ISSNe: 2182.2883 | ISSNp: 0874.0283
Disponível em: http://dx.doi.org/10.12707/RIV14033

RESEARCH PAPER

Contribution to the adaptation of the Geriatric Depression Scale -15 into portuguese

Contribuição para a adaptação da *Geriatric Depression Scale* -15 para a língua portuguesa
Contribución a la adaptación de *Geriatric Depression Scale* -15 al portugués

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Abstract

Theoretical framework:: Depressive symptoms are common among the elderly, and it is important to have access to a reliable and easy-to-use screening scale.
Objectives: To contribute to the validation of the Portuguese versions of the 15-item, 10-item and 5-item Geriatric Depression Scale (GDS).
Methodology: The GDS-15 was hetero-applied to 889 elders, with a mean age of 78.02 years. The factor structure of the GDS-15 and the internal consistency of the three versions were analysed.
Results: The three-factor solution of the GDS-15 explains 45.89% of the variance, but four items load on two factors.
The internal consistency of the GDS-5, GDS-10 and GDS-15 versions, as well as of factor 1 is satisfactory, with Cronbach's alpha values ranging between 0.78 and 0.84, but it is modest in relation to factors 2 and 3, with 0.62 and 0.59 values, respectively. The GDS-5 and the GDS-10 are strongly correlated with the GDS-15.
Conclusion: The GDS versions revealed good psychometric properties and may be used to screen depressive symptoms in the elderly; however, the GDS-15 revealed same fragility related to factor structure.

Keywords: depression; aged; aged, 80 and over; geriatrics.

Resumo

Enquadramento: A sintomatologia depressiva é comum entre os idosos, sendo fundamental o acesso a um instrumento válido e de fácil administração para a rastrear.
Objetivos: Contribuir para a validação das versões em português da Escala de Depressão Geriátrica (GDS) de 15, 10 e 5 itens.
Metodologia: A GDS-15 foi hetero-aplicada a 889 idosos com média de idades de 78,02 anos. Foi analisada a estrutura fatorial da GDS-15 e a consistência interna das três versões.
Resultados: Os três fatores da GDS-15 explicam 45,89% da variância, mas 4 itens saturam em dois fatores.
A consistência interna das versões de 5, 10 e 15 itens, bem como do fator 1 é satisfatória com valores alfa de *Cronbach* entre 0,78 e 0,84, mas modestas nos fatores 2 e 3, respetivamente 0,62 e 0, 59. A GDS-5 e a GDS-10 estão fortemente correlacionadas com a GDS-15.
Conclusão: As versões da GDS apresentam boas propriedades psicométricas podendo ser utilizadas para rastrear sintomatologia depressiva em idosos, embora a GDS-15 revele alguma fragilidade no que respeita à estrutura fatorial.

Palavras-chave: depressão; idoso; idoso de 80 anos ou mais; geriatria.

Resumen

Marco contextual: Los síntomas depresivos son comunes entre los ancianos. Por ello, es importante tener acceso a un instrumento válido y fácil de usar.
Objetivos: Contribuir a la validación de las versiones en portugués de la Escala de Depresión Geriátrica (GDS) de 15, 10 y 5 ítems.
Metodología: La GDS-15 se heteroaplicó a 889 ancianos con una edad media de 78,02 años. Se analizó la estructura factorial de la GDS-15 y la consistencia interna de las tres versiones.
Resultados: Los tres factores de la GDS-15 explican el 45,89 % de la varianza, pero 4 ítems saturan en dos factores.
La consistencia interna de las versiones de 5, 10 y 15 ítems y del factor 1 es satisfactoria, con valores alfa de *Cronbach* entre 0,78 y 0,84, pero modesta en los factores 2 y 3, respectivamente, 0,62 y 0,59. La GDS-5 y GDS-10 están fuertemente correlacionadas con la GDS-15.
Conclusión: Las versiones de la GDS tienen buenas propiedades psicométricas y se pueden utilizar para detectar síntomas depresivos en ancianos, aunque la GDS-15 muestre alguna fragilidad con respecto a su estructura factorial.

Palabras clave: depresión; anciano; anciano de 80 o más años; geriatría.

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Received for publication: 09.04.14
Accepted for publication: 03.06.14

Introduction

Depression is a common but often underdiagnosed or undertreated psychiatric illness among the elderly. Older people with clinically relevant depressive symptoms are confronted with a set of negative consequences, including functional decline, strong inability and frailty, reduced quality of life and increased morbidity and mortality (Fiske, Wetherell, & Gatz, 2008). These consequences lead to an increase in the demand for community and hospital resources, thus representing a rise in health care costs (Luppa et al., 2008; Luppa et al., 2012; Meeks, Vahia, Lavretsky, Kulkarni, & Jeste, 2011).

The underdiagnosis and consequent undertreatment of depression in geriatric age result from several issues. On the one hand, depression in the elderly is often accompanied by subjective experiences of memory loss and cognitive deterioration. On the other hand, the somatic symptoms, which are often a key to the diagnosis of depression in young people, are less useful in elderly patients. For example, sleep disorders are a common symptom of endogenous depression, but they are also common in non-depressed older people. A number of other examples include the normal decline of sexual function, constipation and associated pain complaints, for instance, degenerative osteoarticular pathologies. In addition, despite the major depressive disorder being partly made of somatic complaints, these may be absent in milder forms of depression. Thus, the GDS was designed in an attempt to overcome most of these problems, associated with rating geriatric depression (Yesavage et al., 1983). Therefore, this study aims at contributing to validate the Portuguese versions of the 15-item, 10-item and 5-item Geriatric Depression Scale (GDS).

Background

The 15-item Geriatric Depression Scale (GDS-15) is a short version of the original scale (Sheikh & Yesavage, 1986). As a whole, the items showed good diagnostic accuracy, and appropriate sensitivity, specificity and reliability, thus mitigating the interviewee's fatigue. Besides the GDS-15, various short forms of the GDS with 1, 4 and 10 items have been designed (Kim, DeCoster, Huang, & Bryant, 2013).

In addition, the GDS has been translated into more than 30 languages, such as Chinese, Vietnamese, French, Greek, Japanese, Italian, Turkish, Spanish and Portuguese, as can be consulted in the GDS official webpage: http://www.stanford.edu/~yesavage/GDS.html.

There is no consensus as to the factor structure of the GDS, because it seems to vary between cultures and/or languages. Thus, Kim et al. (2013) carried out a systematic literature review with meta-analysis aimed at assessing this variation. The three most common factors, which emerged in almost all solutions, were *dysphoria, social withdrawal-apathy-cognitive impairment*, and *positive mood*. However, the factor loadings for these factors were not always consistent in the different languages.

The results of the study by Kim et al. (2013) provide strong evidence of linguistic differences in the factor structure of the GDS, requiring some caution in its application in different languages and attention to the structural differences in the interpretation of its results.

The use of the GDS in special populations

According to Sheikh and Yesavage (1986), the GDS may be applied to people with or without physical illnesses, as well as people with cognitive commitments. The authors present data from two studies underpinning the ability of the GDS to distinguish between *depressed* and *non-depressed* elderly patients with physical illnesses, using criteria for the diagnosis of dementia according to the Mini-Mental State Examination (MMSE). However, they present results from a third study arguing that, in severe cases of dementia, individuals may find it difficult to understand the questions posed. Thus, they consider that the GDS can only be applied to people with a mild to moderate level of dementia.

The study of Conradsson et al. (2013) shows that the GDS-15 seems to have an overall usefulness to assess depressive symptoms among very old people (more than 85 years) with an MMSE score of 10 or more. This study points out that more studies are needed to strengthen the validity of the GDS-15 among the elderly with MMSE scores of 10-14, and that there is a need to develop and validate other measurements for the elderly with MMSE scores below 10.

Brief review of the validation studies that we have developed with the GDS-15

In 2010, we adapted the GDS-15 to European Portuguese. Initially, the translation and adaptation of the items to the new cultural context was performed by two specialists in Mental Health and Psychiatry, who used the original version of Sheikh and Yesavage (1986) and the Brazilian Portuguese version of Almeida and Almeida (1999).

The first version was sent to two other specialists in the area, who agreed with the new wording in 86.66%. There was no consensus with regard to two items, thus a new wording was suggested. Upon consulting with a third expert, the second version of the GDS-15 was finally designed.

In 2011, the second version was back-translated by a bilingual expert and then sent to the original author, Dr. Jerome Yesavage, who considered it to be appropriate.

The GDS-15 was initially subject to validation studies. The first study (Apóstolo, 2011) was carried out with a sample of 195 older people residing in nursing homes and users of Day-Care Centres and Health Care Centres, while the second study used a sample of 88 older people hospitalised in Long-Term Care Units. Both studies showed satisfactory results as regards the acceptability of the instruments, ease of understanding of the statements and time of application, as well as good internal consistency and criterion validity.

In the sample of 195 elders, the GDS-15 revealed a Cronbach's alpha value of 0.83, an item-total correlation ranging between 0.21 and 0.61, and a correlation of 0.70 with the Depression Anxiety and Stress Scale (DASS-21) (Apóstolo, Mendes, & Azeredo, 2006). In the sample of 88 elders, a strong negative correlation (-0.74) was found between the GDS-15 and the Satisfaction with Life Scale, whereas a strong positive correlation was found between the GDS-15 and the DASS-21 depression subscale ($rs = 0.83$), which are strong arguments for the validity of the GDS-15.

Taking into account that it is essential that health professionals are prepared to detect depressive symptoms in the elderly and that, to this end, they need to have access to a valid and easy-to-use instrument, and following previous work, the authors put forward other arguments for the validity of the internal consistency and construct validity of the GDS-15, as well as two smaller versions with 10 and 5 items, the GDS-10 and GDS-5.

Research Questions

What is the validity of the GDS-15, GDS-10 and GDS-5 versions?

Methodology

This study aimed at assessing the validity of the Portuguese versions of the GDS-15, GDS-10 and GDS-5, in which the reliability and construct validity were assessed.

Data collection instruments

The GDS-15 is use by interview with two response alternatives depending on how the older person has felt over the past week. One point is given to each *yes* answer and 0 points for each *no* answer. Items 1, 5, 7, 11 and 13 have been reversed (1 point for the *no* answer and 0 points for the *yes* answer).

The final score is the sum of the answers to the 15 items. As for the short versions of 10 and 5 items, the procedures are the same, though taking into account their specific items.

The GDS-15 proved to be well accepted by the elderly, and it did not usually require additional explanations.

Recommendations for the administration of the GDS

The authors consider that, in relation to item 5 – *Are you in good spirits most of the time*, the interviewer should reinforce that it refers to the participant's state of mind, to his/her mood, while in relation to item 9 – *Do you prefer to stay at home, rather than going out and doing new things*, the question should be made taking into account the place where the person lives. Interviewers should bear in mind that institutionalised people may have changes in mobility which impede them from going out. In that case, the interviewer should give additional information, for example, regarding the preference for staying in the room or joining the other elderly people in the living room or activity room. As for item 10 – *Do you feel you have more problems with memory than most*, the interviewer should mention that he/she is talking about people of the same age.

Folstein's Mini-Mental State Examination (MMSE) was translated and adapted to Portugal in 1994 by Professor Manuela Guerreiro and collaborators (Guerreiro et al., 1994). It is one of the most commonly used tools to screen cognitive decline in epidemiological studies, as well as assess the overall cognitive functions in clinical and research environments. It is also one of the most broadly validated tools for different populations and most cited in the literature. The score can range from 0 to 30 and the cut-off points for the Portuguese population were proposed by Morgado, Rocha, Maruta, Guerreiro, and Martins (2009).

Data collection procedures and sample

The research project was accepted by the Ethics Committee of the UICISA: E. Opinion 11-11/2010.

The sample was composed of individuals aged 65 years or more attending Day-Care Centres, residents in nursing homes and users of two Health Care Centres in rural, urban and transition regions of Central and Northern Portugal, from both genders and scoring more than 10 in the MMSE. This inclusion criterion was justified by the fact that individuals with high levels of dementia could find it difficult to understand the questions posed.

The GDS-15 and the MMSE were hetero-applied to a sample of 889 elders, between 2012 and 2013, after they gave their informed consent to participate in the study.

Sample characteristics

The mean age was 78.02 years, with a SD of 8.46, the minimum was 65 and the maximum 101; also 587 (66.03%) were female and 302 (33.97%) were male; 83 (9.34%) were single, 333 (37.46%) were married, 115 (12.94%) were divorced, and 358 (40.27%) were widowed. The average level of education was 3.16 years, with a SD of 3.42, the minimum was 0 and the maximum 17, being that 788 (88.64%) had between 0 and 4 years, 45 (5.06%) had between 5 and 9 years, 17 (1.91%) had between 10 and 12 years, and 39 (4.39%) had completed higher education.

Regarding the place of origin, 327 (36.78%) resided in nursing homes, 225 (25.31%) attended Day-Care Centres and 337 (37.91%) were users of Primary Health Care Centres, who live in their own homes.

Statistical analysis

The internal consistency was analysed through the corrected item-total correlation and Cronbach's alpha value.

The study of the construct validity was performed using the Exploratory Factor Analysis (EFA) on the correlation matrix obtained by calculating the phi coefficient (φ) between the items (given the dichotomous response format), with extraction of the factors by the principal components method followed by the orthogonal Varimax rotation (Marôco, 2011). The number of factors to be retained in the analysis was determined based on eigenvalues >1.00, the scree test and the percentage of variance explained by factor.

Prior to the EFA, the KMO measure was calculated and the Bartlett's test of sphericity was performed.

In order to design the 10- and 5-item versions of the GDS-15 (GDS-10 and GDS-5), the 5 and 10 items were selected, respectively, which would significantly change the Cronbach's alpha if deleted, and which showed higher corrected item-total correlations and with the highest communalities in factor analysis.

Results

Internal Consistency

Table 1 shows that the GDS-15 has item means ranging from 0.21 (item 11) to 0.66 (item 2) and strong internal consistency, without problematic items, and with corrected item-total correlation values ranging between 0.21 (item 9) and 0.63 (item 7). The Cronbach's alpha for the total scale was 0.83.

Table 1
Statistics of the item and statistics of the item with the total GDS-15 (n=889)

	Item mean	Item Standard Deviation	Corrected item-total correlation	Alpha if item deleted
gds1	0.34	0.47	0.58	0.81
gds2	0.66	0.47	0.34	0.82
gds3	0.58	0.49	0.48	0.81
gds4	0.58	0.49	0.51	0.81
gds5	0.36	0.48	0.59	0.81
gds6	0.53	0.50	0.24	0.83
gds7	0.37	0.48	0.63	0.80
gds8	0.31	0.46	0.48	0.81
gds9	0.40	0.49	0.21	0.83
gds10	0.41	0.49	0.25	0.83
gds11	0.21	0.41	0.52	0.81
gds12	0.34	0.47	0.45	0.81
gds13	0.41	0.49	0.46	0.81
gds14	0.33	0.47	0.57	0.81
gds15	0.38	0.49	0.36	0.82

Construct Validity

The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.888 and the Bartlett's test of sphericity was chi-square= 3083.145; p= 0.000.

Initially, the criterion for factor retention was eigenvalues greater than one, by removing absolute values below 0.35. This option revealed a 4-factor solution explaining 52.64% of the variance, respectively: 18.42%, 17.29%, 9.51% and 7.42%. Items 1, 5, 7, 8, 11, 12, 14 and 15 loaded on factor 1; items 1, 2, 3, 4, 5, 7 and 13 loaded on factor 2; items 9, 10, 12 and 13 loaded on factor 3; and items 6, 10 and 15 loaded on factor 4 with factor loadings above 0.30. Items 1, 5 and 7 double-loaded on factor 1 and 2, item 13 double-loaded on factors 2 and 3, and item 10 double-loaded on factors 3 and 4. However, factor 4 has only one item (item 6), that does not load in other factors and had its highest load in it (0.75).

Taking into account the content of the items, their overlapping in factors and the variance explained by factor 4 (7.42%), a second analysis was conducted, forcing the extraction to 3 and 2 factors.

The 3-factor solution in Table 2 explained 45.89% of the variance, i.e. 18.92%, 14.84% and 12.14 %. Items 1, 5, 7 and 14 had factor loadings greater than 0.35 on 2 factors.

The first factor included items 1, 2, 3, 4, 5 and 7 which assessed depression-related aspects, such as anhedonia, lack of interest-involvement-motivation, dysphoria, and overall (dis)satisfaction with life. The second factor includeed items 9, 11, 12 and 13 which assessed depression related-aspects, such as devaluation of life and discouragement, lack of energy/inertia, reduced encouragement, feelings of worthlessness, lack of motivation, and isolation. The third factor included items 6, 8, 10, 14 and 15 which assessed depression related-aspects, such as negative expectations, helplessness, hopelessness, and self-depreciation/low self-esteem.

Table 2
Components of the GDS-15, Varimax rotation with Kaiser Normalisation (n=889)

Items of the GDS-15	3-factor solution		
	F1	F2	F3
1 Are you basically satisfied with your life	0.53	0.38	
2 Have you dropped many of your activities and interests	0.65		
3 Do you feel that your life is empty	0.67		
4 Do you often get bored	0.70		
5 Are you in good spirits most of the time?	0.62	0.36	
6 Are you afraid that something bad is going to happen to you			0.67
7 Do you feel happy most of the time	0.61	0.39	
8 Do you often feel helpless			0.48
9 Do you prefer to stay at home, rather than going out and doing new things		0.48	
10 Do you feel you have more problems with memory than most			0.42
11 Do you think it is wonderful to be alive now		0.67	
12 Do you feel pretty worthless the way you are now		0.56	
13 Do you feel full of energy		0.60	
14 Do you feel that your situation is hopeless		0.40	0.56
15 Do you think that most people are better off than you are			0.62

The analysis of the internal consistency of the items included in each of the three factors showed a Cronbach's alpha coefficient of 0.78 and corrected item-total correlations ranging between 0.38 and 0.62 in factor 1; a Cronbach's alpha coefficient of 0.59 and corrected item-total correlations ranging between 0.22 and 0.43 in factor 2; and a Cronbach's alpha coefficient of 0.57 and corrected item-total correlations ranging between 0.22 and 0.48 in factor 3.

Versions of the GDS-5 and GDS-10

As previously mentioned in the methodology, to design the GDS-5 and GDS-10 versions, the five and ten items of the GDS-15 which would significantly change the Cronbach's alpha if deleted, and which showed higher corrected item-total correlations were selected.

The GDS-5 and the GDS-10 showed a strong internal consistency with corrected item-total correlations ranging between 0.45 and 0.65 (GDS-10), and between 0.52 and 0.63 (GDS-5) (Table 3). The Cronbach's alpha values of the total scale were 0.841 for the GDS-10 and 0.794 for the GDS-5.

Table 3
Statistics of the item with the totals of the GDS-10 and GDS-5 scales (n=889)

	Corrected item-total correlation	Alpha if item deleted	Corrected item-total correlation	Alpha if item deleted
1 Are you basically satisfied with your life	0.61	0.82	0.62	0.74
3 Do you feel that your life is empty	0.48	0.83		
4 Do you often get bored	0.51	0.83		
5 Are you in good spirits most of the time	0.62	0.82	0.57	0.76
7 Do you feel happy most of the time	0.65	0.82	0.63	0.74
8 Do you often feel helpless	0.49	0.83		
11 Do you think it is wonderful to be alive now	0.54	0.83	0.53	0.77
12 Do you feel pretty worthless the way you are now	0.46	0.83		
13 Do you feel full of energy	0.45	0.83		
14 Do you feel that your situation is hopeless	0.56	0.82	0.52	0.77

By comparing the items from these two versions with the factor structure of the GDS-15, it was observed that the GDS-10 consisted of six of the items in factor 1, four items from factor 2 and two items from factor 3, while the GDS-5 was composed of three of the items in factor 1 and one item from each of the other two factors.

The analysis of the correlation between the scores of the three GDS versions showed an almost perfect correlation between the GDS-15 and GDS-10 and a very strong correlation between the GDS-15 and GDS-5. The correlation between the GDS-15 and the three factors proposed was very strong, though it was higher with factor 1 (Table 4).

Table 4

Correlation between the scores of the GDS-15 and the GDS-10, GDS-5 and the three proposed factors (n=889)

	GDS-10		GDS-5		F1		F2		F3	
	r	p	r	p	r	p	r	p	r	p
GDS-15	0.96	0.000	0.89	0.000	0.88	0.000	0.75	0.000	0.79	0.000

Discussion

The different versions proposed in this study showed good internal consistency with Cronbach's alpha values of 0.83, 0.84 and 0.79 for the versions of 15, 10 and 5 items, respectively, thus confirming the reliability of the scales.

However, though the internal consistency of the items considered in factor 1 was acceptable (alpha= 0.78), the internal consistency of the items considered in factors 2 and 3 showed Cronbach's alpha coefficients lower than the values recommended in the literature, which may be seen as a limitation. Nevertheless, they presented a corrected item-total correlation ranging between 0.22 and 0.43 in factor 2 and between 0.22 and 0.48 in factor 3, which may be considered a positive indicator of internal consistency.

Another limitation may be a certain lack of clarity in the factor structure in which three items (1, 5 and 7) of the six included in factor 1 and one item (14) of the five included in factor 3 also showed substantial loads, greater than 0.35 in factor 2. The differences between the main and secondary loads were 0.15, 0.26, 0.22 and 0.16 for items 1, 5, 7 and 14, respectively.

The reliability of the different GDS versions is shown in most studies and synthesised in the review of Kim et al. (2013).

However, due to the linguistic proximity, we highlight the Cronbach's alpha values in three studies carried out with Spanish and Portuguese versions of the scale: in the Colombian Spanish version (Gomez-Angulo & Campo-Arias, 2011), the GDS-15 revealed an alpha of 0.78; in the European Spanish version (Lucas-Carrasco, 2012), the GDS-15 revealed an alpha of 0.81; and in the Brazilian Portuguese version (Almeida & Almeida, 1999), the GDS-15 revealed an alpha of 0.81. Notwithstanding the reliability results of the GDS-5 and GDS-10 proposed here, other studies reporting on their reliability cannot be compared, because versions are different from study to study.

The GDS-5 version proposed by Hoyl et al. (1999) based on the inter-item correlation of the GDS-15 and using criteria from the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) for gold standard is composed of items 3, 4, 5, 6 and 7. The GDS-5 version in Colombian Spanish proposed by Gomez-Angulo and Campo-Arias (2011) through the selection of the five items of the GDS-15 which would significantly change the Cronbach's alpha if deleted, and which showed higher corrected item-total correlations and with the highest communalities in factor analysis is composed of items 1, 3, 4, 6 and 15. The version of the GDS-10 used by Almeida and Almeida (1999) is composed of items 1, 2, 4, 5, 7, 8, 9, 12, 13 and 15 of the GDS-15.

There seems to be no consensus in the several studies published regarding the factor structure.

The results of the studies carried out using a version of the GDS-15 in European Spanish (Lucas-Carrasco, 2012) suggest a 2-factor structure explaining 41.6% of the variance, and one factor for the GDS-5 explaining 48.1% of the variance.

The studies with a Colombian Spanish version of the GDS-15 (Gomez-Angulo & Campo-Arias, 2011) show a structure composed of two factors, designated as *hopelessness* and *depressed mood*, which explained 37.1% of the variance.

The studies of Friedman, Heisel, and Delavan (2005) using the English version of the GDS-15 revealed a two-factor structure, namely depression and positive affect, which explained 33% of the variance.

In Portugal, a study developed by Pocinho, Farate, Dias, Lee, and Yesavage (2009) using a European Portuguese version of the GDS-30 obtained a three-factor structure, in which factor 1 explained 20.4% of the variance and reflected well-being/distress, factor 2 explained 12.3% of the variance and reflected depressed mood, and factor 3 explained 10.7% of the variance and reflected mental and physical problems. This structure of the GDS-30 is different from that proposed by the original author, who presented a 5-factor solution explaining 42.9% of the variance. The factors were described as sad mood, lack of energy, positive mood, agitation, and social withdrawal (Sheikh et al., 1991).

Considering the lack of consensus in relation to the GDS structure, Kim et al. (2013) carried out a review study with meta-analysis and concluded that the three factors of the GDS used in the different languages were *dysphoria*, *social withdrawal-apathy-cognitive impairment*, and *positive mood*, with the following item organisation:

The items *Do you feel that your life is empty*, *Do you often get bored*, *Are you afraid that something bad is going to happen to you*, and *Do you often feel helpless*, *which* correspond to items 3, 4, 6 and 8 of the GDS-15, appeared in all solutions in the different cultures and languages and have been grouped in the *dysphoria* factor.

The items *Have you dropped many of your activities and interests*, *Do you prefer to stay at home, rather than go out and do new things,* and *Do you feel you have more problems with memory than most*, which correspond to items 2, 9 and 10 of the GDS-15, appeared in all solutions except for the Korean version and have been grouped in the *social isolation-apathy-cognitive impairment* factor.

The items *Are you basically satisfied with your life*, *Are you in good spirits most of the time*, *Do you feel happy most of the time*, *Do you think it is wonderful to be alive*, and *Do you feel full of energy*, which correspond to items 1, 5, 7, 11 and 13 of the GDS-15, appeared in all solutions in the different cultures and languages and have been grouped in the *positive mood* factor.

Kim et al. (2013) also considered that the other factors found in the different cultures and languages were more idiosyncratic and did not seem to have significant interpretations. Furthermore, they believed there was a lack of clarity on the reasons why the *positive mood* factor had repeatedly been presented. They argued that the items included in this factor were usually those drawn up within the same scope, while the other factors had more items with reversed formulations. For this reason, this option may be more of a methodological artefact than a theoretical construct with meaning.

As regards the 10-item and 5-item versions, the results of this study seem to confirm their safe use in screening depressive symptoms. Both versions are composed of items from the three factors that were revealed by the factor analysis, though greater weight is put on the items included in factor 1. It may be assumed that this option can bring into question the representativeness of factors 2 and 3 in the GDS-5 and GDS-10, but the fact that the correlation of the GDS-15 is higher with factor 1 (0.88) can support this decision. In addition, the correlation between the GDS-15 and the GDS-10 is almost perfect (0.96), and the correlation between the GDS-15 and the GDS-5 is very strong (0.89).

Conclusion

In general, the properties of the Portuguese version of the GDS-15 attest to its quality to assess depressive disorders in the elderly, with the inherent structural limitations. The scale also reveal fragility regarding the internal consistency of factors 1 and 2 with a Cronbach's alpha coefficient lower than the values recommended in the literature. This is despite the fact that the corrected correlation between the items and the factor that they belong to is greater than 0.20.

As regards the GDS-10 and the GDS-5, both their internal consistency and high correlation with the GDS-15 ensure their validity and reliability to be used autonomously with safety in screening depressive symptoms in the elderly, thus saving time and resources. Their use can also reduce the fatigue of the elderly respondents.

Future studies should address the issues of sensitivity and specificity to calculate an adequate cut-off point for the Portuguese version. Data are being collected using the clinical criteria of the DSM-V as the gold

standard, thus the results obtained will be presented in the near future.

The evidence reported in the literature supports that the GDS can be applied in people with physical illnesses and mild to moderate dementias. It is not recommended for people with high levels of dementia because, as previously mentioned, they may not be able to understand the questions posed.

References

Almeida, O. P., & Almeida, S. A. (1999). Short versions of the geriatric depression scale: A study of their validity for the diagnosis of a major depressive episode according to ICD-10 and DSM-IV. *International Journal of Geriatric Psychiatry, 14*(10), 858-865. doi: 10.1002/(SICI)1099-1166(199910)14:103.0.CO;2-8

Apóstolo, J. (2011). Adaptation into European Portuguese of the geriatric depression scale (GDS-15). *Revista de Enfermagem Referência - Suplemento Actas e Comunicações XI Conferência Iberoamericana de Educação em Enfermagem Vol. II, 3*(4 Supl.), 452.

Apóstolo, J., Mendes, A., & Azeredo, Z. (2006). Adaptação para a língua portuguesa da depression, anxiety and stress scale (DASS). *Revista Latino-Americana de Enfermagem, 14*(6), 863-871. doi: 10.1590/S0104-11692006000600006

Conradsson, M., Rosendahl, E., Littbrand, H., Gustafson, Y., Olofsson, B., & Lövheim, H. (2013). Usefulness of the geriatric depression scale 15-item version among very old people with and without cognitive impairment. *Aging & Mental Health, 17*(5), 638-645. doi: 10.1080/13607863.2012.758231

Fiske, A., Wetherell, J. L., & Gatz, M. (2008). Depression in older adults. *Annual Review of Clinical Psychology, 5*, 363-389. doi: 10.1146/annurev.clinpsy.032408.153621

Friedman, B., Heisel, M. J., & Delavan, R. L. (2005). Psychometric properties of the 15 item geriatric depression scale in functionally impaired, cognitively intact, community dwelling elderly primary care patients. *Journal of the American Geriatrics Society*, *53*(9), 1570-1576. doi: 10.1111/j.1532-5415.2005.53461.x

Gomez-Angulo, C., & Campo-Arias, A. (2011). Geriatric depression scale (GDS-15 and GDS-5): A study of the internal consistency and factor structure. *Universitas Psychologica, 10*(3), 735-743.

Guerreiro, M., Silva, A. P., Botelho, M. A., Leitão, O., Castro-Caldas, A., & Garcia, C. (1994). Adaptação a população portuguesa da tradução do "Mini Mental State Examination" (MMSE). *Revista Portuguesa de Neurologia, 1*, 9-10.

Hoyl, M. T., Alessi, C. A., Harker, J. O., Josephson, K. R., Pietruszka, F. M., Koelfgen, M., ... Rubenstein, L. Z. (1999). Development and testing of a five-item version of the Geriatric Depression Scale. *Journal-American Geriatrics Society, 47*(7), 873-878.

Kim, G., DeCoster, J., Huang, C. H., & Bryant, A. N. (2013). A meta-analysis of the factor structure of the geriatric depression scale (GDS): The effects of language. *International Psychogeriatrics, 25*(1), 71-81. doi: 10.1017/S1041610212001421

Lucas-Carrasco, R. (2012). Spanish version of the geriatric depression scale: Reliability and validity in persons with mild–moderate dementia. *International Psychogeriatrics, 24*(8), 1284-1290. doi: 10.1017/S1041610212000336

Luppa, M., Heinrich, S., Matschinger, H., Sandholzer, H., Angermeyer, M. C., König, H., & Riedel-Heller, S. G. (2008). Direct costs associated with depression in old age in Germany. *Journal of Affective Disorders, 105*(1), 195-204. doi: 10.1016/j.jad.2007.05.008

Luppa, M., Sikorski, C., Luck, T., Ehreke, L., Konnopka, A., Wiese, B., … Riedel-Heller, S. G. (2012). Age-and gender-specific prevalence of depression in latest-life–systematic review and meta-analysis. *Journal of Affective Disorders, 136*(3), 212-221. doi: 10.1016/j.jad.2010.11.033

Marôco, J. (2011). *Análise estatística com o SPSS statistics*. Pêro Pinheiro, Portugal: ReportNumber.

Meeks, T. W., Vahia, I. V., Lavretsky, H., Kulkarni, G., & Jeste, D. V. (2011). A tune in "a minor" can "b major": A review of epidemiology, illness course, and public health implications of subthreshold depression in older adults. *Journal of Affective Disorders, 129*(1), 126-142. doi: 10.1016/j.jad.2010.09.015

Morgado, J., Rocha, C. S., Maruta, C., Guerreiro, M., & Martins, I. P. (2009). Novos valores normativos do mini-mental state examination. *Sinapse, 9*(2), 10-16.

Pocinho, M. T., Farate, C., Dias, C. A., Lee, T. T., & Yesavage, J. A. (2009). Clinical and psychometric validation of the geriatric depression scale (GDS) for portuguese elders. *Clinical Gerontologist, 32*(2), 223-236. doi: 10.1080/07317110802678680

Sheikh, J. I., & Yesavage, J. A. (1986). Geriatric depression scale (GDS): Recent evidence and development of a shorter version. *Clinical Gerontologist, 5*(1-2), 165-173. doi: 10.1300/J018v05n01_09

Sheikh, J. I., Yesavage, J. A., Brooks, J. O., Friedman, L., Gratzinger, P., Hill, R. D., ... Crook, T. (1991). Proposed factor structure of the geriatric depression scale. *International Psychogeriatrics, 3*(1), 23-28. doi: 10.1017/S1041610291000480

Yesavage, J. A., Brink, T. L., Rose, T. L., Lum, O., Huang, V., Adey, M., & Leirer, V. O. (1983). Development and validation of a geriatric depression screening scale: A preliminary report. *Journal of Psychiatric Research, 17*(1), 37-49. doi: 10.1016/0022-3956(82)90033-4