REVIEW ARTICLE

Prevalence of depression morbidity among Brazilian adults: a systematic review and meta-analysis

Marcus T. Silva,[1] Tais F. Galvao,[2,3] Silvia S. Martins,[4] Mauricio G. Pereira[2]

[1]School of Medicine, Universidade Federal do Amazonas (UFAM), Manaus, AM, Brazil. [2]School of Medicine, Universidade de Brasília (UnB), Brasília, DF, Brazil. [3]Hospital Universitário Getúlio Vargas, UFAM, Manaus, AM, Brazil. [4]Department of Epidemiology, Columbia University Mailman School of Public Health, New York, NY, USA.

Abstract

Objective: To estimate the prevalence of depressive symptoms and major depressive disorder, as assessed in population-based cross-sectional studies of Brazilian adults.

Methods: We performed a systematic review of the literature. The major databases were searched up through October 2013. Two researchers selected the studies, extracted the data, and assessed their methodological quality. Meta-analyses were performed using random effects.

Results: Of the 2,971 records retrieved, we selected 27 studies that assessed the prevalence of depression morbidity in 464,734 individuals (66% women). Eleven different screening tools were used to assess depression morbidity. The prevalence of depressive symptoms was 14% (95% confidence interval [95%CI] 13-16; I^2 = 99.5%), whereas the 1-year prevalence of major depressive disorder was 8% (95%CI 7-10; I^2 = 86.7%), and the lifetime prevalence of major depressive disorder was 17% (95%CI 14-19; I^2 = 91.6%). All rates were higher in women than in men. No causes of heterogeneity could be identified.

Conclusion: Depression morbidity was common among Brazilian adults, and affects more women than men. Inconsistencies across studies highlight the need for standardization of future research. Clinicians should routinely investigate for the presence of depression morbidity in this population.

Keywords: Depression; major depressive disorder; prevalence; adults; Brazil

Introduction

Depression is a public health concern that is associated with functional impairment and high morbidity and mortality. The total economic cost of depression is estimated to be around 83 billion dollars in the United States[1] and 118 billion euros in Europe.[2] Depressed people experience limitations in their usual activities and have higher health service utilization.[3] The World Health Organization estimates that over 300 million people have depression, of whom less than half have access to treatment.[4] By 2020, depression is estimated to be the second most common cause of disability. The prevalence of depression morbidity is considered high and is increasing.[5] Elucidating the epidemiological aspects of the disease may help subsidize planning and allocation of investments to better assist this population by providing information about its distribution and related factors.[6] In developing economies with fewer resources, such as Brazil, this strategy is essential for the development of adequate mental health care assistance.

Some epidemiological features of depression are well recognized, such as the fact that more females than males are affected[7] and that it is more frequent in young people and in the elderly.[8] It has been postulated, however, that geographic and economic factors may play an important role in the epidemiology of depression, given that the prevalence of depression is not similar in all settings. One survey conducted in 10 countries suggests that depression is more frequent in Western (3.0 to 5.8%) than in Eastern civilizations (0.8 to 2.3%).[9]

In the last few years, several population-based surveys to estimate the prevalence of depression-related morbidity in the economically active adult population were conducted in Brazil, but no summary of the findings of these studies is available. A narrative review found that the 1-month prevalence of depression ranged from 1.9 to 10.2% in Brazilian studies published between 1993 and 1998.[10] One existing meta-analysis included only reports in English through the year 2000, and did not include any surveys conducted in Brazil.[11] Other systematic reviews conducted using Brazilian data included only the elderly in their target population.[12,13] Thus, meta-analytic studies on the prevalence of major depressive disorder and depressive symptoms among Brazilian adults are needed.

To bridge this gap, the main aim of the current study was to estimate the prevalence of major depressive disorder and depressive symptoms among Brazilian adults through a systematic review of the literature with meta-analysis.

Correspondence: Marcus T. Silva, Universidade Federal do Amazonas, Faculdade de Medicina, Rua Afonso Pena, 1053, Centro, CEP 69020-160, Manaus, AM, Brazil.
E-mail: marcusts@gmail.com

Methods

The protocol for this review was registered in the International Prospective Register of Systematic Reviews (PROSPERO), under registration number CRD42013003976.

Eligibility criteria

Eligible studies included cross-sectional population-based studies that assessed the prevalence of depression morbidity (either major depressive disorder or depressive symptoms) in the Brazilian adult population, published on any date. In this review, we classified as adults persons between the ages of 18 and 65 years. The prevalence of major depressive disorder had to have been measured using a validated instrument. If the study assessed the prevalence of depression through only a single question (self-reported depression, i.e., the presence of depression morbidity was informed by respondents themselves), we considered that it was measuring depressive symptoms. No pre-specified diagnostic criteria for depression morbidity were applied; instead, each study criterion was assessed. We did not exclude studies on the basis of sample size.

Information sources and search strategy

The MEDLINE, Embase, Scopus, LILACS, and SciELO databases were searched, as well as the Brazilian public domain web portal (Portal Domínio Público), without restrictions as to language or publication date. The last search was run in October 2013. We screened the references of relevant studies to identify potentially eligible research.

The following search query was used for MEDLINE (via PubMed): ("depression"[mesh] OR "depressive disorder"[mesh] OR depression OR depresion OR depressão) AND ("prevalence"[mesh] OR prevalence OR prevalência) AND ("Brazil"[mesh] OR Brazil OR Brazil). This strategy was adapted to the other sources as required.

Study selection and data extraction process

Considering the eligibility criteria, two authors (MTS and TFG) independently reviewed the titles and abstracts of the retrieved studies. Disagreements were resolved by consensus. The level of agreement between the reviewers was assessed using a kappa test.[14]

Previously standardized forms were used to collect the following relevant data from the studies: city, research date, publications deriving from the study, sample size, tool used to measure depression, use of two-step diagnosis, and prevalence of depression or depressive symptoms in the sample in both women and men. One author extracted the data (MTS), and the other checked the extraction (TFG).

When available, the databases of the studies were assessed. In these cases, we selected only the age range of interest (18 to 65 years old) and the cases in which the participants themselves responded regarding the outcome of interest (i.e., proxy answering was excluded) to mitigate the risk of recall bias.[15]

Assessment of the quality of included studies

The critical appraisal tool proposed by Loney et al.[16] for prevalence studies was used to assess study quality. This tool contains eight criteria: 1) adequate sampling; 2) unbiased sampling frame; 3) adequate sample size; 4) standard measures of outcomes; 5) unbiased assessors of outcomes; 6) adequate response rate with refusals described; 7) prevalence presented with confidence intervals and by relevant subgroups; and 8) study subjects described and appropriate for the research question. For each criterion met, the study received one point, for a maximum score of eight, which indicates the studies of highest quality in the present review.

For the third quality criterion (adequate sample size), we considered the sample size to be adequate if it was calculated for the study on the basis of local population estimates or if it was higher than 1,000. This minimum sample size was calculated to allow outcome assessment using simple random sampling, with an estimated rate of depressive symptoms of 10%, confidence level of 95%, and precision of 1.8%, resulting in a sample of 1,068 subjects.[17] As all quality criteria, the sample size criterion was not used to exclude studies.

Data analysis

The primary outcome was the prevalence of depression morbidity (depressive symptoms or major depressive disorder), with a 95% confidence interval (95%CI). We pooled the available estimates for lifetime, 1-year lifetime, and point prevalence of each outcome. Meta-analyses were calculated using a random effects model and weighted by inverse variance.[18] Statistical heterogeneity across the results of the selected studies was assessed by chi-square test at the $p < 0.10$ significance level,[19] and the magnitude of the inconsistency was estimated using the I-square (I^2) statistic.

To identify the causes of heterogeneity, we performed meta-regression analyses using a restricted maximum likelihood estimators method, with the Knapp & Hartung test.[20] The variables tested were sample size, quality assessment score, proportion of women, use of a validated tool for outcome assessment, and lower age of inclusion in the study. The presence of the small-study effect, i.e., a tendency of studies with smaller sample size to overestimate the global effect, was assessed by inspecting the asymmetry funnel plot and using Egger's test.[21] STATA software (version 10.1) was used for all calculations.

Results

Study selection

The literature search retrieved 2,971 records, of which 821 were duplicates, resulting in 2,150 unique records. The independent reviewers selected 51 records[10,22-70] for full-text assessment (kappa = 0.79; 95%CI 0.68-0.90). The reasons for exclusion are presented in Figure 1.
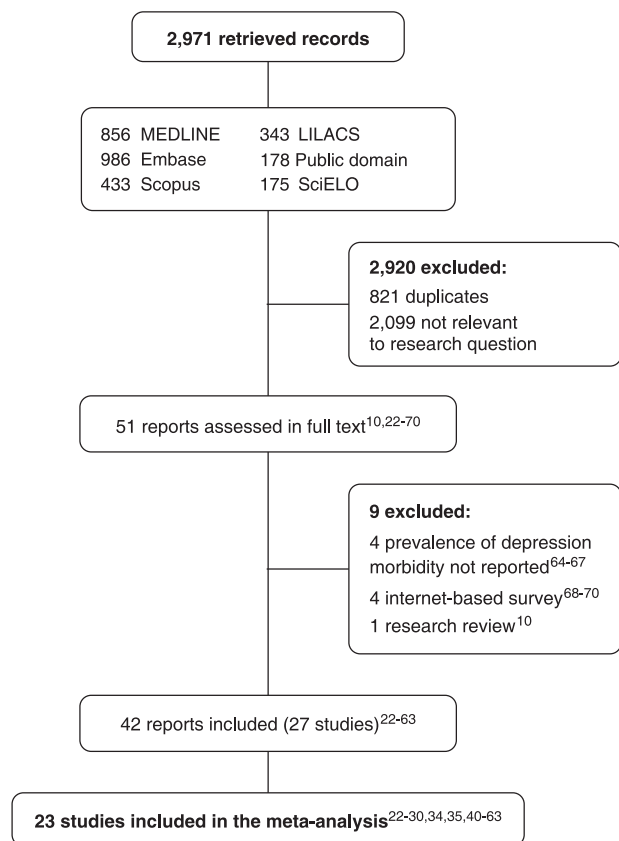
Figure 1 Study search, selection, and inclusion flowchart.

Study characteristics

We included 27 studies that were published in 42 different reports (Table 1).[22-63] For simplicity, we named each study after the location where the research was conducted. A total of 464,734 persons were interviewed, of whom 304,374 (65.5%) were females. Most of the surveys included persons 18 years old and older.[22-29,36-38,40,41,43,44,50-52,55-63] Three studies did not primarily aim to assess the prevalence of depression.[30,35,47] Six national studies were included.[23-30] Nine studies were conducted in the Southeast region,[22,31-33,43-45,50-63] eight in the South region,[31-42,46] two in the Northeast region[47-49] and one in the Mid-West region of Brazil.[31-33] Eight studies were conducted in the 1990s.[22-24,31-33,41,47]

All studies used the official census for the sampling frame and employed probability sampling: one study used a random sample from the whole population,[22] whereas the others employed complex sampling, with one or more stages. Two studies had fewer than 1,000 participants.[35,47] Ten studies did not report participant losses.[23-28,30,35,45,48,49,53,62,63]

To screen for the prevalence of depressive symptoms, nine studies considered self-reported depression,[23-28,30,34,46,47,53] and 11 used the following tools: 1) Adult Psychiatric Morbidity Questionnaire (Questionário de

Morbidade Psiquiátrica de Adultos, QMPA)[31-33,48,49]; 2) Beck Depression Inventory (BDI)[35,62,63]; 3) Center for Epidemiologic Studies Depression Scale (CES-D)[29]; 4) Composite International Diagnostic Interview Short-Form (CIDI SF)[54]; 5) Edinburgh Postnatal Depression Scale (EPDS)[42]; 6) Patient Health Questionnaire (PHQ-9)[40]; and 7) Primary Care Evaluation of Mental Disorders (PRIME-MD).[45] The seven studies that screened for major depressive disorder used the following tools: the Composite International Diagnostic Interview (CIDI),[22,43,44,50-52,55-61] the Mini-International Neuropsychiatric Interview (MINI),[36-39] and the DSM-IV.[41]

The mean quality score was 5.8. Three studies scored fewer than five points.[25,26,30,53] Due to the absence of raw data, three studies could not be included in the meta-analysis,[31-33] and five did not stratify results by sex, precluding their inclusion in the subgroup analysis.[25,26,30,40,46,54]

Depressive symptoms

The overall prevalence of depressive symptoms in the whole population surveyed in the studies was 14% (95%CI 13-16; I^2 = 99.5%; Figure 2). Table 2 shows the results of subgroup analysis for this outcome. Prevalence was significantly higher among women than in men. Lifetime prevalence of depressive symptoms was assessed in one study[54] and was higher than that observed in studies that measured point prevalence. The point estimate of self-reported depressive symptoms was lower than that measured by other tools.

The meta-regression analysis performed to investigate the high heterogeneity across the results of the studies did not find the following factors to be possible causes: proportion of women, quality score, use of validated screening tool, urban or rural area, minimum age for inclusion, or year of research.

Visual inspection of the funnel plot revealed some asymmetry in the distribution of study results (Figure 3). However, the presence of the small-study effect was rejected by Egger's test (p = 0.051).

One-year prevalence of major depressive disorder

The 1-year prevalence of major depressive disorder was 8% (95%CI 7-10; I^2 = 86.7%) among the adults surveyed in five studies (Figure 4A).[22,43,44,50-52,55-61] All five studies used the CIDI as a screening tool. The prevalence was higher among women (11.3%; 95%CI 9.4-13.2; I^2 = 81.7%) and lower among men (4.0%; 95%CI 2.8-5.3; I^2 = 76.1%). All of the estimates had high heterogeneity. Due to the small number of studies, the causes of heterogeneity could not be explored through sensitivity analysis or meta-regressions.

Lifetime prevalence of major depressive disorder

The lifetime prevalence of major depressive disorder was assessed in four studies: three used the CIDI as a screening tool, [43,44,55-61] and one used the DSM-IV.[41]

Table 1 Characteristics of the included studies

Study	Area	Year	Age range (years)	Screening tool	Outcome	Sample size	% of women	Quality score
Bambuí, MG[22]	urban	1996-1997	⩾ 18	CIDI	disorder	1,041	56.6	7
Brazil (PNAD)[23,24]	mixed	1998	18-65	self-report	symptom	135,932	74.1	5
Brazil (WHS)[25,26]	mixed	2003	⩾ 18	self-report	symptom	5,000	12.3	4
Brazil (PNAD)[23,27,28]	mixed	2003	18-65	self-report	symptom	120,203	66.2	5
Brazil (Brazilian alcohol survey)[29]	mixed	2005-2006	⩾ 14	CES-D	symptom	3,007	57.2	6
Brazil (PNAD)[23,28]	mixed	2008	18-65	self-report	symptom	150,727	63.4	5
Brazil (racial inequity)[30]	mixed	2008	⩾ 20	self-report	symptom	3,863	34.4	4
Brasília, DF[31-33]	urban	1990-1991	⩾ 15	QMPA	symptom	2,345	53.7	6
Florianópolis, SC[34]	urban	2009	20-59	self-report	symptom	1,720	55.6	6
Joaçaba, SC[35]	urban	2005	20-59	BDI	symptom	707	60.0	5
Pelotas, RS[36-39]	urban	2007	18-24	MINI	disorder	1,560	56.4	7
Pelotas, RS[40]	urban	2012	⩾ 20	PHQ-9	symptom	2,925	58.9	6
Porto Alegre, RS[31-33]	urban	1990-1991	⩾ 15	QMPA	symptom	2,384	54.9	6
Porto Alegre, RS[41]	urban	1996-1998	⩾ 18	DSM-IV	disorder	1,174	56.1	7
Porto Alegre, RS[42]	urban	2009	⩾ 20	EPDS	symptom	3,391	55.9	7
Rio de Janeiro, RJ[43,44]	urban	2007-2008	15-75	CIDI	disorder	1,208	56.5	6
Rio de Janeiro, RJ[45]	urban	2008	⩾ 35	PRIME-MD	symptom	1,249	100.0	5
Rio Grande, RS[46]	mixed	2000	⩾ 15	self-report	symptom	1,259	53.9	5
Salvador, BA[47]	mixed	1998	40-70	self-report	symptom	513	0.0	5
Salvador, BA[48,49]	urban	2001	⩾ 20	QMPA	symptom	2,306	54.3	6
São Paulo, SP[31-33]	urban	1990-1991	⩾ 15	QMPA	symptom	1,742	51.5	6
São Paulo (catchment area study)[50-52]	urban	1994-1996	⩾ 18	CIDI	disorder	1,464	57.5	8
São Paulo (ISA-SP, ISA-Capital)[53]	urban	2001-2003	all ages	self-report	symptom	8,317	52.3	4
São Paulo (GENACIS)[54]	urban	2005-2007	20-64	CIDI SF	symptom	2,083	58.3	6
São Paulo (megacity study)[55-61]	urban	2005-2007	⩾ 18	CIDI	disorder	5,037	56.6	7
São Paulo, SP (EPISONO)[62,63]	urban	2007	20-80	BDI	symptom	1,042	53.5	6
São Paulo, SP[44]	urban	2007-2008	15-75	CIDI	disorder	2,536	59.1	6

BDI = Beck Depression Inventory; CES-D = Center for Epidemiologic Studies Depression Scale; CIDI = Composite International Diagnostic Interview; CIDI SF = Composite International Diagnostic Interview Short-Form; EPDS = Edinburgh Postnatal Depression Scale; EPISONO = São Paulo Epidemiologic Sleep Study; GENACIS = Gender, Alcohol, and Culture International Study; ISA = Inquérito de Saúde do Estado de São Paulo (Health Survey - State of São Paulo); ISA-Capital = Inquérito Multicêntrico de Saúde no Município de São Paulo (Multicenter Health Survey - City of São Paulo); ISA-SP = Inquérito Multicêntrico de Saúde no Estado de São Paulo (Multicenter Health Survey - State of São Paulo); MINI = Mini-International Neuropsychiatric Interview; PNAD = Pesquisa Nacional por Amostra de Domicílios (National Household Sample Survey); PHQ-9 = Patient Health Questionnaire; PRIME-MD = Primary Care Evaluation of Mental Disorders; QMPA = Questionário de Morbidade Psiquiátrica de Adultos (Adult Psychiatric Morbidity Questionnaire); WHS = World Health Survey.

The prevalence was 17% (95%CI 14-19; I^2 = 91.6%; Figure 4B) and was higher in the female subgroup (21.6%; 95%CI 18.5-24.7; I^2 = 86.0%) than in the male subgroup (9.7%; 95%CI 7.5-11.8; I^2 = 80.6%). High heterogeneity was present in all estimates, and the causes could not be investigated due to the small number of studies.

Discussion

Depression morbidity was shown to be common among Brazilian adults. The polled data show that one in seven adults has depressive symptoms and that one in 12 adults has 12-month major depressive disorder. The prevalence was twice as high in women as in men for depressive symptoms, and three times higher for the 1-year prevalence of major depressive disorder. The findings were highly heterogeneous, which reduces the confidence of the estimates.

Limitations

The high heterogeneity found may reflect differences across study settings: studies were conducted in different regions of Brazil that have distinct economic profiles,

employed diverse screening tools, and had disproportionate sex distributions. The interviews took place during distinct periods of time, which may also have contributed to the heterogeneity found, as depression morbidity may have increased from one time point to another.[5]

The polled results may be overestimates: several studies were conducted in large urban centers, a factor associated with higher depression rates.[58] In addition, the demographic transition in Brazil over the past years,[71] with dramatic growth of the middle class, may also have influenced the results found, as depression is more common in lower social strata.[72]

To mitigate potential bias, we performed sensitive searches, and the results were assessed by independent researchers. All of the included studies were population-based and were assessed for methodological quality. If feasible, the microdata of the studies were assessed for the degree of compliance with the eligibility criteria used in the present review.[23] The factors potentially associated with high heterogeneity were assessed through meta-regression analyses.

Interpretation and generalizability

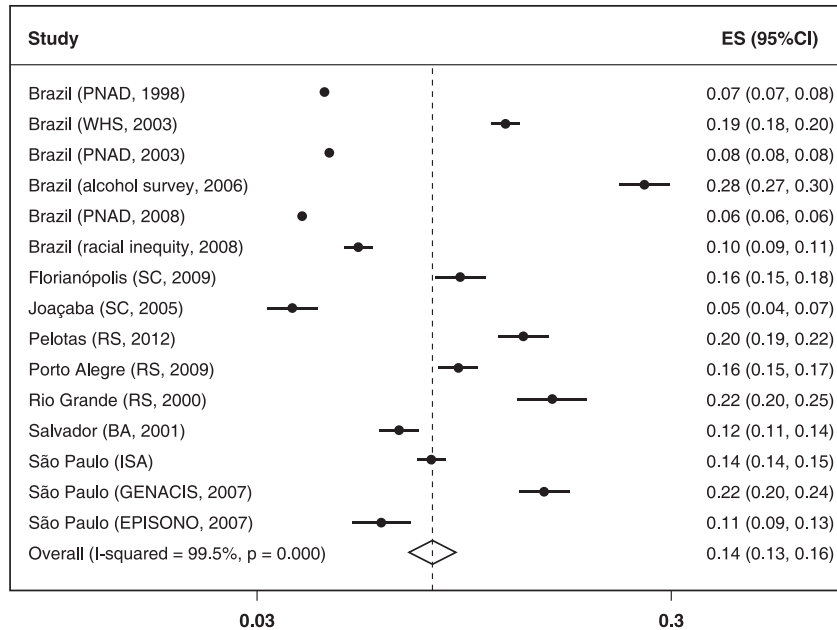One systematic review of worldwide studies found a lower 12-month prevalence (4%) for major depressive disorder

Figure 2 Prevalence of depressive symptoms among adults surveyed in Brazilian population-based studies. ES (95%CI) = effect size (95% confidence interval); EPISONO = São Paulo Epidemiologic Sleep Study; GENACIS = Gender, Alcohol and Culture International Study; ISA = Inquérito de Saúde do Estado de São Paulo (Health Survey - State of São Paulo); PNAD = Pesquisa Nacional por Amostra de Domicílios (National Household Sample Survey); WHS = World Health Survey.

than that observed in the present review, and found similar results for depressive symptoms (12%); the estimates were also higher in women than in men and significantly heterogeneous.[73] The point prevalence of major depressive disorder is higher in South Asia, Africa and the Middle East, and Eastern Europe. Individual, large-population studies (over 20,000 participants) have also reported lower estimates: in the United States, the 1-year prevalence of major depressive disorder was 5%,

and the lifetime prevalence was 13%[74]; in Western Europe, the 1-year prevalence of major depressive disorder was 4%, and the lifetime prevalence was 13%.[75]

The literature in the field also shows that people with depression have a poorer quality of life, are more likely to have other diseases, and have a higher utilization of health care services – outcomes that increase the costs to health care systems.[76] Depressive individuals are less productive and have higher rates of absenteeism,

Table 2 Subgroup analysis of the prevalence of depressive symptoms

Subgroups	Number of studies (references)	Total number of participants	Prevalence, % (95%CI)	I^2 (%)	p-value (chi-square)
Sex					
Female	11[23-29,34,42,45,46,48,49,54]	285,752	22 (20-24)	99.6	< 0.001
Male	11[23-29,34,42,46-49,54]	144,634	9 (8-11)	99.3	< 0.001
Time of outcome					
Lifetime	1[54]	2,083	22 (20-24)	-	-
Point	16[23-30,34,35,42,45-49,53,62,63]	442,036	15 (14-17)	99.6	< 0.001
Screening tool					
Self-reported	9[23-28,30,34,46,47,53]	427,021	11 (14-17)	99.6	< 0.001
BDI	2[35,62,63]	1,624	8 (2-14)	94.9	< 0.001
CES-D	1[29]	3007	28 (27-30)	-	-
CIDI-SF	1[54]	2083	22 (20-24)	-	-
EPDS	1[42]	3391	16 (15-17)	-	-
PHQ-9	1[40]	2925	20 (19-22)	-	-
PRIME-MD	1[45]	1249	46 (43-48)	-	-
QMPA	1[43,44]	2306	12 (11-14)	-	-

BDI = Beck Depression Inventory; CES-D = Center for Epidemiologic Studies Depression Scale; CIDI SF = Composite International Diagnostic Interview Short-Form; EPDS = Edinburgh Postnatal Depression Scale; PHQ-9 = Patient Health Questionnaire; PRIME-MD = Primary Care Evaluation of Mental Disorders; QMPA = Questionário de Morbidade Psiquiátrica de Adulto (Adult Psychiatric Morbidity Questionnaire).
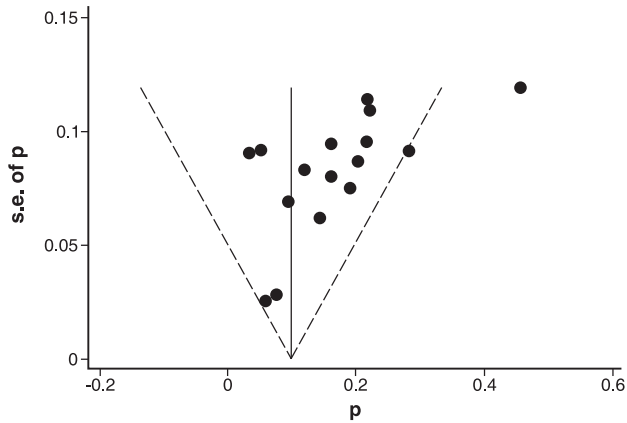
Figure 3 Funnel plot of the small-study effect: prevalence of depressive symptoms in each study by the standard error (s.e.) of the studies.

which has a negative impact on the economy of their communities.[77,78] These persons also exhibit high-risk behaviors, such as alcohol and tobacco use, a sedentary lifestyle, and unhealthy eating habits.[5,79,80]

Future research should take into account these variables and focus on Brazilian regions that have been less extensively studied, such as the North, Northeast and Mid-West, and should include areas of lower population density, such as rural areas. Concentrated efforts towards developing a tool that has adequate sensitivity and specificity, is easy to administer, and does not require a second-stage interview are essential to improve the quality and consistency of information obtained from research. The health supplement of the Brazilian National Household Sample Survey (Pesquisa Nacional por Amostra de Domicílios, a countrywide survey conducted by the Brazilian Institute of Geography and Statistics every 5 years, interviewing over 150,000 persons each time)[23] could fulfill this demand if it included data from only the participants who answer the interview questions and used a validated tool to screen for depression morbidity. Further evidence on factors associated with depression in the Brazilian population could be provided by studies that explore variables such as religiosity, violence, sexual orientation, eating habits, sedentary lifestyle, and involvement in cultural activities, leisure, and hobbies.
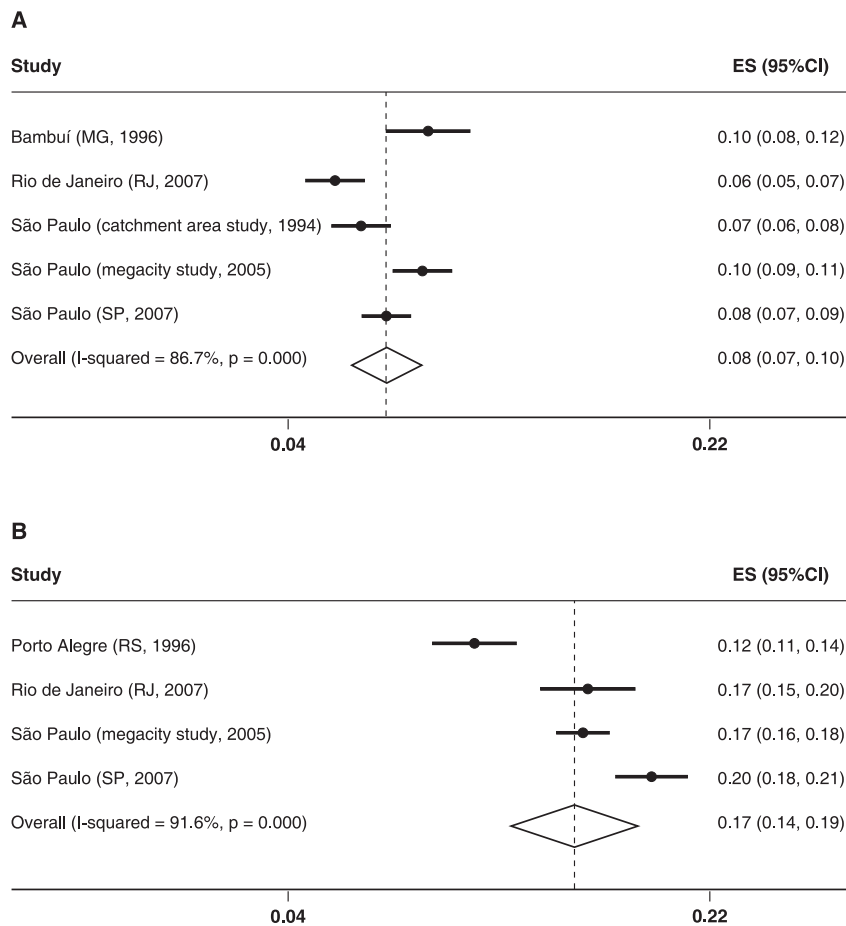

Figure 4 One-year (A) and lifetime (B) prevalence of major depressive disorder among adults surveyed in Brazilian population-based studies. ES (95%CI) = effect size (95% confidence interval).

Conclusion

Depressive symptoms and major depressive disorder, as assessed in population-based studies, are common among the adult population of Brazil. The prevalence of all outcomes was higher in women than in men. In terms of clinical practice and healthcare policy, the present results highlight the need for standardization in the clinical investigation of depression morbidity in this population. Future research should focus on less-studied regions of Brazil, such as the North, Northeast and Mid-West, where very few studies have been conducted. Future studies should also employ validated tools with adequate accuracy and explore the effects of socio-cultural factors.

Disclosure

The authors report no conflicts of interest.

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