32K-120K)	<0.001
Health Status[§], %				
High blood pressure	58.5	49.3	42.6	<0.001
Diabetes	28.4	14.6	11.7	<0.001
Cancer	13.8	10.4	16.4	0.088
Lung disease	17.6	8.9	6.0	0.001
Heart Condition	25.1	20.1	19.6	0.216
Stroke	10.3	5.5	5.3	0.188
Self-rated health, fair or poor	60.8	25.1	16.9	<0.001
ADL Difficulty[§], %				
Bathing	17.9	4.3	3.8	<0.001
Transferring	20.0	4.1	3.9	<0.001
Toileting	11.5	3.6	3.7	0.003
Dressing	21.1	5.3	6.0	<0.001
Eating	4.8	2.8	1.7	0.316
Mobility Difficulty[§], %				
Walk Several Blocks	51.4	24.6	21.1	<0.001
Climb 1 Flight of Stairs	40.9	15.6	13.2	<0.001

* Subjective social status categorized according to self-report (Low=Rungs 1-3, Middle=Rungs 4-7, high=rungs 8-10 on a ladder scale of rungs 1-10)
[†] P-value calculated using chi-square for categorical variables and trend tests for binary and continuous variables. P-values are based on log-transformed values for income and wealth.

[‡] Other race/ethnicity includes Native American, Asian and those who identify as "other"

[§] Health status, ADL Difficulty and Mobility Difficulty based on self-report

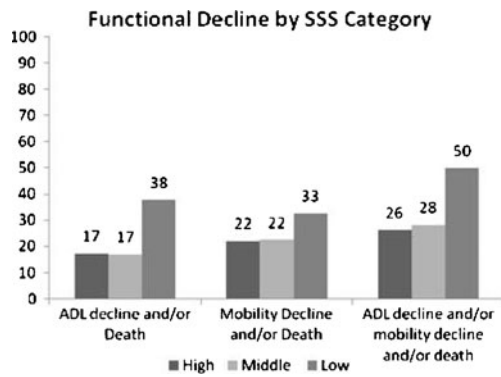


Figure 2. Subjective social status is associated with 4-year functional decline. This figure shows the percent of individuals who experienced 4-year functional decline or death, according to self-reported social status. A higher percentage of individuals in the self-reported lowest rungs of social status experienced ADL decline or death; mobility decline or death; and ADL decline, mobility decline or death, than individuals who reported a middle or high level of social status, in each group P for trend <0.001 .

4.9% had marked disagreement (off by two categories). Of those that did not agree, 61.2% rated their subjective social status better than their net worth, and 38.8% rated it lower.

Subjective Social Status and 4-year Functional Decline

Overall, 29.6% of subjects experienced functional decline and/or death over 4 years. Those in the lowest subjective social status group were more likely to experience ADL decline, mobility decline, and overall decline in ADL, mobility and/or death over the 4 years. (Fig. 2). For those in the lowest SSS group, 38% experienced decline in at least one ADL in 4 years, compared with 17% in both the middle and high groups ($P<0.001$); 33% experienced a decline in mobility (vs. 22% in both the middle and high groups, $P<0.001$); and 50% experienced ADL and/or mobility decline (vs. 28% and 26%, $P<0.001$). When we analyzed subjective social status first as a continuous variable, and then categorized in quartiles, there remained a statistically significant association between subjective social status and functional decline.

Multivariate Analyses

We performed a sequential series of modified Poisson regression models to assess whether subjective social status was still predictive of 4-year functional decline after accounting for demographics, objective SES and baseline health status. Those in the lowest rungs of SSS were at increased risk of 4-year functional decline (unadjusted RR= 1.91, CI 1.49–2.46), (Table 2). This association remained throughout sequential adjustments for demographics (age, race, gender, and marital status, RR 1.97, CI 1.52–2.55); objective SES (years of education, income, and net worth, RR 1.62, CI 1.25–2.10); baseline health and functional status (RR 1.36, CI 1.08–1.73); and self-rated health (RR 1.29, CI 1.03–1.67). The association between self-rated health and functional decline was also significant in the fully adjusted model (RR 1.59, CI 1.38–1.84). The difference between the strengths of association for fair/poor self-rated health and low SSS was not statistically significant (p -value=0.126). Additionally, the relationship between SSS and functional decline did not differ by race/ethnicity (p for interaction=0.56).

DISCUSSION

The link between traditional measures of objective SES (income, education and net worth) and functional outcomes in older adults is well-established and strong. We found that persons who report they are in the lowest rungs of subjective social status are also at substantially increased risk for functional decline. The relationship between a subjective belief that one is worse off than others and poor health outcomes persisted even after adjustment for demographics, three objective measures of SES, self-rated health, and medical conditions and functional status. Thus the belief that one is in the lowest rungs of social status is not only a measure of socioeconomic distress, but is also a measure of significant health risk.

There are many potential explanations for why subjective social status might predict functional decline in older adults even after accounting for objective SES. Subjective social status assessment might concisely capture additional com-

Table 2. Subjective Social Status is Associated with 4-year Functional Decline and/or Death after Serial Adjustment for Sociodemographics, Baseline Health Status and Baseline Functional Status

Sequential adjustment	Low SSS (N=216)	Middle SSS (N=1645)	High SSS (N=662)
Proportion	50.1%	28.4%	26.2%
Unadjusted, RR (95% CI)	1.91 (1.49, 2.46)	1.08 (0.90, 1.29)	1
Adjusted for demographics, RR (95% CI) (age, gender, race/ethnicity, marital status)	1.97 (1.52, 2.55)	1.14 (0.96, 1.34)	1
Adjusted for sociodemographics, RR (95% CI) (age, gender, race/ethnicity, marital status, education, income, net worth)	1.62 (1.25, 2.10)	1.06 (0.90, 1.25)	1
Adjusted for sociodemographics, health status* and functional status†, RR (95% CI)	1.36 (1.08, 1.73)	1.07 (0.92, 1.24)	1
Adjusted for sociodemographics, health status*, functional status†, and self-rated health, RR (95% CI)	1.29 (1.03, 1.67)	1.06 (0.91, 1.24)	1

*Health status based on co-morbidities including hypertension, diabetes, cancer, lung disease, heart conditions, stroke

†Functional status based on having difficulty in any Activity of Daily Living or mobility at baseline

ponents of the multifactorial nature of socioeconomic status.^{6,25} For instance, assessment of education alone as a measure of SES might miss those who have achieved high SES without attaining high grade levels or who attended a poor-performing school. Similarly, using income alone does not always reflect a person's high property or pension values. Moreover, an individual could have very low wealth due to high debt because they are living beyond their means, but have greater access to lifestyle benefits than an individual with fewer assets but also much lower debt. Additionally, SSS might also reflect whether a person perceives that his or her resources are able to meet his or her health-related medical and social needs in comparison to peers. Subjective social status asks a person to integrate these multiple domains into one category, and thus may add substantively to a person's multi-dimensional SES. Our finding that frequent differences between how participants rate their subjective social status as compared to their objective social status demonstrates that SSS may provide information not captured in objective measures.

It is also possible that subjective social status helps to capture the effect of a person's changing SES over his or her lifetime. Evidence suggests that the cumulative life experience influences health trajectories in a way that no static timepoint can capture.^{26–29} Despite this evidence, it has been difficult to find a way to better account for the collective effect of lifetime SES. Indeed, evidence has shown that the effects of socioeconomic disparities on health may have the most impact earlier in life, perhaps due to mortality selection.^{30–32} Since SSS comes from a person's assessment of his or her own station, it might be a domain that reflects the cumulative impact of an individual's shifting SES throughout his or her lifetime. A growing literature also links neighborhood socioeconomic characteristics to the health of its residents.^{33–36} Subjective social status might help account for the effect of the larger community on a person's life in a way that standard measures of SES do not fully capture.

The previous longitudinal study of subjective social status and health¹⁰ examined self-rated health as an outcome rather than as a potential confounder. However, we found that the relationship between SSS and functional decline was still significant even after accounting for self-rated health as a potential confounder. Although it is likely that a person's SSS contributes to their assessment of self-rated health, our findings suggest that even when self-rated health is accounted for, the question of where older adults perceive they are in relationship to their peers is still of incremental value to predicting functional decline. Moreover, there is evidence that the predictive accuracy of self-rated health is quite different across racial/ethnic groups.³⁷ When we assessed whether SSS has similar limitations, we found that there were no significant interactions between SSS and race/ethnicity, suggesting that unlike self-rated health, subjective social status functions similarly across racial/ethnic groups.

The following limitations should be considered when assessing this study. We categorized subjective social status into three levels—low, middle and high. While this might be viewed as a limitation, we did this because interpretation of low, middle and high SSS is easier than interpreting continuous findings, and our groups were created to identify groups who clearly felt that they were worse or better off in comparison to others. Second, HRS uses self-report to collect all data; however self-report is considered a robust measure of disease burden and functional impairment.^{38,39}

In conclusion, we found that low subjective social status was strongly associated with 4-year functional decline in older adults. We found that older adults who self-identify in the lowest rungs of subjective social status are at particularly high risk for poor functional health outcomes. This risk persisted after accounting for many known sociodemographic and health-related risk factors for functional decline. Thus, self-report of low subjective social status may give clinicians additional information about which older adults are at high risk for future functional decline.

Author Contributions: Study Concept and Design: Chen, Williams
Acquisition of Data: Williams, Stijacic-Cenzer, Covinsky
Analysis and Interpretation of Data: Chen, Stijacic-Cenzer, Covinsky, Adler and Williams
Preparation of Manuscript and Critical Review: Chen, Stijacic-Cenzer, Covinsky, Adler and Williams
No other parties contributed substantially to this research or to preparation of this manuscript.

Funders: Dr. Williams was funded by the Brookdale Leadership in Aging Fellowship, the National Institute on Aging (K23AG033102), the UCSF Hartford Foundation Center of Excellence Physician-Scholar Award and the Program for the Aging Century. Dr. Covinsky was supported by the National Institute on Aging (R01 AG028481 and K24 AG029812). The R01 was administered by the Northern California Institute for Research and Education, and with resources of the San Francisco Veterans Affairs Medical Center. Dr. Adler received support from the MacArthur Foundation Research Network on Socioeconomic Status and Health. These funding sources had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; or preparation, review, or approval of the manuscript. This work was supported with resources of the Veterans Affairs Medical Center, San Francisco, California. Drs. Williams and Covinsky are employees of the Department of Veterans Affairs. The opinions expressed in this manuscript may not represent those of the VA.

Prior Presentations: This paper was presented as an oral presentation at the 33rd Annual Meeting of the Society for General Internal Medicine on April 29, 2010.

Conflict of interest: None disclosed.

Corresponding Author: Brie A. Williams, MD, MS; Department of Medicine, Division of Geriatrics, University of California, San Francisco, CA, USA (e-mail: brie.williams@ucsf.edu).

REFERENCES

1. Isaacs SL, Schroeder SA. Class—the ignored determinant of the nation's health. *N Engl J Med*. 2004;351(11):1137–42.

2. **Backlund E, Sorlie PD, Johnson NJ.** The shape of the relationship between income and mortality in the United States. Evidence from the National Longitudinal Mortality Study. *Ann Epidemiol.* 1996;6(1):12–20. discussion 21–2.
3. **Marmot M.** Social determinants of health inequalities. *Lancet.* 2005;365(9464):1099–1104.
4. **Kunst AE, Groenohof F, Mackenbach JP, Health EW.** Occupational class and cause specific mortality in middle aged men in 11 European countries: comparison of population based studies. EU Working Group on Socioeconomic Inequalities in Health. *BMJ.* 1998;316(7145):1636–42.
5. **Lantz PM, House JS, Lepkowski JM, Williams DR, Mero RP, Chen J.** Socioeconomic factors, health behaviors, and mortality: results from a nationally representative prospective study of US adults. *JAMA.* 1998;279(21):1703–8.
6. **Krieger N, Williams DR, Moss NE.** Measuring social class in US public health research: concepts, methodologies, and guidelines. *Annu Rev Public Health.* 1997;18:341–78. Review.
7. **Kennedy BP, Kawachi I, Glass R, Prothrow-Stith D.** Income distribution, socioeconomic status, and self rated health in the United States: multilevel analysis. *BMJ.* 1998;317(7163):917–21.
8. **Braveman PA, Cubbin C, Egarter S, Chideya S, Marchi KS, Metzler M, et al.** Socioeconomic status in health research: one size does not fit all. *JAMA.* 2005;294(22):2879–88.
9. **Operario D, Adler NE, Williams DR.** Subjective Social status: Reliability and Predictive Utility for Global Health. *Psychol Health.* 2004;19:237–46.
10. **Singh-Manoux A, Marmot MG, Adler NE.** Does subjective social status predict health and change in health status better than objective status? *Psychosom Med.* 2005;67(6):855–61.
11. **Singh-Manoux A, Adler NE, Marmot MG.** Subjective social status: its determinants and its association with measures of ill-health in the Whitehall II study. *Soc Sci Med.* 2003;56(6):1321–33.
12. **Hu P, Adler NE, Goldman N, Weinstein M, Seeman TE.** Relationship between subjective social status and measures of health in older Taiwanese persons. *J Am Geriatr Soc.* 2005;53(3):483–8.
13. **Miyakawa M, Magnusson Hanson LL, Theorell T, Westerlund H.** Subjective social status: its determinants and association with health in the Swedish working population (the SLOSH study). *Eur J Public Health.* 2011
14. **Ostrove JM, Adler NE, Kuppermann M, Washington AE.** Objective and subjective assessments of socioeconomic status and their relationship to self-rated health in an ethnically diverse sample of pregnant women. *Health Psychol.* 2000;19(6):613–8.
15. **Wilkinson RG, et al.** Health, hierarchy, and social anxiety. In: **Adler NE, Marmot M, McEwen B, eds.** *Socioeconomic Status and Health in Industrial Nations: Social, Psychological, and Biologic Pathways.* New York: New York Academy of Science; 1999:48–63.
16. **Wright CE, Steptoe A.** Subjective socioeconomic position, gender and cortisol responses to waking in an elderly population. *Psychoneuroendocrinology.* 2005;30(6):582–90.
17. **Adler NE, Epel ES, Castellazzo G, Ickovics JR.** Relationship of subjective and objective social status with psychological and physiological functioning: preliminary data in healthy white women. *Health Psychol.* 2000;19(6):586–92.
18. **Adler N, Singh-Manoux A, Schwartz J, Stewart J, Matthews K, Marmot MG.** Social status and health: a comparison of British civil servants in Whitehall-II with European- and African-Americans in CARDIA. *Soc Sci Med.* 2008;66(5):1034–45.
19. **Demakakos P, Nazroo J, Breeze E, Marmot M.** Socioeconomic status and health: the role of subjective social status. *Soc Sci Med.* 2008;67(2):330–40.
20. **Hebert R.** Functional decline in old age. *CMAJ.* 1997;157(8):1037–45.
21. **Carey EC, Covinsky KE, Lui LY, Eng C, Sands LP, Walter LC.** Prediction of mortality in community-living frail elderly people with long-term care needs. *J Am Geriatr Soc.* 2008;56(1):68–75.
22. **Lunney JR, Lynn J, Foley DJ, Lipson S, Guralnik JM.** Patterns of functional decline at the end of life. *JAMA.* 2003;289(18):2387–92.
23. **Murphy TE, Han L, Allore HG, Peduzzi PN, Gill TM, Lin H.** Treatment of death in the analysis of longitudinal studies of gerontological outcomes. *J Gerontol A Biol Sci Med Sci.* 2011;66(1):109–114.
24. **RAND HRS Data Documentation, Version K.** Available at: <http://hrsonline.isr.umich.edu/modules/meta/rand/randhrsk/randhrsk.pdf>. Last accessed December 5, 2011.
25. **Abramson JH, Gofin R, Habib J, Pridan H, Gofin J.** Indicators of social class. A comparative appraisal of measures for use in epidemiological studies. *Soc Sci Med.* 1982;16(20):1739–46.
26. **Lynch JW, Kaplan GA, Salonen JT.** Why do poor people behave poorly? Variation in adult health behaviours and psychosocial characteristics by stages of the socioeconomic lifecourse. *Soc Sci Med.* 1997;44(6):809–19.
27. **Singh-Manoux A, Ferrie JE, Chandola T, Marmot M.** Socioeconomic trajectories across the life course and health outcomes in midlife: evidence for the accumulation hypothesis? *Int J Epidemiol.* 2004;33(5):1072–9.
28. **Smith GD, Hart C, Blane D, Gillis C, Hawthorne V.** Lifetime socioeconomic position and mortality: prospective observational study. *BMJ.* 1997;314(7080):547–52.
29. **Power C, Matthews S, Manor O.** Inequalities in self-rated health: explanations from different stages of life. *Lancet.* 1998;351(9108):1009–14.
30. **Beckett M.** Converging health inequalities in later life—an artifact of mortality selection. *J Health Soc Behav.* 2000;41(1):106–19.
31. **Kaplan GA, Seeman TE, Cohen RD, Knudsen LP, Guralnik J.** Mortality among the elderly in the Alameda County Study: behavioral and demographic risk factors. *Am J Public Health.* 1987;77(3):307–12.
32. **House JS, Lantz PM, Herd P.** Continuity and change in the social stratification of aging and health over the life course: evidence from a nationally representative longitudinal study from 1986 to 2001/2002 (Americans' Changing Lives Study). *J Gerontol B Psychol Sci Soc Sci.* 2005;60(Spec No 2):15–26. Review.
33. **Anderson RT, Sorlie P, Backlund E, Johnson N, Kaplan GA.** Mortality effects of community socioeconomic status. *Epidemiology.* 1997;8:42–7.
34. **Pickett KE, Pearl M.** Multilevel analyses of neighbourhood socioeconomic context and health outcomes: a critical review. *J Epidemiol Community Health.* 2001;55:111–22.
35. **Robert SA.** Socioeconomic position and health: the independent contribution of community context. *Annu Rev Sociol.* 1999;25:489–516.
36. **Yen IH, Syme SL.** The social environment and health: a discussion of the epidemiologic literature. *Annu Rev Public Health.* 1999;20:287–308. Review.
37. **Lee SJ, Moody-Ayers SY, Landefeld CS, et al.** The relationship between self-rated health and mortality in older black and white Americans. *J Am Geriatr Soc.* 2007;55(10):1624–9.
38. **Guralnik JM, Simonsick EM, Ferrucci L, et al.** A short physical performance battery assessing lower extremity function: association with self-reported disability and prediction of mortality and nursing home admission. *J Gerontol.* 1994;49(2):M85–94.
39. **Reuben DB, Siu AL, Kimpau S.** The predictive validity of self-report and performance-based measures of function and health. *J Gerontol.* 1992;47(4):M106–10.