Published in final edited form as:
Gen Hosp Psychiatry. 2014 ; 36(2): 199–202. doi:10.1016/j.genhosppsych.2013.11.003.

The association between depressive disorders and health care utilization: results from the São Paulo Ageing & Health Study (SPAH)

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Keywords

depression; depressive symptoms; health services; ageing; Brazil

INTRODUCTION

Major depressive disorder (MDD) is a prevalent illness that commonly occurs in the elderly (1) and is associated with poor quality of life, disability, and increased health care utilization and costs (2–4). Older adults with depression have poorer control of common medical illnesses such as diabetes, hypertension, asthma, and congestive heart failure than those without depression, increasing the risk of hospitalization (5). In Brazil, similar to other Latin American countries, the effect of depression on disability-adjusted life years (DALYs) is evident. From 1990 to 2010, depression climbed from 10th to 6th as a primary cause of disability (6), and there is good evidence that hypertension, diabetes and depression account for a major portion of DALYs (7). The resulting disability and health care spending related to these conditions is forecasted to increase in the coming years (8).

As the global ageing population grows, it will be essential to examine the patterns of health care use among depressed elderly adults, especially those living in low and middle income

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Conflict of Interest Notification:
Drs. Huang, Menezes, da Silva, Tabb, Barkil-Oteo, and Scazufca have no disclosures.

Additional Contributions:
We thank KeriLee Horan for her thoughtful review of the manuscript, for which no compensation was received.

countries (LAMICs). To date, the majority of research on this topic has taken place in high-income and Western countries (2, 9), thus there is a need to understand the factors related to depression and health service use among older adults in other parts of the world. The purpose of this study is to examine whether the presence of depression and depressive symptoms are independently associated with health care utilization among community-dwelling older adults living in Brazil. Our hypothesis is that individuals with depressive symptoms and depression will have higher rates of health care utilization than those without depression.

METHODS

Study design and sample

This study is based on data from the "São Paulo Ageing & Health Study" (SPAH), a population-based study carried out with all eligible participants ≥ 65 years old living in São Paulo, the largest city of Brazil. São Paulo has a population of 11.2 million people according to the 2010 census, and the population aged 60 years or over has exceeded 1.2 million inhabitants (10).

This study was conducted in the Districts of Butantã, Rio Pequeno and Raposo Tavares, located in the west of the city. In the year 2000 this region had 377,576 residents, of whom 13% of lived in shanty towns and 6.2% were aged 65 years or over. Sixty six census sectors (smaller administrative areas) covering a population of about 63,000 people (17% of the population in the three districts) were selected for the study. We selected these sectors because they had the lowest Human Development Index (HDI) of these districts and included numerous shanty towns (10). The selection was based on, but not limited to, the presence of shanty towns or Family Health Strategy teams (FHS) in the census sectors. Participants were identified by door-knocking every household in the area defined for the study. Institutionalized individuals were not included.

Of the 2,266 older adults invited, 2,072 (91.4%) consented to participate and were interviewed by trained mental health professionals. For each participant, an informant was also selected (informants were aged 16 years and over; were preferably a relative living with the participant or a close friend). Participants provided written informed consent. Those deemed unable to consent as well as those who were illiterate were recruited on the basis of consent signed by the informant or verbal consent. All study procedures were approved by the Brazilian National Committee for Ethics and Research.

Measures

Outcome variables—The three outcomes of interests for this investigation were health service use information from outpatient visits, inpatient hospitalizations, and medication use. Data on health services use was obtained for the three months prior to interview. Outpatient visits included medical consultations with providers from primary care, private care, and specialty services, and was based on the number of visits. Hospital admissions were assessed by asking whether or not the participant has been admitted to a hospital. Use of medication was assessed by asking if the participant had used any medications during the same period. Hospital admissions and use of medications were dichotomized as "yes" or "no". Outpatient visits was used as a continuous variable.

Exposure Variables—We used a standardized questionnaire to obtain *demographic information* on gender, age, marital status, education, occupation and income. *Demographic* and *socioeconomic characteristics* were included as follows. Age was grouped in five-year age categories (65–69, 70–74, 75–79, 80 and over). Monthly income (in US dollars

equivalent), was divided into four categories ($0–85, $86–193, $194–500, $501 or more). Educational attainment captured formal years of education and was divided into three categories (0, 1–3, 4 or more). Occupation status was an item with three categories (working, unemployed/homemaker, or retired). Marital status also had three categories (unmarried/separated, married, or widowed).

Major Depressive Disorder (MDD) was diagnosed according to the International Classification of Diseases, 10th edition (ICD -10) and was based on items of the Geriatric Mental State (GMS) (11) and the Neuropsychiatric Inventory (NPI) (12). The GMS is a semi-structured assessment of mental disorders among older adults and has been validated in both developed and developing settings, including São Paulo, Brazil (13). Presence of *clinically relevant depressive symptoms* (CRDS) was based on depression diagnosis generated by the GMS algorithm, the Automated Geriatric Examination for Computer Assisted Taxonomy (AGECAT) (14). Subjects classified as having MDD (ICD-10) were excluded from the CRDS group.

Physical morbidities were assessed for each participant and included arthritis or rheumatism, hearing difficulties, eyesight problems, heart problems, stroke, gastrointestinal (GI) problems, blackout or fainting, limb problems (paralysis, paresis or limbs loss), severe skin disorders (pressure ulcers, severe burns) and chronic obstructive pulmonary disease (COPD). Participants were asked if they had the aforementioned conditions or not. *Diabetes mellitus* was assessed by fasting plasma glucose ≥ 126mg/dl or current use of oral hypoglycemic agents or insulin (15). *Hypertension* was defined as diastolic pressure ≥ 90 mmHg or systolic pressure ≥ 140mmHg on standardized measurement, or current treatment with antihypertensive (16). *Dementia diagnosis*, using the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) criteria, was assessed with the protocol developed by the 10/66 Dementia Research Group for population studies in developing countries (17).

Statistical Analyses

We performed descriptive analyses of demographic and socioeconomic characteristics of participants and the prevalence of physical and psychiatric morbidities. The mean of outpatient visits, the proportion of hospital admissions, and use of medication were calculated. Multivariate analysis was based on the Zero-Inflated Negative Binomial Regression (ZINB) model to describe the association between outpatient visits and MDD/CRDS. The outpatient variable was constructed by the sum of all consultations with providers from primary care, private care, and specialty services and used as a continuous outcome. The variable presented excess zeros, allowing us to work with a count model with dispersion and inflation of zeros. The ZINB model was compared with the negative binomial model by the Voung test and the Zero-Inflated Poisson Regression (ZIP). In addition, the three models were compared using the Akaike's Information Criterion (AIC) for non-nested models. With the ZINB model we estimated the Ratio of Means (RM) of the outpatients visits and their 95% Confidence Interval (95%CI). We performed a first model adjusting only for demographic and socioeconomic variables and a second model adjusting for all variables in which the p-value <0.20 in the bivariate analysis.

Prevalence Ratios (PR) were calculated for the probability of having hospital admission or using of medication in the past three months when exposed to potential confounding variables, MDD and CRDS with 95% confidence intervals. As the outcome variable was common, we used Poisson regression with robust variance estimates (18). A first model was adjusted only for demographic and socioeconomic variables and a second model adjusted all variables that had p-value <0.20 in bivariate analysis. Data were analyzed using STATA IC 10 (College Station, TX).

RESULTS

Descriptive Statistics

The present study included 2,072 participants (91.4% of participants in the SPAH). The overall prevalence of MDD was 4.9% (95% CI: 4.0–5.9) and the prevalence of CRDS was 21.4% (95% CI: 21.3–25.0). Table 1 describes the sample characteristics for our study population: 1,255 (60.6%) participants were women, 889 (42.9%) were aged between 65 to 69 years, 1,083 (52.3%) had between one and three years of education, and 643 (31.0%) had no income or very low income.

Health Service Use

Among the participants, 1,475 (71.3%) had at least one outpatient visit (maximum number of visits = 11). Use of inpatient services was reported by 107 (5.2%) participants. The proportion of participants with three or more outpatient visits was 40.8% for those with MDD, 30.8% among those with CRDS, and 26.1% among participants without depression. Use of inpatient services was 15.1% among those with MDD, 5.6% among those with CRDS, and 3.7% among those without depression.

Table 2 reports the prevalence ratios for outpatient services, inpatient services, and use of medication. The unadjusted model showed that compared with the no depression group, MDD and CRDS were both significantly associated with the outpatient visits (RM: 1.52, 95% CI: 1.24–1.86 and RM: 1.26, 95% CI: 1.12–1.40, respectively), while only MDD was significantly associated with inpatient services (PR: 3.28, 95% CI: 1.91–5.64). The unadjusted model also showed that compared to the no depression group, participants with MDD or CRDS were significantly associated with medication use (PR: 1.10, 95% CI: 1.05–1.15 and PR: 1.06, 95% CI: 1.03–1.10, respectively). In Model 2 we adjusted for demographic covariates (sex, age, income, occupation, and marital status) and found that the association remained constant, compared to the no depression group, the MDD and CRDS groups were more likely to use outpatient services (RM: 1.50, 95% CI: 1.23–1.86 and RM: 1.22, 95% CI: 1.23–1.84, respectively) and more likely to use medication (PR: 1.09, 95% CI: 1.04–1.14 and PR: 1.03, 95% CI: 1.0–1.07, respectively). Compared to the no depression group, the MDD group was more likely to use inpatient services (PR: 2.87, 95% CI: 1.64–5.00).

In the fully adjusted model, older adults with MDD were 36% more likely to have one more outpatient visit (RM: 1.36, 95% CI: 1.11–1.67), while older adults with CRDS were 14% more likely to have one more outpatient visit (RM: 1.14, 95% CI: 1.02–1.28). Elderly individuals with MDD had a prevalence of hospital admissions in the previous three months that was twice that of those without depression (PR=2.02, 95% CI: 1.09–3.75). Significant differences were not found for medication use.

DISCUSSION

Our study examined the association between depressive disorders and health care utilization in a large sample of community-dwelling older adults in São Paulo, Brazil. We found higher rates of hospital admissions among older Brazilian adults with MDD or clinically relevant depressive symptoms than among those without depression. Those with MDD were more likely to use outpatient services than non-depressed patients. Our results are consistent with a previous study conducted in Brazil with adults aged 18 and older, describing the relationship between mental disorders and increased general health services use (19). It is suggested that the relationship between depression and physical health is bidirectional, influencing health services use among older adults (20, 21).

The findings of this paper are especially important in light of the 2010 Global Burden of Disease report published in the Lancet. Mental health problems, such as depression and substance abuse, are among the most common and disabling health conditions worldwide (22). These diseases often occur in conjunction with other medical problems, which often leads to poorer health outcomes overall (23). People dealing with depression find self-care and adherence to medical and mental health treatments more difficult than those suffering from other diseases, which can lead to higher morbidity and mortality rates, increased health care costs, and decreased productivity (24).

The growing burden of non-communicable diseases and mental disorders demands new ways of organizing health services and clinical practices in order to meet these health delivery challenges. Integrated interventions targeted especially at the aging population could help in the identification and management of multiple chronic diseases. There is evidence that including diabetes mellitus and hypertension as priorities within the Brazilian community health network “family health program” led to decreased hospitalizations (25). This means that to address chronic diseases effectively, depression should become a priority area, and an integrative framework should be used to deal with all non-communicable diseases.

Accordingly, an integrated approach could create immediate synergies in service delivery. The greatest opportunity for integration is with patients who come into contact with a health service provider several times for different conditions (26). Mental health care and non-communicable disease care could be offered together in primary care platforms. One promising strategy is to use a Collaborative Care model, which restructures the roles of health care providers and introduces a team-based approach to the management of chronic and complex medical conditions. We have increasing evidence from low-and middle-income countries on the effectiveness of collaborative care interventions, but this research was performed on the management of depression alone (27). There is recent evidence from the TEAMC are trial that managing depression along with diabetes mellitus, hyperlipidemia, and hypertension improved health outcomes for mental and medical problems in a high income country (28).

A primary strength of this study is the large sample size of community-dwelling older adults. Additional strengths include the controlling of socio-demographic and impairment variables, the high level of participation, and the use of well validated structured interviews specifically designed to assess older adults’ mental health. A limitation of our study is that the sample came from a specific, low-income area of the city of São Paulo which may reduce generalizability to higher income groups. However, the socioeconomic characteristics of our sample are similar to the profile of the Brazilian elderly population. According to the 2010 Brazilian census, the population over 65 years was composed by a higher percentage of women (55.1%), a large proportion was living in urban areas (81.0%), had a high rate of illiteracy (34.7%), and were low income (more than 40.1% of them with no income or very low-income) (29). Therefore, our results can probably be generalized to most elderly individuals aged 65 or over in Brazil, and possibly to other low- and middle-income countries (10).

CONCLUSION

Among low income older adults living in a LAMIC, those with MDD are more likely to have had a recent hospital admission and outpatient usage than those without depression. Future studies are needed to examine the effectiveness of depression treatments for this population in order to both decrease the burden of illness as well as to minimize health care utilization related to depression.

Acknowledgments

Funding/Support:

Dr. Huang was supported by the Health Services Division of the National Institute of Mental Health (T32 MH20021-14).

The authors would like to thank the research team responsible for collecting the data for the São Paulo Ageing & Health study.

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Table 1

Demographic characteristics, socieconomic conditions, and Clinical Characteristics of SPAH sample, São Paulo – Brazil, 2003–2005 (N=2072)

	n=	(%)
Demographic/socioeconomic conditions		
GENDER		
Female	1255	(60.6)
Male	817	(39.4)
AGE (years)		
65 to 69	889	(42.9)
70 to 74	556	(26.8)
75 to 79	346	(16.8)
80 or more	281	(13.5)
MARITAL STATUS		
Never married/Separated	389	(18.8)
Married	952	(45.9)
Widowed	731	(35.3)
EDUCATION (years)		
None	793	(38.3)
1 to 3	1083	(52.3)
4 or more	196	(9.4)
INCOME MONTHLY (US$)		
None to 85	643	(31.0)
86 to 193	402	(19.4)
194 to 500	515	(24.9)
501 or more	512	(24.7)
OCCUPATION		
Currently working	441	(21.3)
Unemployed/Housewife	534	(25.8)
Retired	1097	(52.9)
Physical Morbidities		
Hypertension	1061	(77.2)
Diabetes	442	(21.3)
COPD	121	(5.8)
Arthritis/Rheumatism	408	(19.0)
Eyesight Problems	1857	(89.6)
Hearing Difficulties	725	(35.0)
Heart Problems	449	(21.7)
Stroke	197	(9.5)
GI Problems	733	(35.4)

	n=	(%)
Fainting/Blackouts	40	(2.0)
Limbs Problems	255	(12.3)
Skin Disorders	180	(8.7)
Psychiatric Morbidities		
Dementia	105	(5.1)
ICD10 Depression	99	(4.9)
Depressive Symptoms	443	(21.4)

§ The minimum Brazilian wage at the time of the study was approximately US$85.

44 missing values for hypertension; 105 missing values for diabetes; 2 missing values for COPD; 1 missing values for arthritis, eye and hearing problems.

Table 2

Ratio of Means (RM), Prevalence Ratio (PR) and 95% confidence interval (95% CI) for the association between major depressive disorder (MDD) and clinically relevant depressive symptoms (CRDS) with three months health services use. São Paulo, Brazil, 2003–2005.

	MDD			CRDS		
	Crude Model	**Model Adjusted[1]**	**Model Adjusted[2]**	**Crude Model**	**Model Adjusted[1]**	**Model Adjusted[2]**
Outpatient Services	RM	RM	RM	RM	RM	RM
Number of consultations[3]	1.52*** (1.24 – 1.86)	1.50*** (1.23 – 1.84)	1.36** (1.11 – 1.67)	1.26*** (1.12 – 1.40)	1.22*** (1.23 – 1.84)	1.14* (1.02 – 1.28)
Inpatient Services	PR	PR	PR	PR	PR	PR
Hospital admission	3.28*** (1.91 – 5.64)	2.87*** (1.64 – 5.00)	2.02* (1.09–3.75)	1.45 (0.92 – 2.29)	1.47 (0.93 – 2.33)	1.33 (0.81 – 2.18)
Use of medication	PR	PR	PR	PR	PR	PR
Yes	1.10*** (1.05 – 1.15)	1.09*** (1.04 – 1.14)	1.04 (0.99 – 1.09)	1.06*** (1.03 – 1.10)	1.03* (1.00 – 1.07)	1.01 (0.98 – 1.04)

[1] Adjusted for sex, age, formal education, income, employment, and marital status, *N*=2026

[2] Adjusted for all variable (sociodemographic characteristics, socioeconomic conditions, physical and psychiatric morbidities), *N*=1955

[3] Number of consultation with primary care doctor, hospital doctor and private doctor Note: *p* values

* <.05,

** <.01,

*** <.001