Socioeconomic Determinants of Psychological Well-Being: The Role of Income, Income Change, and Income Sources Over 29 Years

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Abstract

Background—Considerable evidence indicates that income and other measures of socioeconomic position are associated with a wide variety of health outcomes, there are few studies that prospectively examine the association between socioeconomic position over decades and health outcomes. The present study, covering almost three decades of the life course, examined the cumulative impact of different income measures on psychological well-being among adults.

Methods—We used data collected over 29 (1965–94) years from Alameda County Study participants to study the association between average income, income changes, profit and benefit incomes—and five scales of psychological well-being—Purpose in Life, Self-acceptance, Personal Growth, Environmental Mastery, and Autonomy. In age-adjusted models, the psychological well-being measures were each regressed on each of the income measures. Potential confounders (sex, education, race/ethnicity, social isolation, depression and perceived health) were also examined.

Results—Mean income over almost three decades was strongly associated with all five scales of psychological well-being. Psychological well-being increased with the number of waves in which profit income was reported and with income increases over time. For all scales except Autonomy, psychological well-being decreased with the number of waves receiving need-based benefit and with decreasing income over time.

Conclusions—Psychological well-being may reflect the accumulation of socioeconomic advantage and disadvantage over decades.

Keywords

Psychological well-being; socioeconomic factors; quality of life; life course

Introduction

The pervasive role of socioeconomic factors in the natural history of health and disease is well-known (1). Overall, these associations are robust, occurring in analyses carried out in many

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geographic locations for most diseases and using many measures of socioeconomic status (2, 3). While some evidence, based on relatively short periods of observation, indicates that declines in income are associated with heightened mortality risk (4,5), little is known concerning the impact of socioeconomic forces over the life course on the quality of life in later years.

Although there is also evidence that lower socioeconomic status is associated with higher levels of psychological distress (6,7), particularly lacking are data on the cumulative impact of socioeconomic advantage or disadvantage over time on more positive aspects of functioning such as psychological well-being. It seems reasonable to suggest, however, that patterns of economic success and failure, and the associated different mixes of environmental resources and demands, would have an important impact on the extent to which feelings of accomplishment, mastery, and self-acceptance, for example, develop over the life course (2) Since occupation is closely tied to socioeconomic level, some support for this assertion can be found in Kohn and Schooler's work (8,9) in which they demonstrated that job characteristics, which are highly correlated with social class, exert a growing influence over time on psychological well-being.

In the present study we make use of data collected over 29 years from respondents in the Alameda County Study, a population-based cohort first studied in 1965, to examine the association between average income level, rate of changes in income, and other indicators of economic status and the measures of psychological well-being developed by Ryff (10) Synthesizing a wide variety of information coming from developmental and gerontologic theories, clinical writings on personal growth, and the mental health literature, Ryff has developed a series of scales measuring six dimensions of positive psychological functioning (11). Five of these scales were added to the survey instrument used in the 1994 data collection for the Alameda County Study, permitting the unique opportunity to examine the 29-year determinants of psychological well-being in a large population-based sample of adults who were then 50–102 years of age.

Methods

Study cohort

The Alameda County Study (ACS) is a population-based prospective study of predictors of health and functioning in a representative sample of 6,928 adults (aged 16–88) in Alameda County, California in 1965. Additional details about the sample construction and follow-up waves can be found elsewhere (12–15). In 1974, the respondents from 1965 were re-contacted and completed questionnaires were obtained from 4,864 respondents (85.1% of those located). In 1983, a 50% sample of the 1974 respondents not known to be dead, were interviewed with a response rate of 87%. In 1994, all living respondents from the 1974 wave (if not part of the 1983 sample) and those who participated in the 1983 wave of data collection were recontacted and interviewed (93% response rate). Between 1965–1994, there were 1,629 deaths and 1,813 study participants (less than 1% per year) were lost to follow-up or refused to continue in the study. An additional 159 participants were removed from the analyses due to missing data. The current analyses are based on the 1,127 respondents aged 50–102 in 1994 who were respondents in 1965, 1974, 1983, and 1994 and for whom complete information on all variables used in the analyses was available.

Socioeconomic variables

Mean Income—At each wave ACS respondents reported total household income using bracketed range categories. This data was subsequently combined with data from the Current Population Survey (CPS) of the same year in order to impute continuous income data at each

wave. The CPS is a monthly survey of about 50,000 households conducted by the Bureau of the Census for the Bureau of Labor Statistics and it provides the best national data on income. The imputation was done using "IVEware--Imputation and Variance Estimation Software" (SRC/ISR, University of Michigan, 2002), based on a multivariate sequential regression method described elsewhere (16). The common covariates between the two surveys were used as predictors in the imputation process. Thus, imputed incomes for ACS respondents were conditional on the distributions observed in the CPS data for similar cases in terms of age, education, gender, race, marital status, occupation and number of household members. Additionally, the imputed values for each ACS respondent at a particular wave were bounded within the bracketed income category reported by the respondent in that same wave. The mean of the imputed incomes for 1965, 1974 and 1983 (all adjusted to the 1999 Consumer Price Index) is used in the present analyses as a measure of long term or permanent income.

Income Slope—In order to measure changes in income over time, income slopes were estimated based on the imputed incomes from each one of the five available ACS waves. The goal was to obtain stable estimates of changes in income over time using as much information as possible from each individual. A random effects model was used to estimate the subject-specific slopes. The following model was used to estimate the subject-specific intercept and slopes:

$$y_{st} = \beta_{os} + \beta_{1s}t + \varepsilon_{st}$$
$$\beta_{os} = \beta_o + \eta_{os}$$
$$\beta_{1s} = \beta_1 + \eta_{1s}$$

Where y_{st} denotes the log income for subject s at time t, and where (ρ_{os}, ρ_{1s}) has a bivariate normal distribution with mean 0 and covariance matrix D and $\varepsilon_{st} \sim N(0, \sigma_\varepsilon^2)$. We then converted the slope to the original scale by computing the average expected difference per year over the study period using the empirical Bayes estimate of the subject specific slopes and intercepts and restricted maximum likelihood estimates of the variance components and the population averaged intercepts and slopes. These estimates are more efficient and stable than just using only the observations on any particular subject to estimate his/her slope, and use much more information than just the first and last incomes. In the analyses presented here, income slope measures the average rate of changes in the income per year, from 1965 thru 1999, in units of one thousand 1999 US dollars.

Income Sources—In 1965, 1974, and 1983, respondents reported whether or not they received income from a variety of different sources. From these reports, we constructed a score reflective of relative wealth by counting the number of waves (0–3) in which they reported income from profits, rentals or investments. Depth of financial need was indexed by a similar score counting the number of waves (0–3) in which they reported income from unemployment, welfare or disability. We refer to the first type of score as 'profit income' and to the second as 'benefit income'.

Baseline Covariates

Age at baseline was measured continuously in years. Education was coded as high school graduate versus less, and race/ethnicity as black, white, and other. In order to adjust for baseline 1965 measures which might be associated with psychological well-being, we included measures of depression, social isolation, and perceived health. Depression was measured using an index of depressive symptoms (7), with those with five or more symptoms coded depressed. Social isolation was measured using an index which combines responses from questions about the number of close friends, the number of close relatives, and the number of these seen at least

once during the last month (17). Respondents who reported at least two of the following were considered isolated: fewer than three close friends, fewer than three close relatives, saw fewer than three close friends or relatives during the last month. Perceived health was measured in response to the question "Overall, how would you rate your health (18)," with those reporting 'fair' or 'poor' compared to those reporting 'very good' or 'excellent' health.

Outcome

The well-being measures used in this study were originally developed by Ryff (10) as part of a model encompassing six different dimensions of positive psychological functioning. The scales used to measure these dimensions are meant to capture one's sense of: (1) Self-Acceptance (e.g., "I like most aspects of my personality"); (2) Personal Growth (e.g., "I think it is important to have new experiences that challenge how you think about yourself and the world"); (3) Purpose in Life (e.g., "Some people wander aimlessly through life, but I am not one of them"); (4) Autonomy (e.g., "I have confidence in my opinions, even if they are contrary to the general consensus"); having (5) Positive Relations with Others (e.g., "People would describe me as a giving person, willing to share my time with others"); and being able to manage effectively one's life and surroundings, which Ryff called having a sense of (6) Environmental Mastery (e.g., "In general, I feel I am in charge of the situation in which I live"). Additional details on the definitions and psychometric properties of these well-being dimensions and scales can be found elsewhere (19). In its original form, each dimension was measured with a 20-item scale, but several shorter versions have since been tested (11,20) and are also widely used (21). The version used in the 1994 ACS survey includes a set of three items for all but one of Ryff's well-being dimensions (the exception being Positive Relations with Others, which was not included in the survey). The items consisted of sentences related to different aspects of individual well-being dimensions, and the participants were asked to grade their agreement to the sentences in four categories, from strong disagreement to strong agreement. For the present study, the responses were coded (with values ranging from 0 to 3) and summed across the three items of each dimension so that the total score (ranging from 0-low to 9-high) indicates the respondent's level of well-being at that particular dimension.

Statistical methods

We used SAS 8.2 software (SAS Institute, Cary NC) for all statistical analyses. Means (s.d.) were calculated for each scale of psychological well-being by sex, age, and race/ethnicity; one-way analyses of variance were performed, using PROC GLM and Tukey multiple comparisons test, to examine differences between the means. A series of multiple regression models was carried out using PROC REG. In the first set of models, each measure of psychological well-being was regressed on age and on each of the socioeconomic measures separately; the second set of models added adjustment for sex, education and race/ethnicity; and the third set added depressive symptoms, social isolation, and perceived health status to the models.

Results

Characteristics of the sample are presented in Table 1. Average income across waves was $68,839 (1999 dollars), and mean income slope was .38 ($1000/year). No income from profits, rents, or investments was received by 54.0%, 23.1% reported income from these sources on one wave, and 22.9% reported such income on two or more waves. Receipt of need-based benefits was reported on one wave by 11.9%, on two or more wave by 4.0%, and on no waves by 84.1%. Table 2 presents the economic measures by age, sex and race/ethnicity. Average 1965–83 income was highest for those aged 50–64, about 12% higher for males than for females, and 67% higher for whites compared to blacks. Income slope in the 1965–99 period showed an average of 840 dollar increase in income per year for the youngest respondents, in contrast with a decrease at a rate of 260 dollars yearly for respondents aged 80+. There were

also substantial differences by gender and race/ethnicity: although both experienced income increases, slopes for males were more than 2.5 times the slopes experienced by females; and while whites had an average increase of 440 dollars per year, blacks experienced income losses at a rate of 120 dollars per year. Regarding income sources, for approximately 46% of the respondents there was at least one wave in which they received profit income, while about 16% reported receiving benefit income for at least one period.

Table 3 presents the mean (s.d.) for each measure of psychological well-being by age, sex, and race/ethnicity. Overall the magnitudes of the differences are unremarkable. However, females were significantly higher on Personal Growth than males (p=0.009), and, while there were no statistically significant difference between blacks and the other racial groups, whites did have a higher level of Purpose in Life (p=0.0155) than the 'other' category, which includes 'Hispanics'. There were also significant differences by age: Purpose in Life decreased with increasing age (p<0.0001); Personal Growth was higher in the youngest group (p<0.0001); and Environmental Mastery was highest among those 65–79 years of age (p=0.0024).

Table 4 presents the results of age-adjusted linear regression analyses in which the well-being measures are regressed on each of the four economic measures. All measures of psychological well-being increased as mean income over 29 years increased, with the strongest associations being for Purpose in Life ($\beta_{1s.d. \text{ difference}}$= 0.319, p<.0001), Self-acceptance ($\beta_{1s.d. \text{ difference}}$=0.224, p<.0001), and Personal Growth ($\beta_{1s.d. \text{ difference}}$=0.201, p<.0001).

With the exception of the results for the measure of Autonomy, the results are quite consistent for the three other measures of economic status. As economic status is higher, represented by reporting profit income or by higher positive income slopes, psychological well-being improves. As economic status decreases, represented by receiving benefit income, psychological well-being worsens. These associations are graded, with the number of waves of economic advantage or disadvantage being associated with higher or lower well-being, respectively.

Adjustment for demographic and baseline variables

Table 5 presents the multivariate-adjusted associations between psychological well-being and economic measures in two additional sets of models. The first set adjusts additionally for sex, education, and race/ethnicity. The second set adds the 1965 levels of three variables highly associated cross-sectionally with psychological well-being in 1994 -- social isolation, depression and perceived health. The model adds 1965 values of these variables as proxy baseline measures of psychological well-being. Table 6 shows the strong cross-sectional (1994) associations between these three measures and the measures of psychological well-being.

Overall, adjustment for demographic and psychosocial covariates at baseline had little impact on the associations between economic measures and psychological well-being, with associations decreasing in strength (always by small amounts) with adjustment for depression, social isolation and health status, and some associations increasing and others decreasing (again by small amounts) with adjustment for demographic factors. The lack of a significant association between the economic measures and Autonomy is not altered in these models.

Discussion

The results from the present analyses illustrate the powerful impact of economic status, and changes in status over time, on psychological well-being. Higher average level of income, increases in income over time, and receipt of profit income were, for the most part, associated with higher Purpose in Life, Self-acceptance, Personal Growth, and Environmental Mastery, and these same scores were lower for those with lower average income, lower income slopes,

and for those receiving need-based benefits. Moreover, there was often an appearance of a graded relationship, such that the higher the number of waves in which profit income was received, the higher the psychological well-being. Similarly, for the same scales, multiple periods of receipt of benefit income, representing greater need, were associated with poorer psychological well-being. Strikingly, while demographic variables and psychosocial variables and perceived health at baseline were strongly associated with psychological well-being 29 years later, they did not account for the associations between psychological well-being and the economic variables.

The economic measures do not identify how much income is received from profit income or from benefit income. This may result in an underestimate of the impact of these sources of income on psychological well-being. Selective attrition due to deaths associated with major economic losses could also lead to underestimates as those whose psychological well-being would be most influenced would be removed from the analyses.

Because we do not have measures of psychological well-being at baseline, it could be argued that poorer economic achievement is the result of lower psychological well-being. While it would have been desirable to have the Ryff measures at baseline, they had not been developed in 1965. However, adjustment for 1965 baseline levels of depressive symptoms, social isolation and perceived health, all strongly associated cross-sectionally with the well-being scales, made very little difference in the associations between economic variables and psychological well-being. The dose-response relationship between economic changes and psychological well-being also argues against such a possibility. In addition, the available cross-sectional evidence (11) suggests that there are substantial age-related differences in a number of the scales of psychological well-being. Such plasticity over time makes the reverse causation argument less plausible. At the same time, while self-rated health, levels of depressive symptoms, and degree of social isolation are correlated with the psychological well-being scales, Ryff (19) makes a strong theoretical and empirical argument that they are not identical.

In summary, the present analyses indicate that psychological well-being at age 50–102 is heavily influenced by income levels and economic transitions over the previous almost three decades. The results underscore the fundamental impact of economic well-being on psychological well-being, and suggest that quality of life during the "second fifty" may reflect patterns of economic success and hardship during the "first fifty."

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Table 1

Characteristics of 1965–1994 Alameda County Study Respondents

	N (%)
Age in 1994	
50–64	584 (51.8)
65–79	430 (38.2)
80+	113 (10.0)
Gender	
Male	512 (45.4)
Female	615 (54.6)
Education	
<12	205 (18.2)
>12	922 (81.8)
Race	
White NH	945 (83.8)
Black NH	90 (8.0)
Other	92 (8.2)
Self-Rated Health	
Fair/Poor	105 (9.3)
Excellent/Good	1022 (90.7)
Depressive Symptoms	
0–4	1009 (89.5)
>5	118 (10.5)
Social Isolation	
No	909 (80.7)
Yes	218 (19.3)

Table 2

Income, Income Slope and Income Sources by Age, Sex, and Race/Ethnicity Alameda County Study, 1965–1994

-- N or Mean (% or S.D.) --

	Age			Sex		Race/Ethnicity[e]		
	50–64 (n=584)	65–79 (n=430)	80+ (n=113)	Male (n=512)	Female (n=615)	White (n=945)	Black (n=90)	Other (n=92)
Mean Income[a]								
($1,000)	70.75 (39.77)	68.19 (41.92)	61.42 (45.36)	73.06 (40.16)	65.33 (41.82)	71.89 (42.22)	43.13 (26.78)	62.70 (32.56)
Income Slope [b]								
($1,000)	0.84 (1.67)	− 0.09 (0.86)	− 0.26 (0.83)	0.57 (1.50)	0.22 (1.35)	0.44 (1.48)	− 0.12 (1.12)	0.24 (1.03)
Profit Income [c] in:								
0 Waves	325 (55.7)	235 (54.7)	49 (43.4)	207 (40.4)	402 (65.4)	473 (50.1)	69 (76.7)	67 (72.8)
1 wave	135 (23.1)	102 (23.7)	23 (20.4)	136 (26.6)	124 (20.2)	238 (25.2)	12 (13.3)	10 (10.9)
2–3 Waves	124 (21.2)	93 (21.6)	41 (36.3)	169 (33.0)	89 (14.5)	234 (24.8)	9 (10.0)	15 (16.3)
Benefit Income [d] in:								
0 Waves	490 (83.9)	358 (83.3)	100 (88.5)	431 (84.2)	517 (84.1)	812 (85.9)	59 (65.6)	77 (83.7)
1 wave	75 (12.8)	51 (11.9)	8 (7.1)	62 (12.1)	72 (11.7)	101 (10.7)	19 (21.1)	14 (15.2)
2–3 Waves	19 (3.3)	21 (4.9)	5 (4.4)	19 (3.7)	26 (4.2)	32 (3.4)	12 (13.3)	1 (1.1)

[a] Mean annual household income, 1965–1983. Based on incomes reported in 1965/74/83, adjusted to 1999 consumer price.

[b] Yearly household income change, 1965–1999. Based on incomes reported in 1965/74/83/94/99, adjusted to 1999 consumer price.

[c] Number of waves (1965/74/83) in which profit, rental or investment income were reported.

[d] Number of waves (1965/74/83) in which unemployment, disability or welfare benefits were reported.

[e] 'Hispanics' are classified in the 'Other' category.

Table 3

Psychological Well-being by Sex, Age, and Race/Ethnicity Alameda County Study, 1965–1994

-- Mean (S.D.) --

	Purpose in Life	Self-Acceptance	Personal Growth	Environmental Mastery	Autonomy
Sex					
Male	6.45 (1.84)	6.19 (1.87)	6.81 (1.69)	6.85 (1.74)	6.99 (1.47)
Female	6.27 (1.79)	6.23 (1.90)	7.07 (1.66)	6.84 (1.73)	7.01 (1.53)
Age					
50–64	6.73 (1.70)	6.25 (1.96)	7.17 (1.64)	6.73 (1.84)	7.02 (1.57)
65–79	6.05 (1.81)	6.22 (1.83)	6.79 (1.68)	7.06 (1.58)	7.03 (1.43)
80+	5.56 (1.95)	6.01 (1.72)	6.50 (1.73)	6.58 (1.65)	6.82 (1.42)
Race[a]					
White	6.42 (1.78)	6.17 (1.89)	6.94 (1.69)	6.82 (1.74)	7.00 (1.52)
Black	6.17 (2.03)	6.61 (1.80)	7.12 (1.67)	7.03 (1.59)	7.12 (1.44)
Other	5.88 (1.92)	6.25 (1.91)	6.90 (1.58)	6.90 (1.77)	6.92 (1.44)

[a]'Hispanics' are classified in the 'Other' category.

Table 4

Age-adjusted Psychological Well-Being by Income, Income Slope, and Income Sources Alameda County Study, 1965–1994

Models	Purpose in Life		Self-Acceptance		Personal Growth		Environmental Mastery		Autonomy	
	β	p	β	p	β	p	β	p	β	p
A -- Mean Income[a] (1 sd)	0.319	<.0001	0.224	<.0001	0.201	<.0001	0.165	0.0014	0.091	0.0419
B -- Income Slope[b] ($1,000)	0.250	<.0001	0.223	<.0001	0.113	0.0023	0.134	0.0006	0.061	0.0699
C -- Profit Income[c] **in:**										
1 wave	0.344	0.0079	0.166	0.2335	0.322	0.0084	0.135	0.2896	−0.028	0.7996
2–3 waves	0.650	<.0001	0.301	0.0324	0.484	<.0001	0.486	0.0002	0.112	0.3157
D -- Benefit Income[d] **in:**										
1 wave	−0.414	0.0104	−0.556	0.0013	−0.510	0.0008	−0.152	0.3414	−0.076	0.5824
2–3 waves	−1.022	0.0001	−0.761	0.0079	−0.633	0.0121	−0.536	0.0427	0.277	0.2278

[a] Mean annual household income, 1965–1983. Based on incomes reported in 1965/74/83, adjusted to 1999 consumer price.

[b] Yearly household income change, 1965–1999. Based on incomes reported in 1965/74/83/94/99, adjusted to 1999 consumer price.

[c] Number of waves (1965/74/83) in which profit, rental or investment income were reported. (Reference category: 0 waves.)

[d] Number of waves (1965/74/83) in which unemployment, disability or welfare benefits were reported. (Reference category: 0 waves.)

Table 5

Psychological Well-Being by Income, Income Slope, and Income Sources Alameda County Study, 1965–1994 Adjusted for Age, Sex, Education, and Race/Ethnicity (Model 1), plus Depression, Isolation, and Health Status (Model 2)

Models	Purpose in Life		Self-Acceptance		Personal Growth		Environmental Mastery		Autonomy	
	β model 1	β model 2	β model 1	β model 2	β model 1	β model 2	β model 1	β model 2	β model 1	β model 2
A -- Mean Income[a] Household (1 sd)	0.272 ***	0.253 ***	0.237 ***	0.214 ***	0.194 ***	0.181 ***	0.151 **	0.125 *	0.081	0.076
B -- Income Slope[b] Household ($1,000)	0.221 ***	0.213 ***	0.229 ***	0.218 ***	0.113 **	0.106 **	0.125 **	0.114 **	0.055	0.053
C -- Profit Income[c] in:										
1 wave	0.244	0.233	0.199	0.178	0.376 **	0.359 **	0.145	0.133	−0.045	−0.042
2–3 waves	0.542 ***	0.528 ***	0.345 *	0.328 *	0.586 ***	0.569 ***	0.501 ***	0.473 ***	0.099	0.092
D -- Benefit Income[d] in:										
1 wave	−0.337 *	−0.285	−0.569 **	−0.512 **	−0.470 **	−0.444 **	−0.120	−0.040	−0.043	−0.014
2–3 waves	−0.904 ***	−0.641 *	−0.794 **	−0.460	−0.569 *	−0.363	−0.461	−0.035	0.339	0.471

[a] Mean annual household income, 1965–1983. Based on incomes reported in 1965/74/83, adjusted to 1999 consumer price.

[b] Yearly household income change, 1965–1999. Based on incomes reported in 1965/74/83/94/99, adjusted to 1999 consumer price.

[c] Number of waves (1965/74/83) in which profit, rental or investment income were reported. (Reference category: 0 waves.)

[d] Number of waves (1965/74/83) in which unemployment, disability or welfare benefits were reported. (Reference category: 0 waves.)

*
p<.05

**
p<.01

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p<.001

Table 6

Association (odds ratio comparing top to bottom quintile) between 5 Ryff Psychological Well-Being Scales and Depression, Fair/Poor Self-Rated Health and Social Isolation: Alameda County Study, 1994

Odds Ratio (Q1 vs Q5)	Depression	95% CI	Self-Rated Health	95% CI	Social Isolation	95% CI
Purpose in Life	7.72	3.29–18.10	4.27	2.27–8.06	2.29	1.35–3.88
Self-Acceptance	*	*	4.13	2.09–8.16	3.17	1.78–5.64
Personal Growth	9.12	4.42–18.81	4.26	2.54–7.13	1.96	1.26–3.07
Environmental Mastery	24.50	8.72–68.41	7.10	3.87–13.01	2.88	1.80–4.59
Autonomy	3.10	1.77–5.44	1.39	0.83–2.33	1.06	0.66–1.70

*
Could not be estimated because of absence of depressed people in top quintile