

BMJ Open Socioeconomic position, symptoms of depression and subsequent mental healthcare treatment: a Danish register-based 6-month follow-up study on a population survey

Aake Packness,^{1,2} Anders Halling,³ Lene Halling Hastrup,² Erik Simonsen,^{2,4} Sonja Wehberg,⁵ Frans Boch Waldorff¹

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For numbered affiliations see end of article.

Correspondence to

Mr Aake Packness;
apackness@health.sdu.dk,
aake.packness@gmail.com

ABSTRACT

Objective Examine whether the severity of symptoms of depression was associated with the type of mental healthcare treatment (MHCT) received, independent of socioeconomic position (SEP).

Design Register-based 6-month follow-up study on participants from the Danish General Suburban Population Study (GESUS) 2010–2013, who scored the Major Depression Inventory (MDI).

Participants Nineteen thousand and eleven respondents from GESUS.

Interventions The MHCT of the participants was tracked in national registers 4 months prior and 6 months after their MDI scores. MHCT was graduated in levels. SEP was defined by years of formal postsecondary education and income categorised into three levels. Data were analysed using logistic and Poisson regression analyses.

Outcomes MHCT included number of contacts with: general practitioner (GP), GP mental health counselling, psychologist, psychiatrist, emergency contacts, admissions to psychiatric hospitals and prescriptions of antidepressants.

Results For 547 respondents with moderate to severe symptoms of depression there was no difference across SEP in use of services, contact (y/n), frequency of contact or level of treatment, except respondents with low SEP had more frequent contact with their GP. However, of the 547 respondents, 10% had no treatment contacts at all, and 47% had no treatment beyond GP consultation. Among respondents with no/few symptoms of depression, postsecondary education ≥ 3 years was associated with more contact with specialised services (adjusted OR (aOR) 1.92; 95% CI 1.18 to 3.13); however, this difference did not apply for income; additionally, high SEP was associated with fewer prescriptions of antidepressants (education aOR 0.69; CI 0.50 to 0.95; income aOR 0.56, CI 0.39 to 0.80) compared with low SEP.

Conclusion Participants with symptoms of depression were treated according to the severity of their symptoms, independent of SEP; however, more than half with moderate to severe symptoms received no treatment beyond GP consultation. People in low SEP and no/few symptoms of depression were more often treated with antidepressants. The study was approved by The Danish

Strengths and limitations of this study

- The design of this study, combining data from a population survey on depression symptom scores with prospective register data on healthcare use and medication, is unique in health service research on treatment of people with symptoms of depression.
- The study design made it possible to reduce the inherent problem of recall bias in these types of studies.
- The actual reasons for treatment contacts or for prescription of antidepressants were not known; they could have been caused by disorders other than depression.
- The study sample was generally better educated than the population they were sampled from.

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INTRODUCTION

Equal access to healthcare based on need and the reduction of health inequalities are major policy objectives in most countries in the Organisation for Economic Co-operation and Development (OECD).¹ Similarly, the WHO states that addressing social inequalities contributes significantly to the health and well-being of individuals and countries.²

Sustained economic hardship can lead to poorer physical, psychological and cognitive functioning,³ and is furthermore associated with a higher prevalence of mental health problems.⁴ Specifically, depressive disorders are more prevalent among people in a low socioeconomic position (SEP)⁵ and are enhanced by worsening socioeconomic circumstances.⁶ Whereas low SEP is an outcome of schizophrenia, it is a determinant

for depression.^{7 8} Additionally, depression is a major health problem, globally ranked as the single largest contributor to non-fatal health loss, accounting for 7.5% overall in years lived with disability.⁹ It is estimated that life expectancy is reduced by 14 years for men and 10 years for women treated for severe depression.¹⁰

Equity in access to healthcare is commonly defined as equal access for equal need. However, both *access* and *need* are ambiguous concepts.¹¹ It has been documented that patients in high SEP use more specialised healthcare services,^{12 13} also within mental healthcare;¹⁴ yet there remains a gap between those in need of mental healthcare and those who receive it.^{15–17} Additionally, not all users of mental healthcare are in clinical need.¹⁸ As for depression and anxiety disorders, some studies have found access to specialist care to be reflective of clinical need, with little inequality in SEP,^{19 20} whereas others report specialised mental health services are not provided to persons in low SEP according to need,^{21 22} or that higher SEP is associated with more use of specialised mental health services.^{23 24} This uncertainty and the fact that depressive disorders are widespread and more common among persons in lower SEP makes these disorders both relevant and well suited to evaluate the capability of healthcare systems to address the needs of economically deprived citizens. Depression is a serious disorder with extensive personal, social and economic consequences, which makes its treatment an important issue and health equality an urgent cause.

OBJECTIVES

We aimed to evaluate whether the Danish healthcare system delivers equal treatment to patients with symptoms of depression. We defined *mental healthcare treatment* (MHCT) as the use of specific healthcare services related to the treatment of depressive disorders, as well as treatment with antidepressants.

The objective was to examine if the severity of symptoms of depression (need) was associated with the MHCT received, independent of SEP in both type and frequency of treatments, and highest gained treatment level within 6 months following a symptom score in a survey study.

METHOD

Design

A 6-month follow-up study on respondents with symptoms of depression, combining survey data with register data on MHCT.

Setting: the Danish healthcare system

Healthcare is tax-funded in Denmark and free at delivery, except for dental care and visits to psychologists for adults, which are both partly subsidised.²⁵ The general practitioner (GP) acts as a gatekeeper to more specialised care. Treatment by a psychologist is subsidised for patients with specific conditions, such as reaction to specific traumatic events, moderate depression and, specifically for citizens

between 18 years and 38 years, also moderate anxiety disorders. In 2014, the co-payment for a psychologist appointment was equivalent to €44 per session.²⁶ Each psychologist is obliged to obtain a special authorisation from the Danish Supervisory Board of Psychological Practice in order to be subsidised.

Study population and data sources

The study was conducted as a follow-up study on mental healthcare utilisation and use of antidepressants, examining participants who scored high on symptoms of depression in the Danish General Suburban Population Study (GESUS)²⁷ in the municipality of Næstved, Denmark. The municipality of Næstved is located 90 km south of the capital Copenhagen. It has a total population of 81 000 and a socioeconomic index score 4% lower than the 2013 national average.²⁸ The GESUS data were collected from January 2010 through October 2013. The aim of GESUS was to facilitate epidemiological and genetic research by using information from questionnaires, health examinations, biochemical measurements, genetic variants and public registers to analyse the occurrence of comorbidities (eg, diabetes, cardiovascular disease, pulmonary disease and cancer) and mortality. All citizens over the age of 30 years were invited, as were a random selection of a quarter of citizens between 20 years and 30 years of age. The study included 21 253 participants, equivalent to 43% of the invited citizens; the median age of participants was 56 years and that of non-participants 52 years. Data from the self-administered GESUS questionnaire were used in the present study.

Persons with permanent residence in Denmark are registered in the Danish Civil Registration System (CRS)²⁹ and are assigned a unique 10-digit identification number, the Central Personal Register (CPR) number. The CPR number was registered in the survey data and thus provided a way to match respondents with information on their age and gender, and also made it possible to identify the individuals in all public data registers in Denmark. In addition to the data sources already mentioned, data concerning vital status and dates of migration were gathered from the CRS as well.

Using the CPRs from GESUS, we linked to the national registers and tracked the use of healthcare services and antidepressants for 4 months (120 days) prior and 6 months (180 days) after the respondents entered the GESUS study, or until their death or migration, if that occurred before. Data from national registers covered the years 2010–2014; however, in order to fit a time frame of 4 months prior to index date, the sample was reduced to include only respondents entering the GESUS study from May 2010, due to lack of data availability from 2009. The period of 4 months prior to the study was chosen assuming active treatment would include a treatment appointment or renewed prescription at least every 3–4 months.

Independent variables

Data on independent variables came from GESUS.

Measure of need

Depression was chosen as an expression of need, with the Major Depression Inventory (MDI) as a measurement tool, extracted from the GESUS questionnaire. The MDI is based on the 12-item Likert Scale and has been found to have adequate internal and external validity for defining different stages of depression.³⁰ The MDI is based on the International Classification of Diseases version 10 (ICD-10) diagnostic criteria for depressive disorder,³¹ with scores ranging from 0 to 50; scores ≤ 20 do not indicate depression; mild depression is defined as a score from 21 to 25; moderate depression from 26 to 30; and severe depression from 31 to 50.³² In the study, we collapsed moderate and severe depression into the same category, reducing the categories to three in order to gain statistical power: *no/few symptoms* (summed MDI 0–20), *mild symptoms* (summed MDI 21–25), and *moderate/severe symptoms* (summed MDI 26+). This splitting of symptomatic individuals into only two groups (mild or moderate/severe) was supported by the recommended therapeutic approach at the time: patients with mild symptoms were recommended ‘watchful waiting’ and perhaps supportive consultations, whereas patients with moderate to severe depression were recommended antidepressants and therapy by a psychologist or a psychiatrist.³³ If more than two items were missing in the MDI, the score was categorised as missing.³⁴

Socioeconomic position

SEP is commonly measured by income, occupation, housing tenure, or education; higher education in particular is known to predict higher response rates in questionnaires.³⁵ Education and income were chosen as measures of SEP in this study due to the respondents’ age distribution skewing older than the general population; older age groups tend to have lower education, and they also have lower incomes, but occupation is not a useful SEP measurement for retired individuals. Education was classified as, *no postsecondary education*: if the respondent did not complete any postsecondary education; *1–3 years postsecondary education*: for vocational education of 1–3 years; *or for academy/professional graduates of 1–3 years*; *3+ postsecondary education*: for baccalaureate who completed 3–4 years and *academic* for those who completed graduate study of ≥ 5 years. Students were categorised at the level that their studies would end in, for example, students in doctoral programs would be categorised as academics even though they had not yet completed 5 years of graduate study.

Information on income was also extracted from the GESUS questionnaire, where it was reported in Danish Kroner (Kr). Kr100 equals €13.42, a fixed exchange rate for many years. Income was grouped into three equal groups: *Less than Kr300 000*; *Kr300 000–599 999*; and *Kr600 000+* and reported as: $<€40 250$; $\geq€40 250 <€80 499$; or $\geq€80 500$.

When both income and education show the same association to an outcome, it will be addressed as an association to SEP; otherwise the association will be addressed to the variable in question (income/education).

Extrinsic variables

Sociodemographic data included age, gender, marital status and cohabitation status.

Information on *somatic comorbidity* included: previous acute myocardial infarction, arteriosclerosis, angina pectoris, stroke, cancer, diabetes mellitus, hyperthyroidism or hypothyroidism. The somatic disorders were all grouped into one variable. Previous depressive episodes were registered separately.

Present medication covered self-reported use of antidepressants. Respondents defined as being in *present treatment* included both participants who reported use of antidepressants and participants identified in registers, as described below, who had redeemed a prescription for antidepressants and/or had contact with a psychiatrist and/or a psychologist within 4 months prior to the date of returning the questionnaire (in the following termed the *index date*) with the depression score.

Dependent variables

Data on dependable variables were drawn from national registers.

The outcome variables were graded according to the stepwise treatment of increasing intensity for depression as it was recommended in the Danish national guidelines at the time.²⁵ The guidelines start with (#1) Counselling and (#2) Therapy provided by the GP, followed by (#3) Prescription of antidepressants, followed by (#4) Referral to therapy with a psychologist, then (#5) Referral to treatment by a psychiatrist, and finally (#6) Referral to outpatient public psychiatrist or eventually (#7) Inpatient treatment at a psychiatric hospital (see code definitions in online supplementary table 1; an additional #0 refers to No treatment contact). Emergency visits to a psychiatric hospital were included in the category of hospital contacts. The more severe or non-respondent the depression is to the prescribed treatment, the higher the patient is supposed to move in the recommended treatment hierarchy. Treatment by psychologists (step #4) or psychiatrists (steps #5 and #6), whether private or public, were pooled into one group in some analyses due to low numbers of observations. Data on the utilisation of private psychiatrists, psychologists and GPs were drawn from the Danish National Health Service Register for Primary Care.³⁶ For psychologists, only subsidised services are in the register. Respondents covered by private insurance and treated for depression or anxiety are included in the data, as insurance agencies require referral from GPs to compensate the patient.

Mental health counselling (MHC) provided by a GP consists of at least two talks within the first 6 months and up to seven talks within 1 year. This type of therapeutic

counselling is registered and paid as additional reimbursement to the GP. In the study, this service was termed MHC by GP. Topics for ordinary consultations by GP are not registered in the national registers.

Data on prescriptions for antidepressants (Anatomical Therapeutic Chemical (ATC) Classification System N06A) were extracted from the Danish National Prescription Registry.^{37 38} However, bupropion (ATC N06A×12), which is approved for the treatment of depression in some countries, was excluded from this study since it is only prescribed for smoking cessation in Denmark.

Information concerning public inpatient and outpatient psychiatric treatment was drawn from the Danish National Patient Register³⁹ (ICD 10 coded F00 – F99).

Statistical analyses

First, we estimated the association between SEP and the different binary outcome variables (that is, the five different types of healthcare contacts: *No healthcare contact*, *GP consultation*, *MHC by GP*, *Antidepressants* and *Specialised mental health services*) in separate logistic regression models, both univariable and multivariable. Each model was stratified into three MDI categories: no/few symptoms (MDI<21), symptoms of mild depression (MDI 21–25), and symptoms of moderate to severe depression (MDI ≥26). The SEP category ‘*No postsecondary education and income <€40250*’ was used as the reference category. To examine a possible interaction between SEP and the MDI category, we employed logistic regression models for each outcome, with patients having *No postsecondary education/ <€40250* and *no/few depression symptoms* as key reference.

Second, in order to evaluate differences in visits and prescription rates, we estimated incidence rate ratios (IRRs) by Poisson regression models for each type of contact (*GP consultation*, *MHC by GP*, *Antidepressants* and *Specialised mental health services*). For each type of contact, analyses were restricted to those patients who had at least one contact. For exposure, death and emigration within 180 days after index date were taken into consideration. As above, analyses were stratified into MDI category, and the SEP category ‘*No postsecondary education and <€40250*’ was used as a reference category.

Finally, we performed a linear regression analysis for the effect of combined SEP and MDI category on the highest reached treatment level (see treatment progression described above). The treatment levels were categorised as shown in online supplementary table 1 (0: no treatment/contact; 1: GP consultation; 2: MHC by GP; 3: antidepressants; 4: psychologist; 5: private psychiatrist; 6: public psychiatrist; 7: psychiatric hospital). Patients having *No postsecondary education/ <€40250* and *no/few depression symptoms* were the key reference groups.

All multivariable regression models included age (20–59 years versus 60+ years), gender, present treatment with antidepressants, and psychologist or psychiatrist (*yes/no*), in addition to the variable studied in

the univariate (crude) analysis. In analyses including income, cohabitation was also included.

The significance level was 5% throughout, and all reported CIs were 95%. All statistical analyses were performed using Stata V.14.⁴⁰

PATIENT AND PUBLIC INVOLVEMENT

The study did not involve patients or public in planning or execution.

ETHICS

Access to data from GESUS was approved by the GESUS board in December 2015. The data were stored in a server at Statistics Denmark. The collection and handling of the data have been approved by the Danish Data Protection Agency, journal number: 2015-41-3984. Approval by an ethics committee is not required for register studies in Denmark.

RESULTS

The study included 19 011 respondents from the GESUS study; the original number of 21 253 was reduced by 1627 respondents who entered before May 2010 due to data unavailability for 2009. The respondents were further reduced by an additional 615 who did not have a valid MDI score (see flow chart, supplementary figure 1). Twenty-nine deaths and four persons emigrating were included in the analysis only until death or migration. In all, 988 (5.2%) had symptoms of depression. Of these, 441 had symptoms of mild depression and 547 had symptoms of moderate and severe depression, and of the latter group 271 were rated severe.

The baseline characteristics of the study sample are shown in table 1, in total, and stratified by severity of symptoms of depression. Respondents with symptoms of mild to severe depression tended to be younger, included more singles, were living without a partner and were without formal education, compared with those with no/few symptoms.

In the study sample respondents with no education beyond the secondary level were under-represented and constituted half the proportion of the study population, according to Statistics Denmark; and the proportion with more than 3 years of postsecondary education was 32% in the sample compared with 19% in the population in Næstved.⁴¹

Table 2 shows ORs for MHCT contacts. Among respondents with *no/few* symptoms, the group with three or more years of postsecondary education was 30% more likely to have *no healthcare contacts at all* when compared with the group without postsecondary education (adjusted OR (aOR) 1.32, CI 1.18 to 1.49). Similarly were respondents in the highest income group 66% more likely to have *no healthcare contacts at all* when compared with the lowest income group (aOR 1.66, CI 1.46 to 1.89).

Table 1 Baseline characteristics of the study sample by MDI grade

MDI Score	All	MDI <21	MDI 21–25	MDI 26+	MDI missing
Symptoms of depression	n (%)	None/few	Mild	Moderate./severe*§	NA
All	19 626 (100)	18 023 (100)	441 (100)	547 (100)	615 (100)
In treatment†					
No	18 076 (92.1)	16 860 (93.5)	334 (75.7)	335 (61.2)	547 (88.9)
Yes	1 550 (7.9)	1 163 (6.5)	107 (24.3)	212 (38.8)	68 (11.1)
Gender					
Male	8 927 (45.5)	8 349 (46.3)	162 (36.7)	168 (30.7)	
Female	10 699 (54.5)	9 674 (53.7)	279 (63.3)	379 (69.3)	
Age group, years					
20–29	294 (1.5)	266 (1.5)	10 (2.3)	17 (3.1)	
30–39	2 382 (12.1)	2 206 (12.2)	79 (17.9)	86 (15.7)	
40–49	4 186 (21.3)	3 891 (21.6)	106 (24)	146 (26.7)	
50–59	4 417 (22.5)	4 100 (22.7)	115 (26.1)	144 (26.3)	
60–69	5 123 (26.1)	4 771 (26.5)	74 (16.8)	93 (17)	
70+	3 224 (16.4)	2 789 (15.5)	57 (12.9)	61 (11.2)	
Marital status					
Married	13 398 (68.3)	12 519 (69.5)	234 (53.1)	259 (47.3)	
Separated/divorced	2 174 (11.1)	1 936 (10.7)	71 (16.1)	117 (21.4)	
Widow/er	1 385 (7.1)	1 172 (6.5)	37 (8.4)	45 (8.2)	
None of the above	2 669 (13.6)	2 396 (13.3)	99 (22.4)	126 (23)	
Cohabiting					
No	4 342 (22.1)	3 745 (20.8)	147 (33.3)	217 (39.7)	
Yes (including missing)	15 284 (77.9)	14 278 (79.2)	294 (66.7)	330 (60.3)	
Education					
None (No postsecondary)	2 988 (15.2)	2 502 (13.9)	93 (21.1)	136 (24.9)	
Vocational/1–3 years (1–3 years postsecondary)	8 227 (41.9)	7 645 (42.4)	169 (38.3)	199 (36.4)	
Academy/professional <3 years (1–3 years postsecondary)	2 156 (11)	2 005 (11.1)	56 (12.7)	58 (10.6)	
Baccalaureate/3–4 years (3+ years postsecondary)	5 024 (25.6)	4 706 (26.1)	104 (23.6)	137 (25)	
Academic/5+ years (3+ years postsecondary)	1 231 (6.3)	1 165 (6.5)	19 (4.3)	17 (3.1)	
Income					
Less than Kr150 000 (<€40 250)	1 063 (5.4)	847 (4.7)	38 (8.6)	69 (12.6)	
Kr150 000–299 999 (<€40 250)	3 406 (17.4)	3 003 (16.7)	100 (22.7)	139 (25.4)	
Kr300 000–449 999 (≥€40 250 <€80 500)	3 601 (18.3)	3 344 (18.6)	73 (16.6)	98 (17.9)	
Kr450 000–599 000 (≥€40 250 <€80 500)	3 025 (15.4)	2 863 (15.9)	64 (14.5)	66 (12.1)	
Kr600 000–749 999 (≥€80 500)	3 245 (16.5)	3 086 (17.1)	74 (16.8)	64 (11.7)	
Kr750 000–899 999 (≥€80 500)	1 856 (9.5)	1 794 (10)	22 (5)	29 (5.3)	
Kr900 000–1 049 999 (≥€80 500)	693 (3.5)	667 (3.7)	12 (2.7)	9 (1.6)	
Kr1 050 000 + (≥€80 500)	706 (3.6)	691 (3.8)	8 (1.8)	5 (0.9)	
Missing	2 031 (10.3)	1 728 (9.6)	50 (11.3)	68 (12.4)	
Comorbidity former depression					
No	16 755 (85.4)	15 826 (87.8)	255 (57.8)	210 (38.4)	
Yes	2 484 (12.7)	1 917 (10.6)	173 (39.2)	319 (58.3)	
Missing	387 (2)	280 (1.6)	13 (2.9)	18 (3.3)	
Comorbidity somatic, all‡					
No	13 791 (70.3)	13 109 (72.7)	195 (44.2)	168 (30.7)	
Yes	5 835 (29.7)	4 914 (27.3)	246 (55.8)	379 (69.3)	
Medication antidepressants§					
No	18 537 (94.5)	17 213 (95.5)	363 (82.3)	385 (70.4)	576 (93.7)
Yes	1 089 (5.5)	810 (4.5)	78 (17.7)	162 (29.6)	39 (6.3)

*Moderate or severe.

†In treatment at index date or 120 days before by psychologist, psychiatrist or antidepressant prescription, according to GESUS or registers.

‡Somatic comorbidities: ischaemic heart disease, diabetes, cancer, metabolic diseases.

§Replied in questionnaire.

GESUS, General Suburban Population Study; MDI, Major Depression Inventory.

Table 2 ORs for type of *mental healthcare treatment* by education level and income level stratified by MDI grade

Symptoms, depression	No/few (MDI<21)		Mild (MDI 21 to 25)		Moderate/severe (MDI>25)	
	Crude OR	OR (adjusted)*	Crude OR	OR (adjusted)*	Crude OR	OR (adjusted)*
No contact at all						
Education	(n=18023 patients)		(n=441 patients)		(n=547 patients)	
No postsecondary education	Ref	Ref	Ref	Ref	Ref	Ref
1–3 years postsecondary	1.26 (1.13 to 1.40)	1.10 (0.98 to 1.23)	1.96 (0.91 to 4.22)	1.62 (0.71 to 3.67)	1.73 (0.79 to 3.77)	1.62 (0.72 to 3.65)
3+ years postsecondary	1.54 (1.38 to 1.72)	1.32 (1.18 to 1.49)	2.38 (1.05 to 5.38)	2.01 (0.84 to 4.83)	1.99 (0.87 to 4.55)	1.79 (0.76 to 4.23)
Income	(n=16295)		(n=391)		(n=479)	
Income <€40250	Ref	Ref†	Ref	Ref†	Ref	Ref†
Income ≥€40250 <€80500	1.69 (1.53 to 1.87)	1.39 (1.24 to 1.56)	1.20 (0.62 to 2.33)	0.79 (0.36 to 1.76)	1.74 (0.89 to 3.40)	1.59 (0.72 to 3.52)
Income ≥€80500	2.27 (2.06 to 2.51)	1.66 (1.46 to 1.89)	1.90 (0.99 to 3.63)	1.35 (0.55 to 3.33)	1.16 (0.51 to 2.63)	1.04 (0.38 to 2.82)
GP consultation						
No postsecondary education	Ref	Ref	Ref	Ref	Ref	Ref
1–3 years postsecondary	0.80 (0.72 to 0.89)	0.92 (0.82 to 1.02)	0.52 (0.26 to 1.06)	0.64 (0.31 to 1.35)	0.68 (0.35 to 1.31)	0.70 (0.36 to 1.37)
3+ years postsecondary	0.66 (0.59 to 0.74)	0.77 (0.68 to 0.86)	0.46 (0.21 to 0.97)	0.54 (0.24 to 1.19)	0.69 (0.34 to 1.41)	0.74 (0.36 to 1.53)
Income <€40250	Ref	Ref†	Ref	Ref†	Ref	Ref†
Income ≥€40250 <€80500	0.60 (0.54 to 0.66)	0.72 (0.64 to 0.80)	0.90 (0.48 to 1.67)	1.25 (0.60 to 2.61)	0.55 (0.30 to 1.00)	0.53 (0.27 to 1.07)
Income ≥€80500	0.45 (0.41 to 0.50)	0.60 (0.53 to 0.68)	0.63 (0.34 to 1.84)	0.79 (0.34 to 1.84)	0.94 (0.44 to 1.97)	0.81 (0.33 to 2.01)
GP mental health counselling						
No postsecondary education	Ref	Ref	Ref	Ref	Ref	Ref
1–3 years postsecondary	1.20 (0.84 to 1.71)	1.09 (0.76 to 1.57)	0.34 (0.12 to 0.97)	0.30 (0.10 to 0.91)	1.20 (0.61 to 2.33)	1.27 (0.65 to 2.50)
3+ years postsecondary	1.31 (0.90 to 1.89)	1.21 (0.83 to 1.76)	1.26 (0.50 to 3.17)	1.03 (0.38 to 2.81)	1.23 (0.59 to 2.55)	1.30 (0.62 to 2.73)
Income <€40250	Ref	Ref†	Ref	Ref†	Ref	Ref†
Income ≥€40250 <€80500	1.07 (0.80 to 1.43)	1.09 (0.78 to 1.53)	1.14 (0.43 to 3.05)	1.40 (0.44 to 4.47)	2.06 (1.05 to 4.02)	1.79 (0.81 to 3.97)
Income ≥€80500	0.84 (0.62 to 1.14)	0.85 (0.57 to 1.28)	1.20 (0.44 to 3.31)	1.33 (0.34 to 3.96)	1.66 (0.77 to 3.59)	1.35 (0.52 to 3.53)
Antidepressants						
No postsecondary education	Ref	Ref	Ref	Ref	Ref	Ref
1–3 years postsecondary	0.85 (0.71 to 1.01)	0.75 (0.55 to 1.01)	0.96 (0.52 to 1.77)	1.11 (0.47 to 2.65)	0.72 (0.47 to 1.10)	0.82 (0.43 to 1.56)
3+ years postsecondary	0.69 (0.57 to 0.83)	0.69 (0.50 to 0.95)	1.17 (0.60 to 2.29)	1.40 (0.54 to 3.63)	0.65 (0.40 to 1.05)	0.86 (0.42 to 1.77)
Income <€40250	Ref	Ref†	Ref	Ref†	Ref	Ref†
Income ≥€40250 <€80500	0.67 (0.57 to 0.78)	0.71 (0.52 to 0.95)	0.77 (0.43 to 1.39)	1.29 (0.51 to 3.25)	0.67 (0.43 to 1.03)	0.53 (0.25 to 1.11)
Income ≥€80500	0.44 (0.37 to 0.52)	0.56 (0.39 to 0.80)	0.63 (0.33 to 1.20)	1.25 (0.39 to 3.96)	0.53 (0.32 to 0.89)	0.53 (0.20 to 1.36)
Specialised services‡						
No postsecondary education	Ref	Ref	Ref	Ref	Ref	Ref
1–3 years postsecondary	1.94 (1.24 to 3.03)	1.81 (1.13 to 2.88)	1.34 (0.52 to 3.46)	0.79 (0.27 to 2.36)	1.30 (0.70 to 2.43)	1.73 (0.87 to 3.41)
3+ years postsecondary	1.91 (1.20 to 3.05)	1.92 (1.18 to 3.13)	2.01 (0.75 to 5.41)	1.41 (0.45 to 4.36)	1.25 (0.63 to 2.49)	1.67 (0.78 to 3.57)
Income <€40250	Ref	Ref†	Ref	Ref†	Ref	Ref†
Income ≥€40250 <€80500	1.03 (0.75 to 1.42)	1.11 (0.76 to 1.64)	0.67 (0.30 to 1.49)	0.79 (0.36 to 1.76)	1.32 (0.73 to 2.37)	1.47 (0.69 to 3.14)
Income ≥€80500	0.89 (0.64 to 1.23)	0.99 (0.63 to 1.55)	0.96 (0.44 to 2.09)	1.35 (0.55 to 3.33)	1.05 (0.53 to 2.11)	1.36 (0.52 to 3.56)

Results significant within a 95% CI are marked in bold.

*Adjusted for age group 60± years, gender, present treatment of antidepressants, psychologist or psychiatrist.

†Adjusted for age group 60± years, gender, present treatment of antidepressants, psychologist or psychiatrist, cohabitation.

‡Psychologist or psychiatrist, public or private.

GP, general practitioner, MDI, Major Depression Inventory.

Higher education (3+years) as well as high income were associated with fewer consultations with a GP and fewer prescriptions of antidepressants, compared with those without postsecondary education or with low income. However, increased educational level was associated with more contact with *specialised services* (aOR 1.81, CI 1.13 to 2.88; aOR 1.92, CI 1.18 to 3.13); a difference not seen between the income groups.

Among respondents with symptoms of *mild* depression, there was no statistically significant difference across

educational groups or income groups in odds for contacts and prescriptions in the adjusted analyses, except that those with 1–3 years of postsecondary education had a lower use of MHC by GP (aOR 0.30, CI 0.10 to 0.91) compared with respondents without any postsecondary education.

In the group with symptoms of *moderate/severe* depression there was no difference across socioeconomic categories in any type of healthcare contact, when adjusted for age, gender and present treatment.

Table 3 Incidence rate ratios for *mental healthcare treatments* by education level and income level stratified by MDI grade

Symptoms of depression	No/few (MDI<21)		Mild (MDI 21 to 25)		Moderate/severe (MDI>25)	
	IRR (crude)	IRR (aAdjusted)*	IRR (crude)	IRR (aAdjusted)*	IRR (crude)	IRR (aAdjusted)*
GP consultation						
Education	(n=18 023)		(n=441)		(n=547)	
No postsecondary education	Ref	Ref	Ref	Ref	Ref	Ref
1–3 years postsecondary	0.82 (0.80 to 0.84)	0.87 (0.85 to 0.89)	0.79 (0.69 to 0.89)	0.88 (0.77 to 0.99)	0.81 (0.73 to 0.89)	0.81 (0.74 to 0.89)
3+ years postsecondary	0.77 (0.75 to 0.80)	0.84 (0.81 to 0.86)	0.74 (0.64 to 0.86)	0.83 (0.72 to 0.97)	0.76 (0.68 to 0.85)	0.77 (0.69 to 0.86)
Income	(n=16 295)		(n=391)		(n=479)	
Income <€40 250	Ref	Ref†	Ref	Ref†	Ref	Ref†
Income ≥€40 250 <€80 500	0.81 (0.80 to 0.83)	0.88 (0.85 to 0.90)	0.75 (0.66 to 0.85)	0.88 (0.76 to 1.02)	0.74 (0.67 to 0.82)	0.81 (0.72 to 0.91)
Income ≥€80 500	0.67 (0.66 to 0.69)	0.78 (0.76 to 0.81)	0.63 (0.55 to 0.73)	0.78 (0.65 to 0.94)	0.66 (0.59 to 0.75)	0.75 (0.65 to 0.86)
GP mental health counselling						
No postsecondary education	Ref	Ref	Ref	Ref	Ref	Ref
1–3 years postsecondary	0.93 (0.73 to 1.20)	0.93 (0.72 to 1.20)	1.36 (0.70 to 2.64)	1.22 (0.58 to 2.56)	1.08 (0.74 to 1.58)	1.13 (0.77 to 1.65)
3+ years postsecondary	0.93 (0.72 to 1.22)	0.93 (0.71 to 1.21)	0.85 (0.44 to 1.61)	0.82 (0.40 to 1.69)	0.76 (0.48 to 1.18)	0.79 (0.50 to 1.24)
Income <€40 250	Ref	Ref†	Ref	Ref†	Ref	Ref†
Income ≥€40 250 <€80 500	0.98 (0.79 to 1.22)	0.93 (0.74 to 1.18)	0.73 (0.39 to 1.36)	0.97 (0.49 to 1.91)	0.83 (0.56 to 1.23)	0.69 (0.42 to 1.14)
Income ≥€80 500	1.00 (0.80 to 1.25)	0.94 (0.71 to 1.24)	0.45 (0.22 to 0.96)	0.39 (0.18 to 0.88)	1.07 (0.69 to 1.64)	0.86 (0.50 to 1.48)
Antidepressants‡						
No postsecondary education	Ref	Ref	Ref	Ref	Ref	Ref
1–3 years postsecondary	0.95 (0.85 to 1.05)	0.93 (0.84 to 1.03)	1.03 (0.73 to 1.46)	1.05 (0.73 to 1.50)	1.07 (0.89 to 1.28)	1.06 (0.88 to 1.27)
3+ years postsecondary	1.00 (0.89 to 1.12)	1.01 (0.90 to 1.13)	1.10 (0.76 to 1.59)	1.11 (0.77 to 1.62)	1.12 (0.91 to 1.37)	1.08 (0.88 to 1.33)
Income <€40 250	Ref	Ref †	Ref	Ref†	Ref	Ref†
Income ≥€40 250 <€80 500	0.98 (0.90 to 1.08)	1.00 (0.90 to 1.11)	1.09 (0.79 to 1.49)	1.29 (0.90 to 1.84)	0.97 (0.80 to 1.18)	0.92 (0.73 to 1.16)
Income ≥€80 500	0.92 (0.83 to 1.02)	0.95 (0.84 to 1.09)	1.02 (0.71 to 1.46)	1.18 (0.74 to 1.88)	1.18 (0.94 to 1.47)	1.11 (0.84 to 1.46)
Specialised services§						
No postsecondary education	Ref	Ref	Ref	Ref	Ref	Ref
1–3 years postsecondary	0.97 (0.77 to 1.22)	0.94 (0.75 to 1.19)	1.11 (0.71 to 1.71)	0.93 (0.58 to 1.48)	0.93 (0.72 to 1.21)	0.94 (0.72 to 1.22)
3+ years postsecondary	1.06 (0.84 to 1.34)	1.02 (0.80 to 1.29)	1.32 (0.85 to 2.05)	1.02 (0.63 to 1.66)	1.09 (0.82 to 1.43)	1.10 (0.83 to 1.46)
Income <€40 250	Ref	Ref†	Ref	Ref†	Ref	Ref†
Income ≥€40 250 <€80 500	1.09 (0.92 to 1.28)	1.20 (0.99 to 1.45)	1.30 (0.91 to 1.85)	1.30 (0.88 to 1.94)	1.01 (0.78 to 1.30)	0.77 (0.57 to 1.06)
Income ≥€80 500	1.18 (1.00 to 1.39)	1.35 (1.09 to 1.68)	1.58 (1.14 to 2.19)	1.21 (0.79 to 1.86)	1.46 (1.12 to 1.92)	1.00 (0.69 to 1.45)

*Adjusted for age group 60± years, gender, present treatment of antidepressants, psychologist or psychiatrist.

†Adjusted for age group 60± years, gender, present treatment of antidepressants, psychologist or psychiatrist, cohabitation.

‡Number of reimbursed prescriptions.

§Psychologist or psychiatrist, public or private.

Results significant within a 95% CI are marked in bold.

GP, general practitioner; IRR, incidence rate ratio; MDI, Major Depression Inventory.

Table 3 shows the rate (IRR) of visits and number of prescriptions of antidepressants stratified by severity of symptoms. At all grades of symptoms of depression, short education and low income were associated with higher rates of visits to GP.

Among participants with *no/few* symptoms of depression, high income was associated with more frequent visits to a specialist, compared with the low income group (adjusted IRR (aIRR) 1.35, CI 1.09 to 1.68).

Among participants with *mild* symptoms of depression high income was associated with a lower visit rate for

GP-MHC than the low-income group (aIRR 0.39, CI 0.18 to 0.88).

In the group with symptoms of *moderate/severe* depression there were no significant differences between income groups or educational groups in visit rates to services beyond GP, when adjusted for age, gender and present treatment among those using services.

Table 4 shows the highest gained treatment level within the 180-day window in crude numbers (online supplementary table 2 shows number and mean number of MHCT by MDI grade). More severe symptoms were

Table 4 Highest gained treatment level by MDI grade

Final treatment level/MDI grade	No/few	Mild	Moderate./severe
No contacts	4540 (25.2)	73 (16.6)	56 (10.2)
GP consultation	12084 (67)	257 (58.3)	259 (47.3)
GP MHC	160 (0.9)	5 (1.1)	20 (3.7)
Antidepressants*	931 (5.2)	64 (14.5)	125 (22.9)
Psychologists	162 (0.9)	17 (3.9)	27 (4.9)
Private psychiatrist	96 (0.5)	18 (4.1)	39 (7.1)
Outpatient psychiatry	17 (0.1)	3 (0.7)	7 (1.3)
Admission to psychiatric hospital and emergency access psychiatric ward	33 (0.2)	4 (0.9)	14 (2.6)
Sum	18.023 (100)	441 (100)	547 (100)

Per cent in brackets.

*Reimbursed prescriptions.

GP, general practitioner; MDI, Major Depression Inventory; MHC, mental health counselling.

met with a higher level of treatment, though 10% of the respondents with symptoms of *moderate/severe* depression had no contact at all. Forty-seven per cent of the 547 with symptoms of *moderate/severe* depression had no treatment or contacts beyond a GP consultation.

Table 5 shows that respondents with symptoms of depression gained a significantly higher treatment level, increasing with higher symptom score, compared with those with *no/few* symptoms and no postsecondary education or low income (online supplementary table 3 shows highest treatment level gained within 6 months by education, income and severity of symptoms, in crude numbers and percentage.) For the group with *no/few* symptoms, respondents with 3+ years of postsecondary education or higher income reached a lower level overall.

We found no statistically significant differences between educational groups stratified by grade of symptoms, but a significant increase in treatment level within each educational group when depression score increased from *no/few* symptoms to symptoms of *mild* depression, and again when it changed to symptoms of *moderate/severe* depression

Table 5 Mean level of *mental healthcare treatment* by education level and income level and MDI grade

No/few symptoms of depression		β
Education	0.97 (n=19011)	
No postsecondary education	0.98 (n=2502)	(Ref)*
1–3 years postsecondary education	0.94 (n=9650)	-0.06 (-0.09; -0.03)
3+ years postsecondary education	0.87 (n=5871)	-0.05 (-0.08; -0.02)
Income	0.96 (n=17165)	
Income <€40250	1.07 (n=3850)	(Ref)†
Income ≥€40250 <€80500	0.93 (n=6207)	-0.01 (-0.04; 0.02)
Income ≥€80500	0.81 (n=6238)	-0.12 (-0.15; -0.09)
Mild symptoms of depression		
No postsecondary education	1.49 (n=93)	0.15 (0.01; 0.29)
1–3 years postsecondary education	1.47 (n=225)	0.14 (0.05; 0.24)
3+ years postsecondary education	1.58 (n=123)	0.22 (0.10; 0.35)
Income <€40250	1.62 (n=138)	0.05 (-0.06; 0.17)
Income ≥€40250 <€80500	1.46 (n=137)	0.11 (-0.01; 0.23)
Income ≥€80500	1.47 (n=116)	0.22 (0.09; 0.34)
Moderate/severe symptoms of depression		
No postsecondary education	2.18 (n=136)	0.37 (0.26; 0.49)
1–3 years postsecondary education	1.99 (n=257)	0.35 (0.26; 0.44)
3+ years postsecondary education	2.01 (n=154)	0.45 (0.33; 0.56)
Income <€40250	2.10 (n=208)	0.28 (0.18; 0.37)
Income ≥€40250 <€80500	2.06 (n=164)	0.40 (0.29; 0.51)
Income ≥€80500	1.80 (n=107)	0.34 (0.21; 0.47)

Results significant within a 95% CI are marked in bold.

*Adjusted for age group 60± years, gender, present treatment of antidepressants, psychologist or psychiatrist.

†Adjusted for age group 60± years, gender, present treatment of antidepressants, psychologist or psychiatrist, cohabitation.

Treatment levels: 0: no contact; 1: GP consultation; 2: GP MHC; 3: Antidepressants; 4: psychologist; 5: private psychiatrist; 6: public psychiatrist; 7: psychiatric hospital and emergency visits.

GP, general practitioner; MDI, Major Depression Inventory; MHC, mental health counselling.

(results not shown). SEP measured by income had similar outcomes, but differed in the group with *mild* symptoms of depression, where only respondents with high income gained a higher treatment level compared with the low income group with *no/few* symptoms.

DISCUSSION

Participants with symptoms of depression were treated according to the severity of the symptoms, independent of SEP; however, more than half with moderate to severe symptoms received no treatment beyond GP consultation. People in low SEP and *no/few* symptoms of depression were more often treated with antidepressants.

Symptoms of depression and use of services

Respondents in need and in contact with healthcare providers were treated according to their needs. This finding aligns with other studies on treatment of depression⁴² and a recent Swedish study designed as ours.⁴³ Some studies likewise found SEP had no independent impact on the type of treatment^{19 44 45} or intensity of treatment.^{37 46} Yet some studies have found that higher education was associated with more use of specialised mental healthcare, even when adjusted for needs.^{47–49} However, beside the Swedish study all these prior studies rely on recalled service use only, however, and thus may be subject to recall bias.

Symptoms of depression and no use

A Swedish follow-up study of more than 2000 respondents with symptoms of depression (MDI>20) or anxiety likewise found that a third did not seek care at all. People with higher education were less likely to seek care at all, and if they did, they more often sought help from a psychologist.⁵⁰ Other studies report that 35%–52% of respondents with symptoms of severe common mental disorders have no treatment contacts.^{36 51} As in the Swedish study, we found respondents with 3+ years of postsecondary education or high income were less likely to have contacts at all, compared with respondents without postsecondary education or low income, but these differences were not significant in the groups with symptoms of depression.

The GPs' ability to detect depression could be questioned, since only half the respondents with moderate to severe symptoms of depression are treated. When compared with ratings determined through semistructured interviews, the detection rates for depression in primary healthcare are relatively low, with a sensitivity rate of 50% and a specificity rate of 81%⁵² in 2009, and more recently in 2014, a sensitivity rate of 51% and a specificity rate of 87%, when compared with a standardised instrument as the Patient Health Questionnaire-9.⁵³ The use of depression scoring tools validated for primary care could improve detection rates; if self-administered, it would be less time-consuming for GPs and perhaps a more realistic approach.⁴⁹ It is noteworthy that the proportion receiving

the highest treatment level from a GP was the same across educational groups.

A German study on trends in non-help-seeking for mental disorders found a downward trend, finding that 57% of the citizens with present symptoms of a mental disorder had never sought help for a mental problem in the years 2009–2010;⁵⁴ this result is very similar to the findings of our study.

No/few symptoms of depression and use of services

The group that was treated, but scored with *no/few* symptoms of depression, may indicate emerging needs or an overuse of services. Since respondents did not each undergo additional screening by a professional, there is a lack of verification for the level of need beyond the self-reported symptoms on the inventory. However, we consider a comparison across socioeconomic groups relevant in this group, as in the other symptom groups.

First, we found *no/few* symptoms of depression were associated with more use of specialised mental health services for respondents with postsecondary education when compared with those with no postsecondary education, adjusting for age, gender and present treatment. Notably, when income was used as an indicator of SEP, no difference in use of specialist services was found. Other researchers have found that higher education is associated with more use of specialised services and suggest it could be due to the fact that higher-educated individuals might recognise and accept psychiatric needs more than lower-educated individuals,⁴⁷ or that mental health treatment makes heavy demands on a client's cognitive capacities and this presents a greater obstacle for people with less education.⁴⁸ What is seen in the group with *no/few* symptoms could be the treatment of emerging mental health problems, and a result of specialised services being requested more by patients with postsecondary education, or that specialised services are a more evident first choice by the GP for some patients. We had also expected that the expenses associated with the use of psychologists in Denmark⁵⁵ would have an impact, but it did not.

An Australian study found that only a small proportion (4%) of individuals without any disorders or need indicators were among those receiving mental healthcare. Though this group comprised a fair proportion of service users, the vast majority only sought brief primary care or counselling treatment rather than consultations with psychiatrists, where they constituted only 7% of all psychiatric patients.⁵⁶ That study did not relate the use of services to SEP. However, a Canadian study did find that individuals using mental healthcare and having no symptoms of mental disorders were better educated compared with those with mental disorders using the services.¹⁶

Second, we found that prescription of antidepressants was more common in the group with *no/few* symptoms and in low SEP. Similar findings were shown in another Australian study, where low SEP was associated with higher prescription rates not attributable to

higher rates of depression.⁵⁷ The most plausible reason for this association is that depressive disorders are more prevalent in this group and antidepressants are the first choice of treatment, or that antidepressants are more commonly used as analgesic medications in this group, as chronic pain is more common for persons with low SEP.⁵⁸

Strengths and limitations

A major strength of this study was that we were able to obtain reliable data on need from a large sample of people in GESUS as well as high-quality data on healthcare contacts and prescriptions of antidepressants from national registers, addressing challenges common in studies of equality in healthcare.⁹ To our knowledge, this is the first study combining survey data of depression scores and SEP with register data on MHCT. Thus we managed to avoid the inherent problem of recall bias, which is a common problem in these types of studies.⁵⁹

SEP may be defined in several ways,³⁵ but in the present study we used education and income as indicators of SEP. The span of respondents seen in the sample, from a few students to a high proportion of older and retired persons, indicated that income and employment status would be less potent to differentiate the resources that respondents could be expected to have. For that reason, education was the first choice, paired with income, even though older age is associated with lower educational attainment.²⁷ Additionally, education seems a particularly important factor when evaluating the use of healthcare specialists.¹⁰

The study related respondents' use of services based on an indication of need (MDI score) that might not capture the fluctuations in all 6 months afterwards, which is a potential limitation. Even though need will change over time, such change would not be expected to differ among the socioeconomic groups; however, if it did, it would be expected to trend towards higher need for those in low SEP.

The actual reasons for treatment contacts were not known, nor were the reasons for prescriptions of antidepressants known; both could have been for disorders other than depression, indicating a potential limitation of the study design. The variety of other possible disorders would tend to be more common for people in low SEP, and may explain the generally higher use of GP by respondents in low SEP.

Another potential limitation is that not all services used are included in the registers. If a patient is not referred by a GP and pays the full expense for a treatment out of pocket, there is no state reimbursement and subsequently no registration of the treatment in the registers. This would usually indicate high-income individuals, which is often associated with more years of postsecondary education. We do not expect this to be a common scenario, though we have no data to support this.

IMPLICATIONS

For clinicians and policy makers it is of particular interest to know that the treatment of patients with symptoms of depression matched the severity of symptoms and was independent of the SEP of the patient.

A high proportion with symptoms of depression was not treated. Initiatives to improve mental health literacy might help people with symptoms of depression to address mental health problems when consulting their GP and thereby increase treatment rates. Better attention to mental health by the GP is also necessary, and probably a more systematic approach in evaluating patients' mental health should be implemented.

An interesting disparity between education and income on use of specialised services was found in the group with *no/few* symptoms. Are specialised services—most likely psychologists—the first choice for the GP when the patient has more years of postsecondary education? Is the initial treatment of patients with depressive symptoms different depending on their education, and why are the prescription rates of antidepressants much higher for persons in low SEP compared with those in high SEP? These issues deserve in-depth exploration in order to more fully address issues of health inequity.

CONCLUSION

We found no differentiation between socioeconomic groups in the treatment of respondents with symptoms of moderate to severe depression when looking at treatment contact, frequency of contacts or level of treatment. However, more than half the respondents with moderate to severe symptoms had no treatment beyond GP consultation. Respondents with *no/few* symptoms of depression used services differently; people in low SEP were more often treated with antidepressants than people in high SEP, whereas people with postsecondary education were more likely to receive specialist services compared with those without postsecondary education, though this association was not found for income.

Author affiliations

¹Department of Public Health, Research Unit for General Practice, University of Southern Denmark, Odense, Denmark

²Region Zealand, Psychiatry, Psychiatric Research Unit, Slagelse, Denmark

³Center for Primary Health Care Research, Faculty of Medicine, Lund University, Lund, Sweden

⁴Department of Clinical Medicine, Psychiatric Research Unit, University of Copenhagen, Copenhagen, Denmark

⁵Department of Public Health and Research Unit of Clinical Epidemiology, Institute of Clinical Research, University of Southern Denmark, Odense, Denmark

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ES and LHH contributed to data analysis, interpretation of the results and critical revision of the manuscript.

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