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## Citation

Ladin, K., N. Daniels, and I. Kawachi. 2009. "Exploring the Relationship Between Absolute and Relative Position and Late-Life Depression: Evidence From 10 European Countries." *The Gerontologist* 50 (1): 48–59. <https://doi.org/10.1093/geront/gnp065>.

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# Exploring the Relationship Between Absolute and Relative Position and Late-Life Depression: Evidence From 10 European Countries

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**Purpose:** Socioeconomic inequality has been associated with higher levels of morbidity and mortality. This study explores the role of absolute and relative deprivation in predicting late-life depression on both individual and country levels. **Design and Methods:** Country- and individual-level inequality indicators were used in multivariate logistic regression and in relative indexes of inequality. Data obtained from the Survey of Health, Ageing and Retirement in Europe (SHARE, Wave 1, Release 2) included 22,777 men and women (aged 50–104 years) from 10 European countries. Late-life depression was measured using the EURO-D scale and corresponding clinical cut point. Absolute deprivation was measured using gross domestic product and median household income at the country level and socioeconomic status at the individual level. Relative deprivation was measured by Gini coefficients at the country level and educational attainment at the individual level. **Results:** Rates of depression ranged from 18.10% in Denmark to 36.84% in Spain reflecting a clear north–south gradient. Measures of absolute and relative deprivation were significant in predicting depression at both country and individual levels. Findings suggest that the adverse impact of societal inequality cannot be overcome by increased individual-level or country-level income. Increases in individual-level income did not mitigate the effect of country-level relative deprivation. **Implications:** Mental health disparities persist throughout later life whereby

persons exposed to higher levels of country-level inequality suffer greater morbidity compared with those in countries with less inequality. Cross-national variation in the relationship between inequality and depression illuminates the need for further research.

*Key Words:* Depression, Aging, Health disparities, Cross-national, Inequalities

Higher levels of inequality have been linked to poor health outcomes across numerous health domains, including chronic disease, mental illness, accidents and trauma-related injury, and mortality (Breeze et al., 2005; Brown, Ang, & Pebley, 2007; Mackenbach et al., 2004). Historically overshadowed by measures of physical health in the study of health inequalities, psychosocial morbidity is now gaining more attention as depression is estimated to be the fourth leading cause of morbidity worldwide, projected to rise to the third by the year 2020 (Murray & Lopez, 1997). Although prevalence of depressive symptomatology declines through midlife, it rises sharply and consistently after the age of 60 years, posing a concern to many industrialized countries coping with aging populations (Kessler, Foster, Webster, & House, 1992). Rising costs of health care and increasing rates of early retirement could exacerbate an already fragile dependency ratio (Braam et al., 2005; Karpansalo et al., 2005). With costs of depression estimated at €118 billion for 28 European countries and at \$170 billion annually in the United States (Department of Health and Human Sciences, 2002; Sobocki, Jonsson, Angst, & Rehnberg, 2006), understanding the mechanisms by which inequality influences late-life depression has become a vital issue.

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Two competing theories have been proposed to explain the influence of inequality on health outcomes. Absolute deprivation theory suggests that differential health outcomes result primarily from exposure to poverty, low education, limited health services, and nutritional deprivation (Lynch et al., 2004; Subramanian & Kawachi, 2006). This view is supported by the consistently strong relationship between socioeconomic status (SES) and health at the extreme lower end of the status distribution. By contrast, relative deprivation theory purports that poverty alone does not account for the observed gap in health as the gradient in health is found to persist even among those whose basic needs have been met (Schoen, Davis, How, & Schoenbaum, 2006; Wilkinson & Pickett, 2006). Instead, this theory suggests that relative deprivation, embodied by psychosocial stress, leads to health disparities by influencing an individual's sense of well-being and subsequent health behaviors (Marmot, 2006). Although at lower levels of the socioeconomic spectrum, relative deprivation has been postulated to function through increased stress caused by lifelong subordinate status and limited social mobility; at higher levels, pathways remain unclear, although weaker social cohesion and low levels of social capital have been proposed as underlying mechanisms (Wilkinson, 1990). Some evidence suggests that these theories are not mutually exclusive but rather function simultane-

ously where absolute deprivation is largely responsible for disparities between persons with low versus high SES in a given society, whereas relative deprivation explains disparities between persons residing in countries with higher versus lower levels of societal inequality irrespective of individual SES (Muramatsu, 2003; Wilkinson & Pickett). This, however, has not been adequately studied or demonstrated.

Thus far, distinguishing between the effects of absolute and relative deprivation has been challenging, particularly in cross-national studies. Most studies have focused on a single pathway and few have addressed whether absolute or relativist explanations best explain the observed international gradients in mental health and status (Figure 1). Lochner, Kawachi, and Kennedy (1999) distinguish between social capital at the community-level and its individual-level counterpart, social networks, which relates more directly to individual embeddedness or social cohesion, concluding that the effect of social capital surpasses merely the sum of individual social supports (Lochner et al.). Similarly in the United States, residents in states with low levels of social capital were at significantly higher risk for poorer self-reported health, when compared with their counterparts in states with medium or high levels of social capital (Kawachi, Kennedy, & Glass, 1999). Despite an expansive literature documenting the positive influence of

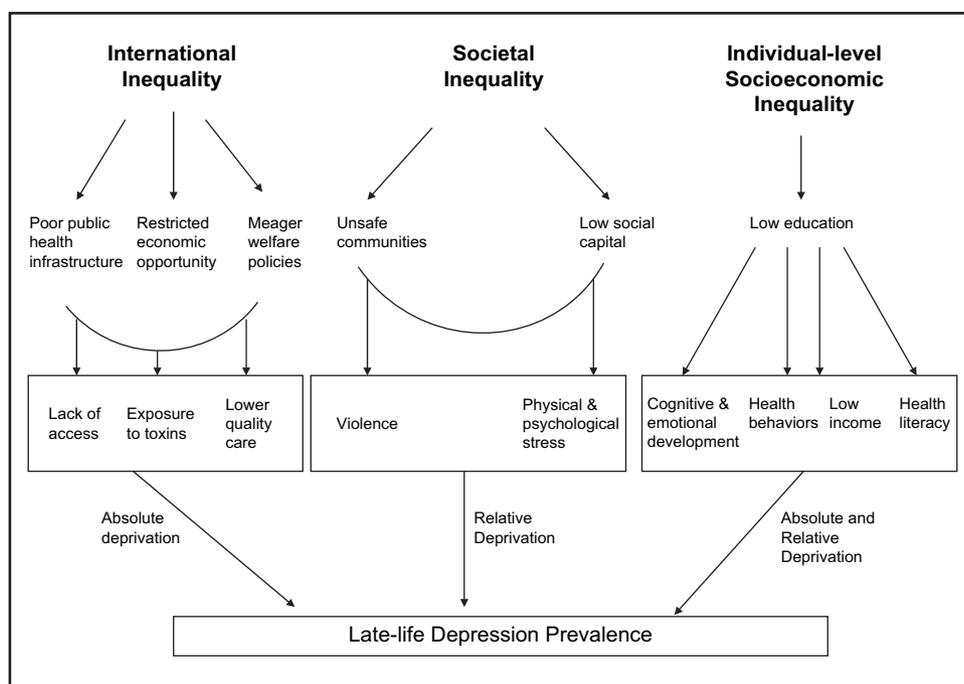


Figure 1. Potential causal pathways through which inequality may influence late-life depression.

social capital on health outcomes, not all studies have been as conclusive. Veenestra (2000) investigated the individual-level relationship between a number of social capital indicators, such as civic participation, social trust, and sense of identity and health, measured by self-rated health, finding little evidence for compositional effects on health. Lynch and colleagues (2004) concluded that social capital, as measured by “aggregated trust,” control, and organizational membership, does not contribute to cross-national health variation (Lynch et al., 2004). Taken as whole, however, associations have been inconsistent and may be confined to particular countries such as the United States, meriting further research.

Additional gaps stem from the strong focus on measures of mortality or physical morbidity and restriction of the analysis to one country, particularly the United States (Blakely & Kawachi, 2002; Pearce & Smith, 2003). The few studies focused on international samples or cross-national comparisons have largely neglected mental health measures (Kahn et al., 1999). Finally, despite their dramatic increase as a proportion of the population, older adults remain one of the least studied populations. This is a serious limitation in understanding of causal pathways, as the life course perspective suggests that older adults should be most influenced by contextual factors as they have often endured the longest exposure and are often deemed (as children are) highly vulnerable to environmental factors (Laaksonen, Rahkonen, Karvonen, & Lahelma, 2005; Mackenbach et al., 2004).

Addressing gaps in the literature, this article examines the roles of absolute and relative position in predicting late-life depression by exploring the importance of national-level income, societal income, and individual-level inequalities across a nationally representative sample from 10 European Union (EU) countries (Figure 1). At the country level, we hypothesize that increased cross-national inequality reflected by lower levels of economic wealth (absolute deprivation) and higher levels of income inequality (relative deprivation) will be associated with differential distribution of depression, where countries that are differentially disadvantaged will suffer higher prevalence rates. At the individual level, we hypothesize that SES will yield differential mental health outcomes, which can be deconstructed into two distinct effects: absolute deprivation, which encompasses the effect of both income and education, and relative deprivation characterized by the indepen-

dent effect of educational attainment (positional advantage).

## Methods

The study population was taken from the Survey of Health, Ageing and Retirement in Europe (SHARE, Release 2), a prospective observational study reflecting a randomly selected sample of 22,777 noninstitutionalized men and women aged 55 years and older living in Austria, Germany, Sweden, the Netherlands, Spain, Italy, France, Denmark, Greece, and Switzerland in 2004. The survey included sociodemographic indicators; physical, emotional, and psychosocial health; and health behaviors. Average age was 66.6 years ( $SD = 10.2$ ), with ages ranging from 50 to 104 years of age. Women comprised 55% ( $n = 12,267$ ) of participants, with men comprising the remaining 45% ( $n = 10,024$ ; Table 1). A total of 1,330 participants were excluded due to missing values in the EURO-D scale or other covariates (primarily income and educational status). Upon further analysis, these participants did not appear to differ from participants in substantive ways. Surveys were administered by professional survey agencies in an attempt to reduce sampling error, interpretation, and recall biases. Individual response rates varied between countries, from 73.7% in Spain to 93.3% in France, with an average response rate of 86.3%.

## Measures

*Depressive Symptomatology.*—Depressive symptomatology was assessed using the EURO-D scale, a well-established 12-item scale that has been validated in several cross-European studies of depression, with a higher score reflecting a greater degree of depression (Prince, Beekman, et al., 1999; Prince, Reischies, et al., 1999). The EURO-D scale asks respondents to rate the levels at which they had experienced feelings of depression, pessimism, wishing death, guilt, irritability, tearfulness, fatigue, sleeping troubles, loss of interest, loss of appetite, reduction in concentration, and loss of enjoyment during the preceding month. Respondents were also asked about their psychiatric history, including episodes of major depression.

This analysis utilized a dichotomized EURO-D scale, analogous to a clinical diagnosis of major depression, defined as a EURO-D score greater than 3. This cut point has been validated in the EURODEP study against a variety of clinically relevant indicators

Table 1. Sample Characteristics of Survey of Health, Ageing and Retirement in Europe Wave 1 Respondents Across 10 European Union Countries, 2004. (n = 21,447)

Country	Men		Women		Age 50–60		Age 61–70		Age 71–80		Age 81–104		Below high school attainment		High school attainment		Above high school attainment		Depression prevalence	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Austria	802	41.77	1,118	58.23	553	28.80	736	38.33	432	22.50	199	10.36	603	31.41	942	49.06	375	19.53	380	19.74
Denmark	743	45.78	880	54.22	614	37.83	471	29.02	343	21.13	195	12.01	410	25.26	705	43.44	508	31.30	295	18.10
France	712	43.71	917	56.29	640	39.29	418	25.66	389	23.88	182	11.17	861	52.85	465	28.55	303	18.60	548	33.46
Germany	1,348	46.58	1,546	53.42	930	32.14	1,100	38.01	613	21.18	251	8.67	505	17.45	1,571	54.28	818	28.27	538	18.50
Greece	854	43.88	1,092	56.12	746	38.34	536	27.54	452	23.23	212	10.89	1,211	62.23	418	21.48	317	16.29	492	24.94
Italy	1,114	44.69	1,379	55.31	761	30.53	932	37.38	596	23.91	204	8.18	1,937	77.70	376	15.08	180	7.22	845	33.87
The Netherlands	1,300	46.45	1,499	53.55	1,105	39.48	876	31.30	553	19.76	265	9.47	1,593	56.91	652	23.29	554	19.79	543	19.18
Spain	959	41.75	1,338	58.25	665	28.95	6,76	29.43	635	27.64	321	13.97	1,960	85.33	172	7.49	165	7.18	850	36.84
Sweden	1,368	46.80	1,555	53.20	945	32.33	1,003	34.31	624	21.35	351	12.01	1,530	52.34	528	18.06	865	29.59	571	19.25
Switzerland	433	46.91	490	53.09	306	33.15	294	31.85	206	22.32	117	12.68	483	52.33	205	22.21	235	25.46	182	19.14
Total (N)	9,633		11,814		7,265		7,042		4,843		2,297		11,093		6,034		4,320		5,244	
Total (%)	45		55		34		33		23		10		52		28		20		24.3	

as the level corresponding to a likely clinical diagnosis of depression (Prince, Harwood, Thomas, & Mann, 1998; Prince, Reischies, et al., 1999). A dichotomized measure was used as it best aligns with a clinical outcome, yielding results more comparable with previous studies using a similar analytical approach. The estimate of Cronbach's  $\alpha$  of the EURO-D scale in this study is .72.

*Absolute Deprivation Measures: Country Level.*—The gross domestic product (GDP) is a measure of national income and input for a country's economy, defined by the total cost of all goods and services produced within the country in a given year. GDP per capita for the year 2000 was reported in terms of purchasing power standards (PPS; EU-25 = 100) adjusted to real terms at constant EU prices to remove currency- and inflation-related variation. Data were obtained from Eurostat, the Statistical Office of the European Communities to ensure comparable and harmonized data. GDP was chosen as an internationally comparable measure of country-level income and material position that is often related to generosity of welfare policies.

Median household income was used as an indicator of economic resources available to the median residents within a given country. Median income was employed as an additional country-level measure of inequality, supplementing GDP. To address compositional differences in household incomes between countries, median household income was adjusted for purchasing power parity (PPP). PPP accounts for differences in the relative prices of goods and services between countries, yielding a more accurate and comparable measure of income across countries as the absolute income level may equate to different purchasing power in different countries.

*Absolute Deprivation Measures: Individual Level.*—Income for respondents was included as an individual-level measure of absolute deprivation. Household equivalized income was calculated by adjusting the income based on the number of persons living in a household, depicting more accurately the purchasing power associated with individual income. Pooled across all countries, the lowest tertile of household size-adjusted annual income was below €15,600, the middle was between €29,450 and €55,725 annually, and top tertile on average reported more than €55,725

annually. Average income exceeded €45,000 in three countries, Denmark, the Netherlands, and Switzerland. Average income was reported between €30,000 and €45,000 in Austria, France, Germany, and Sweden, and below €30,000 in Italy, Greece, and Spain. The three largest components of income included pension income, employment income, and imputed rent (Börsch-Supan & Jürges, 2005).

#### *Relative Deprivation Measures: Country Level.*—

The Gini coefficient of inequality was taken from the *United Nations Human Development Report 2006* as well as from the *CIA World Fact Book 2006*. The Gini coefficient was employed as a measure of societal income inequality as it has become the standard and is a commonly used measure of inequality indicating the dispersion of income across a population. The coefficient is defined between 0 and 1, where a Gini coefficient of 0 reflects complete equality where all citizens achieve equal income, and a coefficient of 1 reflects complete inequality whereby one person enjoys the entire national income and others receive zero. A low Gini coefficient reflects greater equity in income distribution in a given country, whereas a high Gini coefficient reflects greater levels of inequality between earners.

This Gini coefficient was chosen as a country-level measure of relative deprivation complementing the measures of absolute deprivation, namely, GDP and median household income.

#### *Relative Deprivation Measures: Individual Level.*—

Educational attainment was classified using the 1997 International Standard Classification of Education (ISCED-97) created by the United Nations Educational, Scientific and Cultural Organization (UNESCO). Given cross-national variation in educational systems, years of education do not accurately portray high school equivalency. As such, the ISCED-97 transforms data from different systems into a comparable international framework. The ISCED-97 scale was designed to “serve as an instrument suitable for assembling, compiling, and presenting comparable indicators and statistics of education both within individual countries and internationally.” It has been proven valid cross-nationally and has been utilized extensively in cross-national European studies. For the analysis, education was divided into tertiles, with low, middle, and high educational categories defined as less than a high school degree (ISCED-97

ranking 0–2), high school equivalency (ISCED-97 ranking 3), and higher educational attainment (ISCED-97 ranking 5–6), respectively (UNESCO, 2006). This categorization illustrates a dose-response relationship across educational categories. Further analyses reflect that years of educational attainment were highly correlated with the ISCED-97 classifications (Prince, Reischies, et al., 1999).

*Additional Covariates.*—Age (by deciles) and gender were included in all models. Multivariate logistic regression models were conducted for both pooled and country-specific samples. These models included age, gender, annual household size-adjusted income, educational attainment, the presence of chronic diseases, body mass index (BMI), activities of daily living (ADL) limitations, and instrumental activities of daily living (IADL) limitations.

The presence of chronic diseases (such as cardiovascular disease, hypertension, high cholesterol, diabetes, lung disease, asthma, arthritis, and osteoporosis) was ascertained by responses to a battery of questions in the following form: “Has a doctor ever told you that you have ... ?” Functional mobility was measured by performance on standard measures including grip strength, gait, and walking speed and self-reported responses to questions about ADL reflecting ADL and IADL limitations. Self-reported height and weight were used to calculate the BMI (weight [kg] divided by the square of height [m]). BMI equal or higher than 30 was used as a limit for obesity and also the cutoff of 25–29.9 for overweight and that of 25+ for overweight/obesity were used (Börsch-Supan et al., 2005).

#### *Analysis*

To estimate the role of absolute and relative deprivation at a country level, multivariate logistic regression models estimated the predictive value of GDP, PPP-adjusted median household income, the Gini coefficient of inequality, and educational attainment on likelihood of depression (Figures 2–4). Depression was evaluated using a cut point measure of the EURO-D scale, which is highly correlated with a clinical diagnosis of major depressive disorders. Additional analyses using multilevel logistic regressions were conducted for validation to evaluate the independent effects of country- versus individual-level predictors.

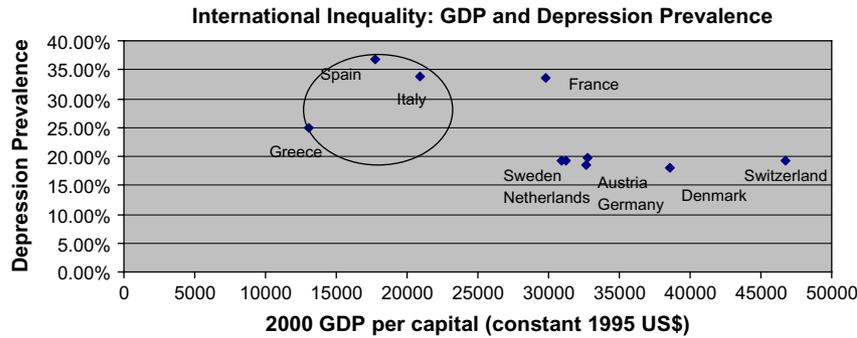


Figure 2. Relationship between country-level absolute deprivation as measured by 2000 gross domestic product and late-life depression, by country.

The effects associated with relative and absolute position on the individual level were evaluated via multivariate logistic regression models using the high education category (greater than high school attainment) as the reference (Tables 2 and 3). Models were run at the country level to adjust for compositional differences, accounting for educational status, annual household size-adjusted income, functional disability, BMI, and the presence of chronic disease.

International comparison of health gradients is complicated by variation in the population-specific distributions of socioeconomic indicators and the varying importance of the factor across countries. The relative index of inequality (RII) explicitly addresses this concern by utilizing information from the entire range of social categories while maintaining sensitivity to the direction of the gradient (Börsch-Supan et al., 2005). The RII is a measure commonly employed to assess the extent to which the occurrence of an outcome such as depression varies with education or an alternative predictor variable. The RII measure is particularly robust for cross-national comparisons because it illustrates the relationship between depression and educational attainment, adjusting for the inequality in distribution of the predicting variable, in this case education. Thus, given that educational categories are ordinal, the RII is calculated by regressing the

prevalence rate of depression in each educational category on the total proportion of the population that is more deprived in terms of educational attainment. RIIs were calculated following the methodology outlined by Sergeant and Firth (2006). RII has been used to measure relative deprivation as it illustrates the degree to which a factor, in this case education, relates higher risk of depression while controlling for cross-country compositional differences. In other words, it relates the risk of depression contingent upon having low education in Austria, for example, to the risk of depression if similarly educated in Italy. In each country, individuals were assigned a socioeconomic rank dependent on educational attainment, assuming values between 0 and 1. Assuming that the rate of incidence of depression, as measured by the EURO-D clinical cut point, depends on education, the resulting RII is calculated by regressing the depression incidence rate in each educational category on the proportion of the national population of lower socioeconomic rank (Figure 5). A larger RII illustrates a greater relative risk of depression due to low education. (For a detailed discussion of the methodology and derivation of RII, please see Sergeant and Firth, 2006.) Analyses employed the survey data analysis software, STATA (version 8.0) and R (version 2.4.1).

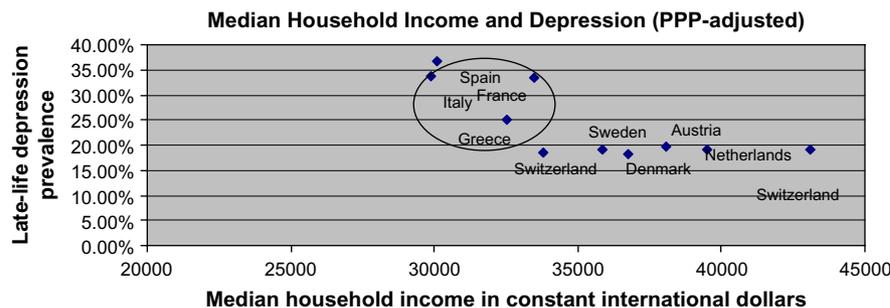


Figure 3. Relationship between country-level absolute deprivation as measured by purchasing power parity-adjusted median household income and late-life depression, by country.

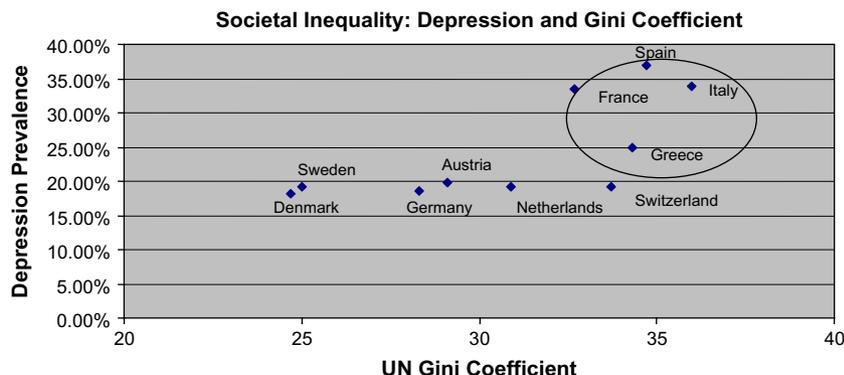


Figure 4. Relationship between country-level relative deprivation as measured by the Gini coefficient of inequality and late-life depression, by country.

## Results

Descriptive statistics are presented in Table 1. The southern European countries show a large gender gap with higher rates of depression among older women, although a significant gender gap exists across all countries (Table 3). National depression rates among participating countries ranged from 18.1% in Denmark to 36.8% in Spain. A bimodal distribution was evident between the Nordic/Eastern European countries reporting depression prevalence rates close to 22% and the Mediterranean countries reporting rates close to 34%.

### Absolute Deprivation Measures: Country Level

Figure 2 depicts the relationship between 2000 GDP and depression, whereby countries exhibit depression rates proportional to their national income. Figure 2 illustrates a clustering of countries with low GDP at the top left, reflecting high rates of depression, whereas countries with higher GDP cluster toward the lower right. The correlation between GDP and depression prevalence was esti-

Table 2. Odds of Depression by Education Attainment Level and Country (unadjusted model)

Country	Below high school education	High school attainment
Sweden	1.22	1.26
France	1.5*	1.36*
Switzerland	1.56*	0.743
Italy	1.75*	0.85
The Netherlands	1.76*	1.2
Denmark	1.86*	1.12
Austria	2.48*	1.17
Spain	2.98*	1.23
Greece	3.20*	1.93*
Germany	3.37*	1.55*

† $p < .1$ . \* $p < .05$ . \*\* $p < .01$ .

mated at  $-.64$  ( $p = .04$ ) and the regression coefficient was  $-.0005$  ( $p = .044$ ). These findings display similar trends to those discussed in the literature, relating poor health to international income inequalities between northern and southern countries (Börsch-Supan et al., 2005). This trend is mirrored in the relationship between median household income and depression (Figure 3), suggesting that persons residing in countries with low GDP and low median household income suffer higher rates of depression, particularly Spain, Italy, Greece, and France, illustrating the relationship between absolute deprivation and depression.

### Relative Deprivation Measures: Country Level

The Gini coefficient was employed as a measure of relative deprivation. Correlation between the Gini coefficient and depression prevalence was estimated at  $.63$  ( $p = .05$ ). Denmark, Sweden, and Germany display the most equal distribution of income, whereas Greece, Spain, and Italy embodied the other end of this spectrum. Figure 4 depicting the relationship between Gini coefficient and depression prevalence suggests that more egalitarian countries (low Gini coefficients) exhibit lower prevalence rates of depression. Indeed, the correlation between depression and the Gini coefficient was estimated at  $.71$  ( $p = .05$ ), whereas the regression coefficient was estimated at  $.91$  ( $p = .05$ ), indicating a near-linear relationship. Societal inequality predicts depression independently of national economic status, suggesting that both absolute and relative deprivation are important in predicting depression rates at the country level. Multilevel models, which included both country-level and individual-level absolute and relative deprivation variables as well as the covariates included in the multivariate logistic regression

**Table 3. Multivariate Logistic Regression Model Describing the Relationship Between Late-Life Depression and Educational Attainment, Adjusting for Gender, Age, Income, Chronic Disease, BMI, and Functional Mobility**

Country	Below high school education	High school attainment	Lowest income tertile	Middle income tertile	Female BMI	ADL	IADL	>Two chronic diseases	
Sweden	0.94	1.15	1.18	1.27	2.39**	1.00	1.62**	1.47**	1.84**
Denmark	1.44†	1.15	1.19	0.9	1.70**	1.02	1.20	1.44**	1.89**
Italy	1.27	0.82	1.01	0.94	2.05**	1.01	1.42**	1.43**	2.14**
France	1.03	1.25	1.14	0.95	2.51**	1.00	1.46**	1.46**	1.62**
Austria	1.46*	1.12	0.8	0.74	2.27**	0.98	1.46**	1.70**	1.76**
Greece	1.96**	1.77**	1.38*	1.25†	2.91**	0.99	1.26*	1.29**	2.32**
The Netherlands	1.43**	1.09	0.91	1.03	1.56**	1.00	1.26**	1.53**	1.90**
Switzerland	1.21*	0.62†	1.24	1.33	2.14**	1.02	1.29	1.44*	2.51**
Spain	2.00**	1.21	1.13	0.85	2.93**	1.01	1.56**	1.30**	2.54**
Germany	1.80**	1.31*	1.43**	0.99	2.19**	1.01	1.24*	1.57**	2.35**

Notes: Age (by deciles) was included in this model and is available upon request from the authors. BMI = body mass index; ADL = activities of daily living; IADL = instrumental activities of daily living.

† $p < .1$ . \* $p < .05$ . \*\* $p < .01$ .

model, indicated similar trends, although the effects were not significant. One reason that multi-level modeling was not predictive at a statistically significant level of  $\alpha = .05$  seems to be the relatively low sample size of countries. Future waves of the SHARE survey will include more countries, presenting the opportunity to further explore these findings.

On the individual level, depression varied by educational attainment, with lower educational attainment predicting rates of depression on average 15 percentage points higher compared with those of high education (mean high education = 15.45%, mean low education = 30.34%,  $p$  value = .00). Unadjusted odds of depression given low education ranged from approximately 3.37 ( $p < .05$ ) in Germany to 1.5 ( $p < .05$ ) in France and 1.22 ( $p < .05$ ) in Sweden, and on average was 1.87 ( $p < .01$ ). Conversely, participants with a high school degree or higher were 0.6 times less likely to experience depression in late life. The odds ratios were reduced from approximately 2.3 ( $p < .01$ ) to 1.7 ( $p < .01$ ) when covariates (income, BMI, ADL and IADL limitations, chronic disease) were introduced via multivariate logistic regression, illustrating that the education effect persists independently of other socioeconomic markers, such as income. This strengthens the argument for the importance of relative position in risk of late-life depression.

#### *Absolute Deprivation Measures: Individual Level*

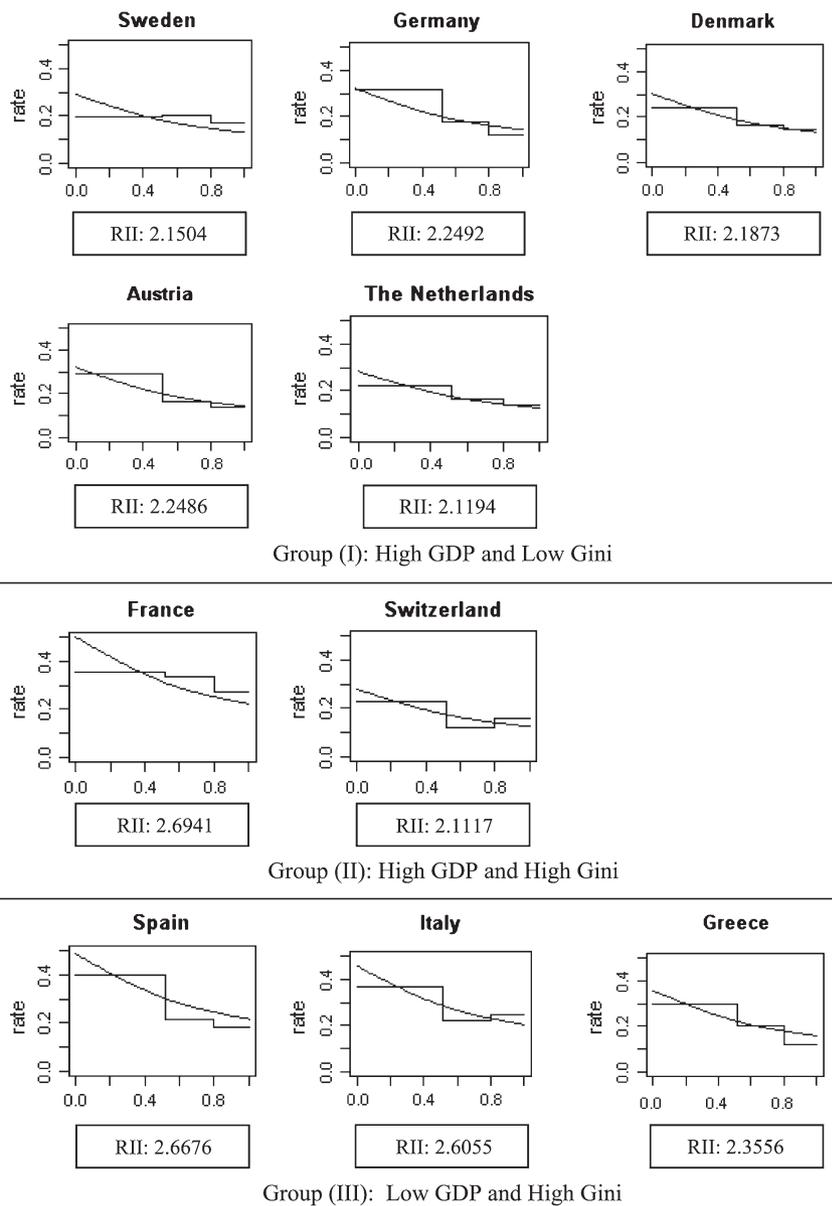
Household income was not independently a significant predictor of depression (Table 3). One explanation is that many variables believed to mediate the relationship between income and depression,

namely, material deprivation, lack of health care access, and necessity to continue working in a low-paying job, may not apply to this population as many respondents own their homes, are no longer working, and receive highly subsidized medical care and social services.

#### *Relative Deprivation Measures: Individual Level*

Figure 5 illustrates the RII plot for each country, comparing rates of depression ( $y$  axis) across educational categories ( $x$  axis), adjusting for the distinct distribution of education and age of each country. The results were categorized into three groups: (a) high GDP and low Gini coefficient (Denmark, Germany, Austria, Sweden, and the Netherlands), (b) high GDP and high Gini coefficient (Switzerland and France), and (c) low GDP and high Gini coefficient (Spain, Italy, and Greece). Interestingly, the effect of education-based disparity is smaller in more egalitarian countries. This is a noteworthy finding and is consistent with the notion that the relative position (societal income equity), rather than absolute position (GDP and median household income), is an important factor, perhaps driving the risk of depression.

A north-south gradient reflected in depression morbidity across educational groups illustrates that education-based disparities are least in Sweden and greatest in Spain and France. Southern countries suffered not only higher prevalence rates of depression but also the greatest gap in the relative risk of depression between individuals with high versus low education. Individual-level household income was not a significant predictor of depression, suggesting that relative deprivation as



**Figure 5.** Relative inequality index plots displaying the relationship between individual-level relative deprivation and late-life depression as measured by educational attainment, by country.

indicated by lower educational attainment is a significant risk factor for depression in aging adults, independent of income effects.

## Discussion

Depression, a robust indicator of well-being in older adults, influences important life decisions such as savings and early retirement, representing an important outcome of interest (Laaksonen et al., 2001). Although country-level and individual-level inequalities have been associated with increased risk for depression, measures of both absolute and relative deprivation have rarely been included in a single study (Kawachi & Berkman,

2001; Prince et al., 1998). Thus, the relationship between absolute versus relative deprivation and depression remains unclear as do the roles of country-level versus individual-level indicators. Further complicating the matter, health inequality research has been largely focused on the American population. It remains to be seen whether the observed relationship between inequality and depression holds for EU countries. Using comparable individual-level health, economic, and socioeconomic indicators to explore the relationship between absolute and relative deprivation and late-life depression in an international context, this article examines the extent to which national prevalence of depression predicted by differences in national

economic status (GDP and median income) versus societal inequality (Gini coefficient of inequality) and, on an individual level, to what extent is education protective beyond its impact as a measure of income. Employing methods of regression models and RII analysis, we examine whether country-level economic inequality (as measured by GDP and median-income levels) reflects cross-national distribution of depression morbidity and whether relative deprivation measures moderate the effect of absolute deprivation.

This article presents an innovative analytical approach to these key issues. First, we attempt to disentangle the effects of absolute and relative position on late-life depression using both country-level and individual-level indicators, better describing the relationship between inequality and mental health. International economic inequality is thought to influence health primarily via mechanisms of absolute deprivation, whereas societal inequality functions largely via relative deprivation pathways. The approach presented in this article allows for a comparison between the two unique effects. We find that although absolute and relative deprivation contribute independently to the risk of depression at the country level, increased absolute position, illustrated by GDP and median income, does not mitigate the effects of societal income inequality as demonstrated by the Gini coefficient. Although multilevel analyses did not yield significant results, they indicated similar trends supporting the notion that absolute and relative inequalities are important in predicting depression in later life. As more countries participate in the SHARE, multilevel analyses could play a role in future studies to examine these relationships further.

At the individual level, the results are also striking as educational attainment remains a significant predictor of depression in late life, independent of household income. Furthermore, the relative positional disadvantage of having low education is increased in less egalitarian countries, which further strengthens the relative position/deprivation argument.

The confounded relationship of relative and absolute deprivation at the individual level was addressed by using educational attainment, a robust indicator of SES, which is temporally prior to late-life depression and adjusting for income. We conclude that not only is educational status a primary predictor of depression but also the level of social equality determines the relative importance of education as a predictor, suggesting that societal in-

equality exacerbates the risk conferred by low education. By studying countries where universal health care coverage is offered, the influence of education as a risk factor for mental health can be more directly examined as access to health care can be defined as relatively constant.

Our findings underscore the notion that both absolute and relative deprivation influence late-life depression. Furthermore, the findings suggest that the adverse impact of societal inequality cannot be overcome by increased individual-level or country-level income. Using a unique cross-national data set, this article seeks to delineate the relationship between late-life depression and absolute and relative deprivation at the country and individual levels.

Prevalence of late-life depression across the SHARE countries resembled the north-south gradient described for many other conditions, in which southern countries such as Italy, Greece, and Spain exhibit disproportionately high morbidity (Ladin, 2008; Mirowsky & Ross, 1996). Although the underlying causes for the gradient remain unclear, historic economic inequality, limited social mobility, and lower levels of social capital have been cited as potential explanations. Our findings suggest that higher levels of poverty, limited social equity, and low education on a population level also contribute to the observed gradient.

Although the results suggest evidence for the influence of inequality at each level on late-life depression, there are limitations. The first is that the cross-sectional data were collected via surveys and is subject to social desirability biases of self-reported surveys. SHARE attempts to minimize this bias by employing professional interviewers however, minimizing self-report biases (Mackenbach, Cavelaars, Kunst, & Groenhof, 2000). The second limitation stems from the cross-sectional nature of these data, limiting the ability of this study to establish longitudinal causality. As this is the first wave of a panel, future studies could explore whether there is any change between the waves and attempt to refine and establish temporality.

Despite these limitations, there are numerous advantages to this study design and sample. The large sample population strengthens the reliability of the findings, whereas the cross-national nature of the data allow for generalizability. In addition, the life course approach illustrates the longitudinal influence of inequality on mental health outcomes in later life. Finally, disparity rankings calculated in this article are reflective of overall

income inequalities between northern and southern countries and reflect that absolute advantages do not compensate for relative/societal disadvantages.

Theories posed by social epidemiologists, medical sociologists, and economists alike propose that greater levels of inequality result in increased prevalence and severity of disease. Inequality has been linked to high levels of morbidity and mortality worldwide. Proposed explanations have included absolute or material deprivation, by which poverty and poor health care relate to increased risk, and relative deprivation, by which low societal position and increased psychosocial stress leads to higher morbidity. The levels at which these factors cause adverse outcomes (national or individual) remains unclear, as does the relationship between the influence of absolute and relative deprivation. The findings presented in this article support this claim indicating that indeed inequality substantially impacts mental illness, both on national and on individual levels. Despite many important attempts by EU governing committees to prioritize health equity, countries have not reaped the benefits uniformly. The result is an uneven map of inequality in the EU with disproportionately high rates of depression in less egalitarian countries. From this study, it becomes clear that both pathways of absolute and relative inequality are important in determining depression in later life and that factors at both the country and individual levels affect risk. Finally, the impact of individual risk factors, such as education, can be exacerbated by increased societal inequality on the country level. Thus, addressing policies aimed at improving health solely via advancing the economy and improving medical technology may not mitigate the effects of societal disparities and an equity-based policy may be prudent. Findings presented in this article illuminate pathways by which inequality influences mental health, critical to crafting effective guidelines for reducing disparities.

#### Funding

The SHARE data collection has been primarily funded by the European Commission through the fifth framework program (project QLK6-CT-2001-00360 in the thematic program Quality of Life). Additional funding came from the U.S. National Institute on Ageing (U01 AG09740-13S2, P01 AG005842, P01 AG08291, P30 AG12815, Y1-AG-4553-01, and OGH4 04-064). Data collection for Wave 1 was nationally funded in Austria (through the Austrian Science Foundation, FWF), Belgium (through the Belgian Science Policy Office), France (through CNAV, CNAV, COR, Drees, Dares, Caisse des Dépôts et Consignations et le Commissariat Général du Plan), and Switzerland (through BBW/OFES/UFES). The SHARE data collection in Israel was funded by the U.S. National Institute on Aging (R21 AG025169), by the German-Israeli Foundation for Scientific Research and Development, and by the National Insurance Institute of Israel. Further support by the European Commission through the sixth framework program (projects SHARE-I3, RII-CT-2006-

062193, and COMPARE, CIT5-CT-2005-028857) is gratefully acknowledged. For methodological details see Börsch-Supan and Jürges (2005).

#### Acknowledgments

The authors acknowledge helpful comments from Jason Beckfield, Axel Börsch-Supan, Hendrik Jürges, and participants of the Mannheim Research Institute for the Economics of Aging Seminar at the University of Mannheim. The authors also acknowledge insightful and instructive comments from the editor and two anonymous reviewers that greatly improved this article.

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Received November 15, 2008

Accepted March 3, 2009

Decision Editor: William J. McAuley, PhD