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ORIGINAL INVESTIGATION

Decomposing differences in utilization of health services between depressed and non-depressed elders in Europe

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Abstract Utilization rates of non-psychiatric health services are often higher in depressed compared to non-depressed adults. We examine whether these differences can be explained by the increased prevalence or the increased impact of demographic, socioeconomic, geographic, and health-related factors. The sample was taken from The Survey of Health, Ageing and Retirement in Europe (Wave 1 Release 2), a prospective observational study of 31,115 randomly selected people ages 50+ living in Austria, Germany, Sweden, the Netherlands, Spain, Italy, France, Denmark, Greece, Switzerland, Belgium, and Israel. Blinder–Oaxaca decomposition methods for multivariate linear regression models were used to estimate the influence of prevalence and impact of covariates on utilization among depressed and non-depressed participants. We find robust evidence that the gap in utilization between depressed and non-depressed can be accounted for by both prevalence (explained) and impact (unexplained) differences. The prevalence effect accounted for 57.7% whereas differences in the impact of covariates between depressed and non-depressed persons explained 42.3% of differences in utilization rates. Despite cross-national differences in quality and coverage of health services, in all countries, the prevalence effect was explained entirely by health measures, including: chronic diseases, functional mobility, painful symptoms, and self-reported health. The impact effect varied cross-nationally, but was largely explained by socioeconomic status and urbanicity. Hospitalization among depressed adults was twice that of non-depressed adults. Policies aimed at improving adherence and improving disease management among depressed adults should be explored.

Keywords Depression · Disparities · Decomposition methods · Aging

Introduction

Across much of Europe, the population is aging rapidly. The proportion of persons over 65 years is projected to increase from rates of 16% in France and Germany, and 18% in Italy in 2000, to rates of 26, 29, and 34% by the year 2040 in France, Germany, and Italy, respectively (UNPD 2002). The demographic transition, which substantially increased life expectancy during the twentieth century, has also brought forth the epidemiologic transition, the tremendous rise in late-life morbidity, particularly chronic and mental illness (Jacobzone et al. 2000). Depression is the fourth leading cause of the global disease burden, projected to rise to the third by the year 2020 (Murray and Lopez 1997). Older adults experience the highest prevalence rate of depressive symptomatology compared to other age groups (Patten 2003; Beekman et al. 1999), resulting in disproportionately high healthcare utilization (WHO 2003; Gabilondo et al. 2011; Himelhoch et al. 2004; Katon 2003). Multiple risk factors contribute to the disproportionate burden of depressive symptoms in later life, including: biological changes (endocrine and neurotransmitter dysfunction, disability, and comorbidities), psychological and cognitive declines, and changes in social status (social isolation, low socioeconomic status, retirement, and bereavement) (Blazer and Hybels 2005).

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Depressive symptomatology disproportionately afflicts persons of low socioeconomic status, further exacerbating health disparities (Ladin 2008; Costa-Front and Gil 2008; Blazer and Hybels 2005).

This study seeks to examine the roles of poor health and socioeconomic status in explaining higher utilization of non-psychiatric health services among depressed adults because these are two key predictors of depression in later life. This article is the first to decompose the gap in utilization between depressed and non-depressed persons and to delineate the role of prevalence and impact of enabling and need factors. Based upon the Survey of Health, Ageing, and Retirement in Europe (SHARE), which collects individual-level health, sociodemographic, and economic data from participants aged 50 years or older, the current study uniquely contributes to existing literature by presenting comparable cross-national results relevant to reducing the burden of late-life depression in Europe.

Late-life depression, inequality, and utilization: a role for social policy?

Understanding determinants of medical utilization presents a key concern for policy makers interested in both health disparities and rising healthcare costs. Increasing demands of aging populations coupled with the emergence and availability of new medical technologies have resulted in continuous growth of healthcare utilization (Cutler and McClellan 2001). Among older adults, depression is cited as the most prevalent mental disorder and the third most common indication for primary care consultations (Shah 1992). Older persons experiencing depressive symptoms are at least twice as likely to utilize emergency department and medical inpatient services compared to those without depressive symptomatology, even after adjusting for possible confounders such as morbidity and symptoms (Herrman et al. 2002; Himelhoch et al. 2004).

Increased utilization has resulted in staggering costs. Healthcare spending in Europe has been increasing, and ranges from 7.8% of GDP in the UK to 10.4% of GDP in France. Cost of primary care services for depressed patients is typically 50–100% greater than for comparable patients without depression (Katon 2003). Late-life depression is also associated with early retirement and a greater number of missed worked days, and emerges as one of the most costly disorders in Europe (Sobocki et al. 2006). Depression accounts for 33% of total health expenditures and 1% of Europe's GDP (Sobocki et al. 2006). Older adults also consume health services disproportionately (Wolinsky and Johnson 1991), averaging at least two additional annual physician visits and incurring the highest rates and durations of hospitalization (Russo and Elixhauser 2006). As such, it is important to understand the drivers of utilization, particularly among older depressed adults who often utilize many services, though not necessarily those aimed at improving mental health.

The Andersen model of health care utilization presents a framework for evaluating utilization by motivating three main categories: *predisposing*, *enabling*, and *needs*-based factors (Andersen and Newman 1973). It operationalizes the decision to seek care as conditional upon *predisposing* factors underlying the propensity to use services (sociodemographic characteristics); *enabling* factors reflecting the ability to secure services (e.g., income, employment status, social support); and *need* indicating the illness level (e.g., symptom perception, self-perceived health, disease severity, chronic disease) (Andersen 1995). While this model has been used extensively in health services research, it has been largely neglected in cross-country settings, and when used, has often omitted important *predisposing* and *enabling* constructs (Evashwich et al. 1984; Bird et al. 2002; Fernandez-Mayoralas et al. 2000; Litwin and Sapir 2009).

Country-level inequality has also been associated with depression. Cross-country studies of a sample of European countries have found that depressive symptoms are associated with GDP (per capita), social inequality, and higher health care expenditures, however, the direction of this association has been inconsistent (Braam et al. 2004; Ladin et al. 2010). Using the EURODEP study sites, Braam et al. (2004) found that higher levels of depressive symptoms were associated with larger GDP (per capita) and higher health care expenses, most notably in Germany, Iceland, and Sweden. Conversely, using the SHARE sample, Ladin et al. (2010) found a strong north–south gradient to depression, with poorer southern countries exhibiting higher levels of depressive symptoms, in this case, Spain, Italy, France, and Greece. These contradictory findings might stem from differences in the samples or instruments. In this context, it important to understand how these cross-country difference relate to the gap in utilization rates among depressed persons. Country-specific cultural factors may play a role in help-seeking, particularly stigmatization of mental illness and cultural norms surrounding help-seeking (Alonso et al. 2008; Alegria et al. 2004). Access to and quality of health services also varies by country and might affect utilization patterns (Alegria et al. 2004; Braam et al. 2004).

Decomposition analysis

Depressed persons may utilize more non-psychiatric health services for two reasons: first, they experience negative life circumstances more frequently (termed 'prevalence'); and second, the impact of experiencing these negative events while depressed may be more impairing (termed 'impact'),

both of which could result in a greater need for services (Luber et al. 2001; Costa-Front and Gil 2008). Decomposition analysis illustrates the fraction of the gap in utilization that is attributable to group differences in the magnitudes of the determinants, termed the *prevalence effect*, and to group differences in the effects of these determinants, termed the *impact effect*. Depressed persons experience comorbidities and symptoms more often than non-depressed persons (Luber et al. 2001). In addition, depression can exacerbate somatic symptoms of chronic illness and decrease treatment compliance, thereby increasing the severity or impact of the illness, also potentially increasing utilization (Moussavi et al. 2007). Low socioeconomic status has also been linked to increased prevalence of depression (prevalence effect), as well as more severe depressive symptomatology (impact effect) (Galea et al. 2007). It is unclear whether increased prevalence or greater impact of negative factors account for higher non-psychiatric utilization rates among depressed persons compared to similar adults without depression. Furthermore, it is unknown which types of factors, enabling or needs, account for higher utilization.

Decomposing the gap in utilization rates between depressed and non-depressed persons reveals whether increased utilization is associated with more comorbidities, or whether the impact of comorbidites varies by depression status by intensifying symptoms in depressed patients, perhaps leading to greater utilization. A similar question can be posed in relation to the role of enabling factors, where decomposition demonstrates whether higher rates of utilization in depressed persons are explained by increased prevalence of poverty, employment status, disability status, and urban status, or whether the impact of these factors is amplified in persons suffering from depression, perhaps triggering more help-seeking behaviors.

Data and measures

Sample population

The sample was taken from the SHARE (Wave 1 Release 2), a prospective observational study of 31,115 randomly selected men and women aged 50 years and above living in Austria, Germany, Sweden, the Netherlands, Spain, Italy, France, Denmark, Greece, Switzerland, and Belgium in 2004, and Israel in 2005–2006. The sample includes spouses of any age, though underage spouses were excluded because they are not representative of their age group. A total of 1,963 participants were excluded from this analysis due to being underage or missing key variables (utilization and depression), leaving a sample of 29,152 participants. Average age of participants was 64.7 (SD = 10.0), with ages ranging from 50 to 104 years of age. Females composed 54% (n = 15,837) of the sample, males the remaining 46% (n = 13,315). Household response rates varied between countries, from 38.8% in Switzerland to 81.0% in France, with an average response rate of 61.6% across all countries (for a detailed review of sampling methodology, please see (Börsch-Supan and Jürges 2005).

Measures

Participants were asked questions regarding their use of health services during the preceding 12 months period, and responded to the prompt, "How many times in total have you seen or talked to a medical doctor about your health?" This measure excludes dental visits and hospitalizations, but includes emergency room and outpatient clinic visits. Additional measures of health care utilization were also examined, including dichotomous measures of more than three general practitioner (GP) visits, consultation with specialists, and hospitalization (operative and non-operative stays) during the preceding 12 months. The decomposition analysis utilized the continuous utilization measure of medical use during the previous 12 months as the main outcome measure (mean = 6.87, SD 10.37).

Depression was assessed using the EURO-D scale, which measures depressive symptomatology. The EURO-D is 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 depressive symptoms (Prince et al. 1999a). Respondents were asked 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. This analysis utilized a dichotomized EURO-D scale with a cut point of greater than 3, which has been validated in cross-national studies and has been shown to be highly correlated to diagnosis of clinical depression (Prince et al. 1999b; Castro-Costa et al. 2008).

Predisposing factors

Demographic and social structure characteristics such as age (by deciles) and gender were included, as female gender and increased age have been often correlated with increased utilization. Social activity and marital status were also included. Social activity was defined as participating in at least one of the following activities during the previous month: voluntary or charity work, help for family, friends or neighbors, educational or training course, sport, social or other kind of club, religious organization, or political/community related organization. Social activity was included as a predisposing factor because it reflects a

factor that predisposes need for health services (e.g., participants who are more active often need fewer services). This is in contrast to income, which is an enabling factor because it depicts resources that enable (or impede) the participant's ability to seek care. 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), which has been validated cross-nationally and utilized extensively in cross-national European studies (UNESCO 2006).

Enabling factors

Variables predicting the ability of an individual to secure health services are classified as *enabling* factors. Household-size adjusted income, employment status, disability compensation, and frequency of contact with children were included as they are critical in predicting access to care. Employment status was categorized as employed, unemployed, retired, permanently sick/disabled (outside of the labor force), or homemaker, with currently employed as the reference. Contact frequency with children was divided into two groups: those who had contact with their children more than once a month versus respondents with less contact. Contact was defined as in-person, communication via phone, letters, emails, text messaging, etc. Urbanicity was also included as a community-level indicator often correlated with availability of health services, and was categorized into five groups: city, suburbs or outskirts of a city, large town, small town, and rural area or village.

Need-based factors

Health measures included in the model illustrate both perceived and evaluated medical need. Additional health variables obtained included measures of physical health and subjective well-being. A count of chronic diseases was obtained from the question, "Has a doctor every told you that you had any of the conditions (cardiovascular disease, hypertension, high blood cholesterol, stroke or cerebral vascular disease, diabetes, chronic lung disease, asthma, arthritis, osteoporosis, cancer (excluding minor skin cancers), ulcers, Parkinson's Disease, cataracts, or hip or femoral fractures?". A dichotomized measure of having more than two chronic diseases was used for this analysis. The respondents were also asked about functional mobility (ADL and IADL limitations), and painful symptoms (joint pain, angina, breathlessness, cough, swollen legs, sleeping problems, falling or fear of falling, dizziness, gastrointestinal problems, and incontinence). Self-reported health was used as a subjective measure of health, where respondents were asked to rank their health from poor to excellent. For the purposes of the analysis, a dummy variable was constructed dichotomizing the US version of self-perceived health into two categories: very good and excellent health or less than very good health.

Analysis

The analysis was composed of two steps. First, adjusted linear multivariate regression models were constructed to estimate the difference in utilization rates between depressed and non-depressed respondents, adjusting for confounding and interactions between predisposing, enabling, and needs factors and utilization. The multivariate regression models were run by country to address cross-national variations in the importance of individual predictors. Second, depression-based differences in utilization by country were deconstructed using decomposition techniques for linear multivariate regression models (Jann 2008), demonstrating the relative importance of each predictor variable, estimating the contribution of both prevalence and impact to the overall difference in the utilization outcome between depressed and non-depressed respondents. All analyses employed the survey data analysis software, STATA (version 9.0). The "Oaxaca" program was used to compute the decomposition (Jann 2008). The Omega option was used to compute the twofold decomposition using the coefficients from the pooled model over both groups as the reference coefficients. Calibrated individual-level cross-sectional weights were used to address possible compositional effects.

The assumptions of the Blinder–Oaxaca decomposition are that the outcome variable, y, is linearly related to the covariates, x, and that the error term, ε, is independent of x. Assuming that the difference in utilization, y, between depressed and non-depressed respondents is explained by a vector of determinants, x, in a regression model (1) where the vectors of β parameters include intercepts:

$$y_i = \begin{cases} \beta^{\mathrm{D}} x_i + \varepsilon_i^{\mathrm{D}} \\ \beta^{\mathrm{ND}} x_i + \varepsilon_i^{\mathrm{ND}} \end{cases} \quad (1)$$

The gap between the mean outcomes of y^{ND} and y^{D} is equal to:

$$y^{\mathrm{D}} - y^{\mathrm{ND}} = \beta^{\mathrm{D}} x^{\mathrm{D}} - \beta^{\mathrm{ND}} x^{\mathrm{ND}} \quad (2)$$

where x^{D} and x^{ND} are vectors of explanatory variables evaluated at the means for the depressed and non-depressed groups. For each country, multivariate regression models were estimated following Eqs. 1, 2 illustrating utilization differences between depressed and non-depressed. Observed differences in utilization were then decomposed by means of Blinder–Oaxaca methodology (Oaxaca 1973; Oaxaca and Ransom 1994; Blinder 1973). To estimate what fraction of

the gap in utilization (or covariates) is attributable to differences in the x's (prevalence) versus differences in the β's (impact), we compute the following:

$$\overline{Y_D} - \overline{Y_{ND}} = \overline{X_D}\beta_D - \overline{X_{ND}}\beta_{ND} \quad (3)$$

$$\overline{Y_D} - \overline{Y_{ND}} = \underbrace{(\overline{X_D} - \overline{X_{ND}})(W\beta_D - (I - W)\beta_{ND})}_{\text{Explained/prevalence}} + \underbrace{(\overline{X_D}(I - W) + \overline{X_{ND}}W)(\beta_D - \beta_{ND})}_{\text{Unexplained/impact}} \quad (4)$$

Upper bars denote subpopulation means, I denotes the identity matrix and W denotes a weighting matrix for the benchmark model of the decomposition. Following convention, $W = \Omega$ was the benchmark used, meaning that the coefficients are from a pooled regression using both samples ($W = \Omega = (X_D'X_D + X_{ND}'X_{ND})^{-1}$ $(X_D'X_D)$) (Reimers 1983; Oaxaca and Ransom 1994; Oaxaca 1973).

Equation 4 decomposes *unconditional* differentials in utilization between depressed and non-depressed into prevalence and impact components pertaining to enabling and needs factors. Differences in the impact of enabling or needs factors on utilization may reflect further biological differences in the influence of depression on utilization, as well as additional differences in the effect of low socio-economic status, social isolation, low levels of social participation, and permanent illness or disability.

Results

Table 1 illustrates the sample and utilization characteristics pooled across all countries. In addition, on average, respondents who reported utilizing any health services during the preceding 12 months varied from 77.6% in Sweden to 92.1% in Germany and Belgium, with an average of nearly 86% of respondents reporting use across all countries (not shown in table). Frequent utilization (measured by more than three GP visits) was reported on average by 42% of respondents. Rates were highest in Belgium followed by France (56%), with lowest rates of frequent utilization in Sweden (13.5%), followed by the Netherlands (26.4%) and Switzerland (27.2%). An average of 41.7% consulted with specialists during the previous year, ranging from only 17.5% in Denmark to 55.3% in Germany. Hospitalization rates during the previous 12 months ranged from low levels of 8.5 and 9.1% in Greece and the Netherlands, respectively, to 15.9 and 19.7% in Germany and Austria, respectively.

Table 2 displays the differences in utilization patterns of depressed and non-depressed respondents, by country and type of utilization. Consistent with existing literature, we find that depressed persons utilize health services more frequently than non-depressed. Differences in utilization rates by depression status were significant for all types of utilization. The gap in hospitalization was starkest compared to other types of utilization, with depressed respondents hospitalized at twice the rate of non-depressed respondents. The difference in any utilization was 7.7 percentage points between depressed and non-depressed respondents, while the differences were 18.6, 8.6, and 11.1 for more than three GP visits, specialist consultation, and hospitalization, respectively ($p < 0.001$). The gap in utilization by depression status varied cross-nationally. Gaps in the percent of respondents using any health services in the prior 12 months were largest in Italy, the Netherlands, and Sweden. These gaps were driven primarily by relatively low utilization rates among non-depressed respondents (75.4, 79.3, and 76.4%, respectively; mean = 84.3%). In contrast, France, Israel, and Germany exhibited the smallest gaps in rates of any utilization between groups, driven by high utilization rates among non-depressed respondents (92.7, 91.7, and 91.5%, respectively; mean = 84.3%). France and Greece displayed consistently small gaps across all three types of care, though in France this was driven by higher utilization rates among the non-depressed. Conversely, in Greece, depressed respondents utilized health services at only half the mean rate. Despite displaying a small gap in any utilization, Israel displayed a large gap by depression status for all types of utilization, largely driven by very high utilization rates among depressed respondents and higher than average utilization overall compared to other countries. Austria showed a large gap in specialist consultation and hospitalization, and Spain displayed a large gap in frequent GP visits and specialist consultations.

Focusing on the number of visits reveals that, across all countries, depressed persons used on average 10.1 visits per 12 month period versus 5.3 visits in non-depressed persons, a difference of 4.8 annually corresponding to rates 52.7% higher (Table 3). The average number of healthcare visits within the previous 12 months between depressed and non-depressed respondents varied cross-nationally. Among depressed respondents, the average number of visits ranged from 13.3 visits a year in Italy to only 4.5 visits in Sweden, with most countries reporting rates between 8.5 and 12.5 visits annually. Non-depressed persons exhibited many fewer visits, with the highest rates reported in Spain (7.7 visits per year) and lowest rates reported in Sweden (2.6 visits per year). Differences in the number of visits between depressed and non-depressed participants were most pronounced in Spain, Italy, and Germany, and least in Sweden, and the Netherlands. These results are consistent with the north–south gradient in health and inequality described extensively for both physical health and mental health.

The decomposition analysis reveals that 57.7% ($p < 0.001$) of the difference in utilization rates between

Table 1 Sample means and 12-month utilization rates

	Utilization	>3 GP visits	Specialist	Hospitalization
Sex (%)				
Female	55.1	58.0	58	53
Age				
Mean (SD)	65.3 (10.13)	67.21 (10.20)	65.21 (9.92)	67.89 (10.40)
Education (%)				
Low	51.0	58.0	48	54
Med	29.0	27.0	31	29
High	18.0	15.0	20	16
Marital status (%)				
Married	71.0	68.0	73	67
Social activity (%)				
Active	47.0	42.0	48	39
Income				
Mean (SD)	€21,727.0 (25,380)	€20,280 (24,49)	22,863 (27,197)	€21,866 (25,799)
Employment (%)				
Retired	50.0	56.0	50	58
Employed	27.0	17.0	25	17
Unemployed	3.0	3.0	3	2
Disabled	3.0	5.0	5	7
Homemaker	15.0	17.0	15	13
Disability funds (%)				
Yes	6.0	7.0	8	9
Forgo any treatment because of unavailability (%)				
Yes	2	3	3	3
Contact with children (%)				
>1 month	96	96	97	96
Urbanicity (%)				
Big city	17	16	19	16
Suburb	18	17	20	17
Large town	19	19	18	19
Small town	24	26	22	26
Rural	22	22	21	21
ADL limitations (%)				
>1 ADLs	11	16	12	21
Depression (%)				
Yes	27	36	31	41
Chronic (%)				
>2	46	60	55	65
Symptoms (%)				
>2	41	52	47	57
Self-reported health (%)				
<Good	73	84	77	87
N	29,152	25,228	12,512	29,145

depressed and non-depressed respondents were explained by variation in prevalence of predisposing, enabling, and needs-based factors, meaning that over half of the gap in utilization would be mitigated if depressed persons exhibited characteristics identical to those of non-depressed. Table 3 illustrates the decomposition results by country. In line with the health services literature, we find that higher levels of comorbidity, limited functional status, low socioeconomic status, female gender, low education, and low levels of social activity are associated with increased rates of depression and help-seeking behaviors. However, differences in the impact of predisposing, enabling, and

Table 2 12-month utilization rates, by country and depression status

Country	Percent utilization			Percent > 3 GP visits			Percent consulting specialists			Percent hospitalization		
	Depressed	Non-depressed	Difference	Depressed	Non-depressed	Difference	Depressed	Non-depressed	Difference	Depressed	Non-depressed	Difference
Austria	89.29	84.80	4.48*	64.20	45.80	18.40***	52.92	41.08	11.84***	31.96	16.63	15.32***
Germany	96.82	91.52	5.29***	70.93	44.58	26.35***	64.99	58.77	6.22***	25.89	13.59	12.31***
Sweden	87.17	75.37	11.80***	27.40	14.58	12.82***	46.83	40.50	6.33***	20.89	9.64	11.25***
Netherlands	90.35	79.32	11.03***	46.00	28.81	17.18***	50.92	43.16	7.76***	17.25	7.16	10.10***
Spain	93.61	86.17	7.44***	71.17	48.35	22.83***	54.44	40.89	13.55***	15.78	7.85	7.93***
Italy	91.49	79.72	11.77***	66.71	51.57	15.14***	54.91	43.83	11.08***	18.82	9.17	9.66***
France	95.03	92.74	2.30*	73.08	55.75	17.34***	53.50	47.17	6.33***	18.50	12.94	5.56***
Denmark	90.29	79.65	10.64***	55.38	35.24	20.14***	23.90	20.62	3.28***	24.10	10.10	14.00***
Greece	86.52	76.43	10.09***	49.64	38.23	11.40***	48.73	42.09	6.64***	13.17	6.18	6.99***
Switzerland	91.06	83.14	7.92**	48.47	28.44	20.03***	46.63	36.82	9.81***	22.35	9.47	12.88***
Belgium	96.56	91.23	5.32***	73.88	53.19	20.68***	59.03	49.68	9.35***	21.69	11.68	10.01***
Israel	96.27	91.69	4.58**	77.94	56.85	21.09***	73.59	62.48	11.11***	27.35	9.78	17.57***
Average	92.04	84.32	7.72***	60.40	41.78	18.62***	52.53	43.92	8.61***	21.48	10.35	11.13***

*** $p < 0.001$; ** $p < 0.01$, * $p < 0.05$

needs-based factors varied significantly between groups, with the unexplained variance (meaning change in utilization among depressed participants when applying coefficients of non-depressed participants to the depressed sample) accounting for 42.33% of the gap in utilization rates.

To explore a potential role for social policy, further analyses were conducted to better understand the contributions of need and enabling factors, particularly whether differentials in the prevalence or the impact of each component explains the gap in utilization (results for predisposing factors are not shown separately, but are available upon request). Linear Blinder–Oaxaca decomposition models were computed, and decomposition components were grouped into 'enabling' and 'needs' categories. Tables 4 and 5 display the decomposition results, delineating the coefficients associated with the prevalence and impact of predictor variables associated with enabling factors or needs. We included key need factors such as prevalence of more than two chronic illnesses, low self-reported health, low levels of social activity and ADL limitations, and IADL limitations and policy-relevant enabling factors such as unemployment, disability status, income (by quintiles) and urbanicity. Interestingly, the findings fell neatly into two categories, where need factors largely influenced the gap via increased prevalence, while enabling factors were accounted for by differences in impact. Despite variation in utilization rates, depression rates, and the structure and quality of the health care system, the results are robust and relatively consistent across all 11 countries. Prevalence of more than two chronic illnesses, low self-reported health, low levels of social activity, ADL limitations, and IADL limitations were significant predictors of differences in utilization between depressed and non-depressed populations, though the relative importance of each factor varied across countries (Table 4).

Conversely, we found that assuming depressed persons enjoyed the distribution of social factors of non-depressed (similar unemployment rates, income distribution, disability status, and urbanicity), the gap in utilization rates would not be significantly affected in most countries (Table 5). Instead, it seems that the impact of low socioeconomic status, residing in a rural environment, unemployment, and low income on depressed persons yields higher utilization rates than in non-depressed persons. Seemingly, these enabling factors intensify the impact of depressive symptoms, perhaps leading to heightened utilization. Urbanicity emerges as a significant factor determining utilization in Germany, Italy, France, and somewhat in Greece with more rural areas exhibiting positive coefficients (compared to the omitted category of urban areas). The impact of income was also significant in many countries, but did not present a clear pattern.

Table 3 Blinder–Oaxaca decomposition of differences in mean utilization rates between depressed and non-depressed, by country

Country	Utilization mean
Austria ($n = 1{,}424$)	
Depressed	10.287***
Non-depressed	5.31***
Difference	4.977***
Unexplained (impact)	1.675**
Explained (prevalence)	3.302***
% Unexplained (impact)	33.7
% Explained (prevalence)	66.3
Germany ($n = 2{,}175$)	
Depressed	12.286***
Non-depressed	6.858***
Difference	5.428***
Unexplained (impact)	2.124***
Explained (prevalence)	3.304***
% Unexplained (impact)	39.1
% Explained (prevalence)	60.9
Sweden ($n = 2{,}529$)	
Depressed	4.536***
Non-depressed	2.594***
Difference	1.942***
Unexplained (impact)	1.018***
Explained (prevalence)	0.924***
% Unexplained (impact)	52.4
% Explained (prevalence)	47.6
Netherlands ($n = 2{,}239$)	
Depressed	7.305***
Non-depressed	3.834***
Difference	3.471***
Unexplained (impact)	1.511***
Explained (prevalence)	1.96***
% Unexplained (impact)	43.5
% Explained (prevalence)	56.5
Spain ($n = 1{,}643$)	
Depressed	12.864***
Non-depressed	7.677***
Difference	5.187***
Unexplained (impact)	1.755*
Explained (prevalence)	3.432***
% Unexplained (impact)	33.8
% Explained (prevalence)	66.2
Italy ($n = 1{,}651$)	
Depressed	13.282***
Non-depressed	7.494***
Difference	5.788***
Unexplained (impact)	1.707***
Explained (prevalence)	4.081***
% Unexplained (impact)	29.5
% Explained (prevalence)	70.5
France ($n = 2{,}258$)	
Depressed	9.315***
Non-depressed	5.766***
Difference	3.549***
Unexplained (impact)	1.785***
Explained (prevalence)	1.764***
% Unexplained (impact)	50.3
% Explained (prevalence)	49.7
Denmark ($n = 1{,}335$)	
Depressed	7.277***
Non-depressed	3.58***
Difference	3.698***
Unexplained (Impact)	1.874***
Explained (Prevalence)	1.823***
% Unexplained (Impact)	50.7
% Explained (Prevalence)	49.3
Greece ($n = 1{,}642$)	
Depressed	8.549***
Non-depressed	4.869***
Difference	3.681***
Unexplained (impact)	1.546***
Explained (prevalence)	2.134***
% Unexplained (impact)	42
% Explained (prevalence)	58
Switzerland ($n = 694$)	
Depressed	8.737***
Non-depressed	3.934***
Difference	4.804***
Unexplained (impact)	2.934**
Explained (prevalence)	1.869***
% Unexplained (impact)	61.1
% Explained (prevalence)	38.9
Belgium ($n = 2{,}875$)	
Depressed	12.235***
Non-depressed	7.084***
Difference	5.152***
Unexplained (impact)	1.518***
Explained (prevalence)	3.633***
% Unexplained (impact)	29.5
% Explained (prevalence)	70.5
Israel ($n = 2{,}394$)	
Depressed	12.591***
Non-depressed	6.598***
Difference	5.993***
Unexplained (impact)	2.193***
Explained (prevalence)	3.800***
% Unexplained (impact)	36.60
% Explained (prevalence)	63.40

*** $p < 0.001$; ** $p < 0.01$, * $p < 0.05$

Table 4 Blinder–Oaxaca decomposition of differences in mean utilization rates between depressed and non-depressed—the role of needs-based factors, by country

	Austria		Germany		Sweden		Netherlands		Spain		Italy	
	Prevalence	Impact	Prevalence	Impact	Prevalence	Impact	Prevalence	Impact	Prevalence	Impact	Prevalence	Impact
Socially active	0.087	−0.209	0.073	−0.453	−0.031	0.254	0.086**	−0.879*	0.012	−0.288	0.048	−0.616*
Self-reported health												
<Very good	0.497***	1.277	0.290***	−0.523	0.422***	0.980***	0.374***	0.433	0.484***	2.373	0.323***	0.674
>2 Chronic diseases	0.555***	0.054	1.256***	0.788	0.293***	−0.135	0.451***	0.418	1.128***	0.403	1.464***	0.294
ADL limitations	0.651*	0.182	0.944***	−0.479	0.075	−0.116	0.321**	0.317	0.789***	−0.058	0.867**	−0.087
IADL limitations	0.981***	0.637	0.482**	0.817**	0.079	0.000	0.493***	0.353	0.524**	−0.572	1.243***	−0.109
	France		Denmark		Greece		Switzerland		Belgium		Israel	
	Prevalence	Impact	Prevalence	Impact	Prevalence	Impact	Prevalence	Impact	Prevalence	Impact	Prevalence	Impact
Socially active	0.025	−0.097	0.016	−0.521	0.0001**	−0.755	0.033	0.318	0.242***	−0.576	0.208	−0.382
Self-reported health												
<Very good	0.323***	−0.214	0.721***	0.478	0.599***	0.742	0.405***	1.380	0.46^{0}***	1.958***	0.399	0.302
>2 Chronic diseases	0.470***	0.615*	0.534***	1.343	0.870***	2.402***	0.423**	0.107	0.721***	1.019*	1.034**	−0.199
ADL limitations	0.211***	0.235	−0.061	−0.250	0.313**	−0.314	0.050	−0.786	0.527***	−0.765**	0.651*	−0.589
IADL limitations	0.300***	−0.301	0.570***	0.640	0.151	−0.555	0.391	1.667	0.966***	−0.511	1.060**	1.381**

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Table 5 Blinder–Oaxaca decomposition of differences in mean utilization rates between depressed and non-depressed—the role of enabling-based factors, by country

	Austria		Germany		Sweden		Netherlands		Spain		Italy	
	Prevalence	Impact	Prevalence	Impact	Prevalence	Impact	Prevalence	Impact	Prevalence	Impact	Prevalence	Impact
Unemployed	−0.027	0.009	−0.001	−0.036	−0.001	−0.071***	0.004	−0.080*	0.002	−0.091	0.01	−0.104
Disabled	0.086	−0.103	0.200**	0.079	0.083**	−0.119*	0.313***	−0.208	0.391***	0.169	0.022	−0.029
Homemaker	0.101	−1.099	0.116*	1.031**	0.002	−0.001	0.007	−0.389	0.324***	0.298	0.140	−0.449
Suburbs	0.009	−1.079*	−0.009	0.576*	0.014	−0.028	0.037	−0.704	0.001	0.093	−0.012	0.344
Large town	−0.028	0.411	−0.018	0.192	0.000	−0.060	−0.018	0.037	−0.024	0.642	−0.045	0.893**
Small town	0.006	−1.136	0.014	1.371***	0.000	−0.038	0.003	0.125	0.004	0.454	−0.002	1.748***
Rural	0.01	−0.001	−0.011	0.632	0.005	0.097	−0.008	−0.055	−0.003	0.106	−0.013	3.238***
Income 20%	−0.029	0.145	−0.042	−0.495	0.001	0.003	−0.001	0.020	0.012	−1.221	0.065	−0.100
Income 40%	0.001	0.741	−0.053	−0.952**	0.020	0.187	0.010	0.256	0.002	−1.071***	0.004	0.042
Income 60%	0.000	1.959	0.015	−0.752**	−0.002	−0.118	0.000	0.496***	−0.018	−0.592*	−0.002	0.092
Income 80%	0.015	0.685*	−0.037	−0.086	−0.012	−0.052	0.003	0.489*	−0.018	−0.290	0.025	−0.220
	France		Denmark		Greece		Switzerland		Belgium		Israel	
	Prevalence	Impact	Prevalence	Impact	Prevalence	Impact	Prevalence	Impact	Prevalence	Impact	Prevalence	Impact
Unemployed	0.013	−0.003	0.026	0.178	−0.009	0.084	−0.016	0.079	−0.006	0.231	0.003	−0.078
Disabled	0.227***	0.051	0.187	0.324	0.006	0.092	0.385*	0.261	0.267***	0.216	0.115	−0.227
Homemaker	0.066	0.373***	0.057	0.137	0.136*	1.490*	−0.004	0.065	0.009	0.121	0.450	0.938*
Suburbs	0.001	0.674***	− 0.003	0.022	0.038	0.210	0.001	−0.165	0.003	0.213	−0.072	0.345
Large town	0.008	0.589***	0.029	0.262	−0.001	0.765*	0.030	−0.413	0.008	−0.261	0.010	−0.035
Small town	0.020	0.548*	0.009	0.597	0.040	0.027	0.002	0.263	−0.016	0.259	0.065	1.12
Rural	0.032	0.123	0.003	0.458	0.016	0.285	−0.019	−0.695	0.014	−0.016	0.001	0.386
Income 20%	0.004	−0.579***	0.011	0.220	0.008	0.408	−0.042	−0.102	−0.010	0.044	−0.001	−0.102
Income 40%	0.001	−0.222	−0.013	−0.466	0.083	0.779	−0.010	0.259	0.049	0.063	0.006	−0.133
Income 60%	−0.012	−0.631***	−0.049	−0.781	0.026	−0.045	−0.015	0.251	0.023	0.318	−0.151	0.301
Income 80%	0.010	−0.345*	0.001	−0.697	−0.015	0.163	0.048	0.338	0.000	0.156	−0.146	0.951*

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Reference categories: Employed omitted (vs. unemployed, disabled, or homemaker); Urban omitted (vs. suburbs, large town, small town, or rural); bottom income quintile omitted

Discussion

This study examines the role of needs and enabling factors in explaining the gap in utilization of health services between depressed and non-depressed European adults over the age of fifty. By applying an innovative statistical method, we are able to delineate the fraction of the gap attributable to enabling factors versus needs, and within those, the proportion attributable to prevalence versus impact. Reinforcing prior studies, our results demonstrate the significant independent association between depressive symptoms and higher utilization of health services in adults over 50 (Peytremann-Bridevaux et al. 2008). While prior studies have demonstrated higher healthcare utilization among depressed participants, they have not adequately explained why by means of a theoretical framework for understanding health care utilization. Depressed participants utilized nearly twice the number of visits relative to similar non-depressed participants. The gap in utilization rates between depressed and non-depressed participants was statistically significant for all outcomes: any utilization, more than three GP visits, specialist consultations, and hospitalizations during the preceding 12 months.

Though there was some variation in the impact of each of the predictor variables, greater cross-national variation was observed in the gap in type of utilization. There is significant cross-country variation with respect to help-seeking for mental health problems. Hospitalization among depressed adults was twice that of non-depressed adults. The gap in hospitalization rates was most extreme in Israel and Austria, and least in France, Spain, and Greece. In Israel, a country with higher than average rates of utilization, depressed persons were hospitalized at a rate nearly three times the non-depressed population. This may be due, in part, to patients seeking mental health care from non-psychiatrists in countries where access to psychiatrists is more limited. The Eurobarometer study found that help-seeking for mental health problems was highest in Belgium and the Netherlands, and lowest in Italy and Spain (European Opinions Research Group 2003). Similarly, the European Study of the Epidemiology of Mental Disorders (ESEMeD), which studied health care utilization for mood disorders in France, Germany, Italy, Belgium, the Netherlands, and Spain, found that respondents from Italy had the lowest consultation rates for mood disorders, whereas those from the Netherlands had the highest (Dezetter et al. 2011). These differences do not seem directly related to health care expenditure as a share of GDP, nor to the proportion of public versus privately funded health care (OECD 2011). Differences in help-seeking might be partially explained by coverage of psychiatric care. Results from the ESEMeD suggest that in countries without gatekeeping systems, such as France, Spain, and Belgium, psychiatrist utilization was higher (Dezetter et al. 2011).

The majority of the gap in utilization between depressed and non-depressed respondents (57.7%) was explained by variation in the prevalence of predisposing, enabling, and needs-based factors. In all countries, the prevalence effect was explained entirely by health measures, including: chronic diseases, functional mobility, painful symptoms, and self-reported health. Although depressed persons more commonly experience low socioeconomic status, social isolation, and unemployment (Klerman and Weissman 1992), higher frequency of these factors did not explain the gap in utilization in this analysis. Instead, low socioeconomic status, residing in a rural environment, unemployment, and low income are captured by the impact effect, and seemingly intensify the impact of depressive symptoms perhaps leading to heightened utilization. Urbanicity and income are significant factors determining utilization in numerous countries, though the results were not robust across all countries.

This study presents an innovative approach to understanding disparities in health services utilization that is grounded in social choice theoretical methodology. Yet, it contains some limitations. While the study helps explain which factors are associated with higher utilization rates among European adults aged 50 years or older who experience depressive symptomatology, the results should be interpreted in the context of its limitations. First, though decomposition delineates the fraction of the gap that is due to observed variables (prevalence), the impact effect reflects the unobserved heterogeneity. Based on the literature and previous studies that have employed this methodology, we are interpreting the factors that can be included in this component; however, unobserved heterogeneity may include other healthcare utilization factors omitted from the models that the prior literature has been unable to identify (Vargas Bustamante et al. 2010).

Second, this study is cross-sectional and thus, causal inference is limited. Given that the population is over fifty, it is likely that predisposing, enabling, and needs factors are all temporally prior to utilization, but the results should still be interpreted with caution. Third, this study examines the effect of depressive symptomatology on utilization, and not the effect of clinical depression, though the measure is highly correlated with a diagnosis of clinical depression. Finally, all measures are based on self-reporting, which itself is subject to recall and social desirability bias. Future studies could validate these findings using claims data allowing for an additional dimension of interpretation.

Understanding why and how enabling factors are related to depression and health services utilization is a prerequisite for effective governmental intervention to alleviate disparities (Costa-Front and Gil 2008). The policy implications of this question are both noteworthy and sizable, addressing, for example, whether income redistribution via transfers

from rich to poor is likely to reduce disparities in utilization between depressed and non-depressed persons. Revealing the extent to which differences in healthcare utilization are explained by variation in need (due either to increased prevalence of comorbidities or to increased impact of comorbidity on depression) versus variation in social position (due to either higher prevalence of poverty or increased impact of poverty on depression) on aggregate and country levels might illustrate potential points of interventions.

We find that income inequality does not seem to be a major factor of uneven utilization of health services, consistent with prior literature (Alonso et al. 2004). Instead, given the importance of comorbidities and disability, interventions aimed at care coordination, disease management, and rehabilitation may hold greater promise. The impact of enabling factors presents an important determinant of the utilization gap between depressed and non-depressed persons, though the influence and direction of this effect vary cross-nationally. Thus, debates surrounding social policy aimed at mitigating disparities in depression-dependent utilization should be tailored to each country individually. Previous studies have postulated the potential success of social policies aimed at decreasing health disparities, primarily income redistribution (Costa-Front and Gil 2008; McCracken et al. 2006). While it is possible that income redistribution would alleviate a fraction of the observed gap in utilization rates, it is unlikely to have a significant effect in most countries, evidenced by the uneven impact effect for enabling factors demonstrated by the decomposition analyses.

While the utilization rates seemingly illustrate that depressed persons are able to access and receive care, disparities in access to and quality of care may still persist, given that the burden of disease is so unevenly distributed between these two groups. Furthermore, greater utilization of non-psychiatric health services may reflect inadequate access to mental health specialists. Gabilondo et al. find similarly that high utilization of non-psychiatric services for depression reflects inadequate access to specialized services for depression in Spain (Gabilondo et al. 2011). Though patients may seek care from GPs, GPs may not provide adequate treatment for depression due to lack of specific knowledge or due to practice time or reimbursement constraints (Fernandez et al. 2006). Better treatment of depression through improved training of GPs, better reimbursement of psychologist and psychiatrists visits, and coordination of care (particularly following hospitalization) is likely to reduce the gap and improve quality of care for depressed patients (Dezetter et al. 2011). Given the significance of need in explaining increased utilization among older depressed persons, policy-relevant implications include improved screening, treatment, and coverage of mental health services for older patients presenting with symptoms in a primary care or emergency setting (Lin et al. 2003; Unutzer et al. 2003). Competing diagnoses (arising when a patient presents with numerous independent symptoms) results largely in treatment of acute somatic symptoms, despite the continued indication of mental illness. The results of this study reinforce those of prior studies which suggest that increasing awareness of depression treatment among GPs and hospitalists caring for aging populations present promising first steps (Oishi et al. 2003; Unutzer et al. 2002).

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