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Low socioeconomic position and depression persistence:
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Abstract

Research examining the association between socioeconomic position and depression course has yielded inconsistent results. We tested the association between low socioeconomic position and 7-year depression persistence among 298 community-based individuals with depression (subset of the Gazel cohort study based in France). Data were analyzed using Generalized Estimating Equation (GEE models). Low socioeconomic position predicted depression persistence (men: low vs. Intermediate/high income: OR: 2.52, 95% CI 1.28-4.95; women: low vs. Intermediate/ high occupational grade: OR: 2.25, 95% CI 1.06-4.80). These associations were reduced and became statistically nonsignificant after controlling for baseline sociodemographic characteristics and stressful life events (men and women), overall health (men), and the severity of mental health difficulties (men and women). Overall, depressed individuals with low socioeconomic position appear disproportionately likely to experience multiple risk factors of long-term depression.

Keywords: depression; socioeconomic position; longitudinal study; epidemiology

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1. Introduction

Depression is persistent in approximately 50% of cases and identifying groups of individuals at risk of persistent depression may have clinical and policy implications ([American Psychiatric Association, 1994]). Depressed individuals who experience socioeconomic disadvantage may have poor recovery rates; however evidence on this is currently inconclusive ([Gilman et al., 2003], [Spijker et al., 2004] , [Mojtabai and Olfson, 2004], [Miech et al., 2005], [Hollon et al. 2006] , [Cohen et al., 2006] and [Cohen et al., 2009]). This is primarily due to methodological limitations of past investigations in this area. First, past studies used several different measures of socioeconomic position such as father's occupation, educational attainment ([Gilman et al., 2003], [Spijker et al., 2004] and [Miech et al., 2005]), as well as adult income level or employment status ([Hollon et al., 2006] and [de Conradi and Ormel, 2008]), making it difficult to determine whether some socioeconomic factors are more relevant than others. Second, previous studies often examined the persistence of depression among patient populations ([Cohen et al., 2006], [Hollon et al., 2006], [Conradi et al., 2008], [Cohen et al., 2009]). Yet depressed individuals who seek medical treatment tend to belong to more privileged socioeconomic groups than those who do not seek treatment ([Grolleau et al, 2008]), raising the possibility that clinical samples do not allow sufficient contrast between different socioeconomic groups. Third, some studies assessed past depression using retrospective reports, which may be tainted by individuals' depressive symptoms at the time of measurement ([Gilman et al., 2003] and [Hollon et al., 2006]). In the present study, we examine the association between four distinct indicators of socioeconomic

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position and depression course in a community-based sample of depressed individuals followed prospectively for 7 years.

2. Methods

2.1 Study population

Data come from an ongoing epidemiological cohort set up in 1989 among employees of France's national gas and electricity company (GAZEL, n=20,624; 25% women, <=1% loss to follow-up since 1989) ([Goldberg et al., 2007]). In 1994, 1,108 participants were interviewed by mental health interviewers to study the determinants of depression; follow-up assessments were conducted in 1998 and 2001 by mailed questionnaire (91% and 88% response rate) ([Duburcq et al., 1999]). This analysis is based on participants who met diagnostic criteria for major unipolar depression in 1994 (n=298).

2.2 Measures

Baseline socioeconomic position was measured by: a) father's occupational grade (low vs. intermediate/high), b) educational attainment (<high school degree vs. >=high school degree), c) household income (<=national average of €2616/ month vs. >€2616/ month) and d) own occupational grade (low vs. intermediate/high). Low occupational grade was defined as manual worker or clerk; other occupations constituted the intermediate/high occupational grade category ([Melchior et al., 2006]).

Mental health symptoms were ascertained using the MINI, a structured diagnostic interview validated in non-clinical populations ([Sheehan et al., 1998]). Major depression and anxiety disorders (panic disorder, agoraphobia, social phobia, obsessive-compulsive disorder, post-traumatic stress disorder, generalized anxiety disorder) were

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ascertained following DSM IV criteria ([American Psychiatric Association, 1994]). To account for the type of depression at baseline, we distinguished three groups: 1) single depressive episode, 2) recurrent depressive episode or depressive episode doubled by dysthymia, and 3) depressive episode with suicidal ideation. The group experiencing depression doubled by suicidal ideation had the highest level of depressive symptoms, health service use, and impaired functioning.

Overall, 28% of men and 48% of women in our study sample took antidepressants in the 12 months preceding assessment and respectively 13% and 13% reported consulting a psychiatrist. There was no association between pharmaceutical treatment of depression and occupational grade or income. Men and women who consulted a psychiatrist prior to the study were somewhat more likely to work in an intermediate/high grade job than in a low grade job, but this association was not statistically significant and there was no association with income. Moreover, mental health treatment was strongly associated with depression severity at baseline; among men with depression with suicidal ideation 38% took antidepressants and 22% consulted a psychiatrist, as compared with 8% and 0% among those with a single depressive episode. In women, among those with depression with suicidal ideation 52% took antidepressants and 16% consulted a psychiatrist, as compared with 33% and 14% among those with a single depressive episode. Thus, we chose not to control our analyses for mental health treatment because treatment was simultaneously unrelated to socioeconomic position and strongly associated with depression severity which our analysis does account for.

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Analyses were adjusted for baseline sociodemographic characteristics (age, marital status, social support from family and friends), stressful life events 12 months prior to the survey (divorce, hospitalization, important purchase, partner's death, partner's hospitalization, partner's unemployment) and baseline poor self-rated health.

2.3 Statistical analysis

We tested the hypothesis that low socioeconomic position predicts the persistence of depression during follow-up ([Spijker et al., 2001], [Solomon et al., 2004]) (that is in 1998 and/or in 2001) using Generalized Estimating Equations (GEE). First, we tested unadjusted associations; second, carrying forward indicators of socioeconomic position that were significantly associated with depression persistence, we controlled the analysis for covariates associated with depression persistence at a statistical significance level of 10%. Covariates were included in the multivariate regression models by block (sociodemographic characteristics+stressful life events, overall health, mental health difficulties). All analyses were conducted separating men and women with SAS V9.

3. Results

In our study, 46.7% of men and 64.7% of men had persistent depression over the course of follow-up. Persistent depression was predicted by low income in men (OR: 2.52, 95% CI 1.28-4.95) and low occupational grade in women (OR: 2.25, 95% CI 1.06-4.80) (**Table 1**). In men **(Table 2)**, the effect of low income decreased after adjusting for sociodemographic characteristics, that is age and lack of social support as well as stressful life events (OR: 1.90, 95% CI 0.91-3.97) and after adjusting for overall health (OR: 2.06, 95% CI 1.03-4.12). Controlling for baseline sociodemographic characteristics

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and stressful life events, health, and mental health difficulties, that is the severity of baseline depression, the OR associated with low income decreased to 1.47 and became statistically non-significant (95% CI 0.74-2.90). In women **(Table 3)**, the effect of low occupational grade slightly increased after adjusting for stressful life events (OR: 2.43, 95% CI 1.15-5.18) but decreased and became statistically non-significant after adjusting for baseline mental health difficulties, that is the severity of baseline depression and comorbid anxiety (OR: 1.87, 95% CI 0.85-4.11). Controlling both for stressful life events and baseline mental health difficulties, the OR associated with low occupational grade decreased to 2.01 and became statistically non-significant (95% CI 0.92-4.36).

4. Discussion

4.1 Main findings

In a community-based cohort of depressed individuals followed for 7 years, low socioeconomic position predicted depression persistence in univariate statistical analyses. This socioeconomic disparity reflected overexposure to several risk factors of poor depression outcomes including unfavorable sociodemographic characteristics and more severe mental health difficulties, and was not statistically significant in multivariate regression models.

4.2 Study limitations and strengths

Our study has limitations which need to be taken into account in interpreting our findings. First, GAZEL cohort participants had stable employment and we could not study the role of unemployment or job insecurity. Second, although GAZEL includes a wide range of occupations and income levels and is characterized by strong health inequalities ([Melchior et al., 2005], [Melchior et al., 2006] and [Melchior et al., 2007]),

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we may have underestimated socioeconomic inequalities in depression persistence. Third, our analysis did not account for certain factors associated with depression course such as family history of mental illness ([Milne et al., 2009]) and age of onset of depressive illness ([Zisook et al., 2007]). However, these factors are thought to influence disease course primarily through greater symptom severity; thus by accounting for the severity of the depression episode at study baseline (single depressive episode, recurrent depressive episode/depressive episode doubled by dysthymia, or depressive episode with suicidal ideation) we probably captured most of the variability in disorder outcome that would be associated with these predictors.

Despite these limitations, our study also has several strengths which argue for the validity of our finding: 1) we systematically used four distinct indicators of socioeconomic position; 2) the sample was selected independently of mental health treatment status; 3) we used a prospective research design which limits information bias; 4) the analysis is controlled for baseline mental health difficulties.

4.2 Socioeconomic position and depression

The association between low socioeconomic position and depression persistence reported in our study is consistent with data from other investigations ([Gilman et al., 2003], [Mojtabai and Olfson, 2004] and [Miech et al., 2005]). In the current debate regarding the socioeconomic indicators most relevant in relation to adult depression ([Araya et al., 2003] and [Lorant et al., 2003]), our data suggest that adult circumstances (i.e. income and occupational grade) play a more important role than father's occupation in childhood. This association appears to reflect worse social and clinical characteristics at baseline and may additionally be compounded by heightened vulnerability to

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depressogenic experiences ([Bonanno et al., 2007]) and available mental health treatment ([Grolleau et al., 2008]). In particular, treatment adequacy, assessed in relation to disorder severity ([National Institute for Health and Clinical Excellence, 2007]), appears to be an important predictor of the long-term course of depression ([Koivumaa-Honkanen et al., 2008]). Unfortunately, we could not address this question as data on treatment adequacy were not collected in the GAZEL cohort; still, it will be important to test the role of adequate treatment in future research. Overall, socioeconomic inequalities in depression probably reflect both "health selection" (i.e. the influence of depression on socioeconomic attainment) and "social causation" (i.e. the influence of socioeconomic disadvantage on depression risk) ([Dohrenwend et al., 1992]). Our design did not allow us to examine this issue in detail; however, our results suggest that socioeconomic disparities in depression persistence are statistically explained by several risk factors with co-occur with low socioeconomic position. Additional longitudinal research is needed to disentangle the lifecourse processes that underlie the association between socioeconomic position and risk factors of depression persistence.

4.3 Gender differences

As previous researchers, we found higher rates of persistent depression in women than in men (64.7% vs. 47.6%); this is consistent with the hypothesis that higher persistence rate contributes to women's increased lifetime risk of depression ([Mueller et al., 1999], [Bracke, 2000],[Spijker et al., 2001] and [Solomon et al., 2004]). Additionally, we observed gender differences with regard to socioeconomic predictors of depression which go along the suggestion that socioeconomic indicators have different meaning in

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women and in men ([Krieger, 1991]). For instance, in France, women are more likely

than men to work in unskilled jobs (32% as compared with 18%) and, on average, there

is a 25% earning gap ([Meurs and Pontieux 2006]) – as a result, occupational grade and

income may not be directly comparable in men and in women. Our results do not allow

us to conclude which socioeconomic indicators are particularly relevant in women and in

men. However, when monitoring social disparities in health, researchers may need to

pay special attention to measuring socioeconomic position in a gender-relevant way.

Finally, in our study, the course of depression among women was associated with

stressful life events and initial mental health difficulties; among men, other factors,

including insufficient social support and poor overall health, played an important role.

Previous research reported that, over and above clinical factors, social characteristics

and physical functioning can predict depression recovery ([Spijker et al., 2004], [Conradi

et al., 2008] and [Gater et al., 2008]). However, these studies combined women and

men and research on gender-specific predictors of depression course is still needed.

4.4 Conclusions

Depressed individuals with low socioeconomic position appear to

disproportionately experience persistent depression; this seems related to their high

level of exposure to multiple risk factors of long-term depression.

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Table 1. GAZEL cohort participants who were depressed in 1994: baseline characteristics in relation to persistent depression during follow-up: 1994-2001 (%; OR, 95% CI).

	Men N=145		Women N=153		Men vs. women p-value
	%	OR [95%CI]	%	OR [95%CI]	
Sociodemographic characteristics					
Age :					
50-54 years	-	1.0	32.7	1.0	
45-49 years	53.8	2.67[1.48-4.80]	34.0	1.35[0.70-2.57]	-
40-44 years	46.2	-	33.3	0.96[0.49-1.87]	
Marital status :					
Married/living with a partner	81.2	1.0	69.2	1.0	0.02
Not living with a partner	18.8	1.03[0.48-2.20]	30.8	0.90[0.48-1.68]	
Social support:					
Sufficient	82.6	1.0	73.3	1.0	0.06
Insufficient	17.4	2.53[1.16-5.53]	26.7	1.58[0.83-3.01]	
Stressful life events:					
0	42.8	1.0	62.8	1.0	
1	36.5	1.75[0.89-3.44]	24.8	1.21[0.64-2.29]	0.002
>=2	20.7	2.83[1.31-6.09]	12.4	2.44[1.07-5.57]	
Socioeconomic position					
Father's occupational grade:					
Intermediate/high	51.3	1.0	53.2	1.0	
Low	48.7	1.31 [0.74-2.35]	46.8	1.37 [0.79-2.35]	0.88
Educational attainment:					
>= High school degree	26.1	1.0	32.9	1.0	0.21
< High school degree	73.9	1.66 [0.84-3.26]	67.1	0.97[0.54-01.73]	
Income level:					
>€2615/month	30.5	1.0	32.7	1.0	0.69
<= €2615/month	69.5	2.52[1.28-4.95]	67.3	0.98[0.56-1.71]	
Occupational grade:					
Intermediate/high	87.7	1.0	80.7	1.0	0.11
Low	12.3	1.43[0.58-3.54]	19.3	2.25[1.06-4.80]	
Overall health status:					
Good	64.7	1.0	70.1	1.0	0.33
Poor	35.3	2.39[1.28-4.47]	29.9	1.16[0.64-2.10]	
Mental health difficulties					
Baseline depression:					
Single depressive episode	14.5	1.0	4.6	1.0	
Recurrent depression or depression with dysthymia	37.2	1.69[0.66-4.32]	36.6	5.40[1.29-22.5]	0.009
Depression with suicidal ideation	48.3	2.89[1.20-6.95]	58.8	7.72[1.88-31.75]	
Comorbid anxiety disorder:					
No	56.6	1.0	51.6	1.0	0.39
Yes	43.4	1.11[0.62-1.98]	48.4	2.42[1.41-4.17]	
Persistent depression during follow-up	47.6	-	64.7	-	0.003

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Table 2. Socioeconomic position and persistent depression in the GAZEL cohort study: men (n=145, 1994-2001) (OR, 95% CI).

	Model 1	Model 2	Model 3	Model 4	Model 5
Income level:					
>€2616/month	1.0	1.0	1.0	1.0	1.0
<= €2616/month	2.52[1.28-4.95]	1.90[0.91-3.97]	2.06[1.03-4.12]	2.38[1.22-4.64]	1.47[0.74-2.90]
Age:					
50-54 years	-	1.0		-	1.0
45-49 years		2.86[1.49-5.49]			3.11[1.62-6.00]
Social support:					
sufficient	-	1.0		-	1.0
insufficient		1.65[0.70-3.91]			1.41[0.57-3.47]
Stressful life events:					
0		1.0			1.0
1		1.55[0.74-3.23]			1.22[0.57-2.62]
>=2		2.45[1.02-5.88]			2.96[1.21-7.24]
Overall health status:					
good			1.0		1.0
poor			2.29[1.21-4.34]		2.09[1.05-4.15]
Baseline depression:					
single depressive episode				1.0	1.0
recurrent depression or depression with dysthymia	-	-		1.30[0.50-3.37]	1.87[0.70-5.01]
depression with suicidal ideation				2.45[1.00-6.03]	3.09[1.23-7.77]

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Table 3. Socioeconomic position and persistent depression in the GAZEL cohort study: women (n=153, 1994-2001) (OR, 95% CI).

	Model 1	Model 2	Model 3	Model 4
Occupational grade:				
intermediate/high	1.0	1.0	1.0	1.0
low	2.25[1.06-4.80]	2.43[1.15-5.18]	1.87 [0.85-4.11]	2.01 [0.92-4.36]
Stressful life events:				
0		1.0		1.0
1		1.13[0.58-2.20]		1.00[0.50-2.01]
>=2		2.50[1.09-5.74]		2.17[0.93-5.09]
Baseline depression:				
single depressive episode	-		1.0	1.0
recurrent depression or depression with dysthymia			3.83[0.89-16.44]	3.48[0.81-14.88]
depression with suicidal ideation			4.72[1.08-20.56]	4.14[0.94-18.25]
Comorbid anxiety disorder:				
no	-		1.0	1.0
yes			1.84[1.01-3.34]	1.85[1.01-3.38]