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# Depressive symptoms and functional decline in an elderly sample of urban center in northeastern Brazil

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ABSTRACT

*Objective:* To examine the association between depressive symptoms and functional status in elderly people living in an urban center in northeastern Brazil.
*Methods:* In this cross-sectional, observational, analytic study, 313 community-dwelling elderly (age $\geq$ 65 years) individuals of both sexes who resided in Natal, Rio Grande do Norte, were evaluated. The Brazilian version of the Center for Epidemiologic Studies Depression Scale was used to screen for depressive symptoms. Physical performance was assessed using the Short Physical Performance Battery. A multivariate linear regression model adjusted for clinical and socioeconomic variables was used to analyze the association between depressive symptoms and functional performance.
*Results:* Our findings showed that the presence of depressive symptoms influenced functional performance, even when analyses controlled for variables such as age, sex, poor perceived health, cognitive status, and body mass index (BMI).
*Conclusion:* The results of this study reinforce the association between depressive symptoms and functional performance in an elderly population in an urban center in northeastern Brazil. These findings provide useful information for the identification of potential targets for research and therapeutic interventions aimed at preventing a decline in mobility in elderly individuals.


## 1. Introduction

Despite the difficulty of diagnosing depression in elderly individuals due to coexisting age-related cognitive disorders(Ávila & de Campos Bottino, 2006), this condition is considered to be one of the most prevalent psychiatric disorders in elderly populations(Oliveira, Gomes, & Oliveira, 2006). Depressive symptoms in elderly patients have been shown to affect many aspects of health, such as cognitive function (Sikkes et al., 2011), inflammatory biomarkers (Looper et al., 2011), quality of life (Duivis et al., 2011), and physical health (Chen et al., 2011). However, the greatest impact of depression in such patients is related to functional disability, as this condition is associated with low levels of physical activity that lead to deficits in mobility and physical performance (Everson-Rose et al., 2005; Hassmen, Koivula, & Uutela, 2000; Lindwall et al., 2007). Some authors have explained this association through the involvement of behavioral and biological mechanisms (Cronin-Stubbs et al., 2000; Ostir et al., 2007), such as reduced motivation arising from depressive states that may contribute to sedentary behavior (Matthews et al., 2011). Nevertheless, the mechanisms underlying the causal relationship between depressive symptoms and functional decline in elderly individuals are complex and involve neural, hormonal, and immunological changes (Barry et al., 2009).

The decline in mobility is an important parameter in the assessment of initial processes leading to disability in elderly individuals. Objective measures, such as the short physical performance battery (SPPB) developed by Guralnik et al. (1994), can estimate the risk of disability in elderly community residents, thereby enabling the design of effective strategies for the prevention of physical immobility in this population.

Population studies in developed countries (Bruce et al., 1994; Barcelos-Ferreira et al., 2009; Hoffmann et al., 2010; Katon & Ciechanowski, 2002; Lindwall et al., 2007; Maciel & Guerra, 2006; Reichert et al., 2011) have revealed the importance of the impact of depressive symptomatology on physical performance in older people. In Brazil, where population aging has accelerated in recent

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decades, few studies have examined depressive symptoms and functional status in elderly populations (Barcelos-Ferreira et al., 2009; Hoffmann et al., 2010; Maciel & Guerra, 2006; Reichert et al., 2011). Regional cultural diversity and variation in socioeconomic conditions in Brazil may lead to differences in the effects of population aging on mental and physical health. Many elderly individuals live under poor socioeconomic conditions in mid-sized cities, such as most cities in northeastern Brazil. This study aimed to determine if there is association between depressive symptoms and functional status in elderly people living in an urban center in northeastern Brazil. Because various socioeconomic and cultural factors determine the presence of depressive symptoms, we hypothesized that depressive states in elderly people living in regions with highly contrasting social conditions would influence functional performance.

## 2. Subjects and methods

In this observational, analytical, cross-sectional study, 313 elderly (age $\geq$ 65 years) Brazilians of both sexes who lived in the community of Natal, Rio Grande do Norte, were evaluated. The following inclusion criteria were adopted: Study participants should be free of severe disability in basic activities of daily living, defined as the self-reported inability to perform the following activities without help: bathing, getting out of bed, eating, dressing, and/or using the bathroom. Also the participants should be registered at the Family Health Strategy, linked to the Family Health Unit. We excluded data from participants who did not complete all phases of the research from analyses during the interview or those with poor cognitive performance.

Sample size calculation was performed with consideration that the probability of physical performance loss was two-fold higher among those with (*vs. without*) depressive symptoms. The proportion of the population with depressive symptomatology ($B$) was determined to be 0.33. Calculation allowed for type I ($\alpha = 0.05$) and type II ($\beta = 0.80$) errors.

A pilot study was conducted to standardize, calibrate, and validate protocols and tools to be used in this research (Freire et al., 2012). Five previously trained professionals evaluated subjects during home visits. All goals and procedures of the research were explained during these visits, and eligible individuals who agreed to participate signed informed consent forms.

This study was approved by the Ethics Committee of the Federal University of Rio Grande do Norte as part of the study "Biomarkers of stress, function and frailty in an elderly population" (CEP/HUOL 481/10), according to resolution 196/96 of the National Health Council.

### 2.1. Measures

The assessment protocol consisted of self-reported questions about socioeconomic characteristics, such as participants' age, sex, income, and educational level; lifestyle habits such as drinking, smoking, and physical activity; and clinical characteristics such as cognitive function, depression, BMI and chronic conditions.

Cognitive decline was measured by the Prueba Cognitiva Leganés a cognitive screening test developed by Zunzunegui et al. (2000) and validated in Portuguese by Caldas et al. (2012). This instrument contains 32 items grouped in seven categories: temporal orientation (3 points), spatial orientation (2 points), personal information (3 points), naming test (6 points), immediate memory (6 points), delayed recall (6 points), and logical memory (3 points). Scores less than 22 points reveal cognitive decline.

Performance was measured using the SPPB, which was developed by Guralnik et al. (1994) and adapted for Brazilian cultural settings by Nakano (2007). The SPPB consists of a series of tests that measure balance, gait speed, and lower limb strength. Each domain has range 0–4 points, which can total 12 points, the more points the better the functional performance.

The Brazilian version of the Center for Epidemiologic Studies Depression Scale (CES-D) (Batistoni, Neri, & Cupertino, 2007) was used to screen depressive symptoms. This 20-item instrument solicits information about respondents' mood, somatic symptoms, interactions with others, and motor function. Responses to items are structured by the frequency with which the respondent experienced depressive symptoms in the week prior to the interview (0 = never or rarely, 1 = sometimes, 2 = often, 3 = most of the time or always), with final scores ranging from 0 to 60 points (Matthews et al., 2011). The cutoff score of $\geq$16, originally proposed by Radloff (1977), was used to indicate the presence of depressive symptoms.

### 2.2. Statistical analysis

Data were analyzed using SPSS software (version 20.0; SPSS Inc., Chicago, IL, USA) with a significance level of 5% ($\alpha = 0.05$). First, the Kolmogorov–Smirnov test was used to verify the normality of the data. Descriptive statistics (means, standard deviations (SDs), absolute and relative frequencies) were calculated. The independent samples $t$-test (a parametric test used in case of Gaussian distribution) and chi-squared (a non-parametric test used in case of non-Gaussian distribution) test were used to compare measures between men and women. Associations between depression and functional performance were examined using the Pearson correlation coefficient. The Mann–Whitney test was used to compare mean functional performance in individuals with and without depressive symptoms, once SPPB data presented non-Gaussian distribution. Linear regression analysis was performed to examine the effects of multiple factors on physical performance, using three models. The model 01 included only the CES-D, in the model 2 sociodemographic variables as sex and age we included, and in the model 3, the variables Prueba Cognitiva Leganés (PCL), self-reported health and BMI were considered.

## 3. Results

We evaluated 313 elderly individuals [210 (67%) women, 103 (33%) men]. All individuals were included. Table 1 shows the main clinical and socioeconomic characteristics of study participants. Most (52.4%) women were widowed or separated, whereas the majority (77.7%) of men was married. Men had a higher mean educational level (years of education) than did women ($p = 0.013$). Most (74.3%) participants reported negative perceptions of their health status and 61.3% reported having two or more chronic conditions.

The mean cognitive performance score was 27.07 $\pm$ 3.80 for the total sample, and this score did not differ significantly between men and women ($p = 0.813$). The prevalence of depressive symptoms was 39.6%; 9.26% of participants reporting depressive symptoms were men and 30.33% were women.

Negative association was observed between depressive symptomatology and functional performance ($p < 0.001$). Individuals who reported depressive symptoms had worse physical performance scores than those who did not ($p = 0.001$). Lower limb strength was the only performance parameter that was not significantly lower in men with (*vs.* without) depressive symptoms ($p = 0.402$). Women had lower mean scores than men for all components of the SPPB (Table 2).

Table 3 shows the results of multiple linear regression analysis. We have built three explanation models, which the final model