



# Development of a Short-form of the “Geriatric Pain Measure-P”, for Multidimensional Evaluation of Pain in the Elderly

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**ABSTRACT:** It is very important to capture the multidimensional aspects of pain in aging. For this end, a specific tool was developed to evaluate pain in the elderly. This tool is the “Geriatric Pain Measure-P” (GPM-P), an instrument already translated, culturally adapted and validated in Brazil. In this study we aimed to develop a shorter version of the instrument GPM-P, originally composed of 24 items. We selected individuals with 60 years or more, with chronic diseases, originating from an outpatient public clinic in São Paulo. These patients had answered the GPM-P in a previous moment. The data regarding the answers to the GPM-P and socio demographic aspects were collected from electronic and paper medical records. In the statistical analysis, we obtained the shorter version of the GPM-P through exploratory factor analysis using the principal component method and we evaluated the psychometric properties with the internal consistency using Cronbach's Alpha coefficient. The Spearman correlation was used to validate the short version, based on the original version. 138 elderly people were evaluated, with a mean age of 75.63 years (60 to 97 years). 16 items were excluded from the GPM-P, originating the GPM-P8, an 08-item instrument with adequate psychometric properties, when compared with the GPM-P. The GPM-P8 is a short version that showed adequate psychometric properties to the multidimensional evaluation of pain in the elderly.

**KEYWORDS:** Elderly, Psychometric properties, Geriatric Pain Measure-P, Pain, Evaluation Instrument

## I. INTRODUCTION

[1].In the last two decades, the World Health Organization (WHO) is highlighting the population aging and its socioeconomic impact. [2].In Brazil, the IBGE (Brazilian Institute of

Geography and Statistics) projections calculate an increase from 19.6 million elderly to 66.6 million between 2010 and 2050, which represents an augmentation of 239.0%. The rise in the number of elderly changes not only the family structures, but also the societal resource distribution.

[3-6].A large proportion of the aging population is affected by chronic pain conditions, causing a high prevalence in community dwelling elderly, ranging from 25% to 50%. [7].Chronic pain has multiple components, which makes its treatment difficult, due to the complex interactions between its multiple domains (physical, psychological, social) and other related factors. These interactions usually vary not only between affected individuals, but also over time in the same individual.

[4.]Despite the high prevalence of chronic pain during the aging process, its implications in health and life quality of the elderly is inappropriately studied, evaluated and treated. [5.]Due to the absence of biological markers for pain, the evaluation of this symptom is based solely on the perception and accounts of the patient, which in turn are subject to the influence of individual perception of the sensations, emotional reactions and behavioral responses.

[8-9].“The management of chronic pain in older persons”, from the American Geriatric Society (AGS) recommends the use of specific instruments for the multidimensional approach of pain in the elderly. Therefore, tools are needed to assist in this approach.

The “Geriatric Pain Measure” (GPM) was developed to allow the multidimensional evaluation of pain and is a quite complete instrument (24 items), with adequate psychometric properties, suitable for use on the community dwelling or institutionalized elderly patients. However, despite being simple, it requires a relatively long period of



time for its application, specially nowadays, when increasingly practical geriatric approaches are sought, in order to allow for broader assessments. This tool was already translated, culturally adapted to Brazil (GPM-P) and had its psychometric properties studied in our country, being considered reliable and valid for multidimensionally evaluating pain in the elderly.

[10.]The GPM-P addresses important aspects of chronic pain in the elderly, such as pain intensity (items 13, 17, 19, 20-23), disengagement because of pain (items 9-12, 15, 18, 24), pain with ambulation (items 4-7), pain with strenuous activities (items 1-3) and pain with other activities (items 8, 13-16), [12-13].and comprises the major psychological dimensions of pain (sensory-discriminative, motivational-affective and cognitive-evaluative) described by Melzack and Katz, with a total of 24 items.

In order to reduce the application time of the GPM-P in outpatient elderly patients and thus increase its clinical practicality, the present study aimed to develop a short version of the instrument, which would maintain valid and adequate psychometric characteristics for the Brazilian population.

## II. METHODS

The present is a qualitative-quantitative analytic study, using mixed evaluation methods by means of retrospective description of secondary data recorded in the participants' medical records and by methodological analysis of measurement instrument validation. All the procedures performed were in accordance with ethical standards of the Ethics Research Committee. The study was approved by the Institutional Ethics Research Committee from the University of São Paulo / Unifesp (CEP nº 1238/2021).

### PARTICIPANTS

We randomly selected 138 elderly with 60 years or more, of both sexes, presenting with chronic pain (duration of 6 months or more) of any etiology and intensity equal to or greater than 3 on the Verbal Numerical Rating Scale, who were on regular outpatient follow up at the "Pain and Osteoarticular Diseases Department" of the Geriatrics and Gerontology Discipline - University of São Paulo/UNIFESP, between 2018 and 2021.

[14].The presence of cognitive impairment (characterized by a Mini Mental Exam score below the expected for the patient's educational level) was defined as an exclusion criteria. The data were collected from the participants' paper and electronic medical records and those who did not possess

complete data regarding their socio demographic and pain characteristics were excluded. Those who had not answered the GPM-P were also excluded.

Sociodemographic data (age, sex, marital status, color, level of education) and data regarding the chronic pains, such as its intensity by the Verbal Numerical Rating Scale (vNRS) were recorded. [15].The vNRS allows us to quantify pain intensity in a numeric form and usually varies from 0 to 10 points (0 meaning no pain and 10 the worst pain possible). [16-17].To describe the degree of independence in basic activities of daily living (BADL) and instrumental activities of daily living (IADL), we used the indexes of Katz and Lawton, respectively. The index of Katz considers the scores of 6 for independent status, 3 to 5 to partially dependent and 1 and 2 for dependent, whilst the index of Lawton considers scores 9 to 15 as highly dependent, 16 to 20 as moderately dependent, 21 to 25 as mildly dependent and 26 to 27 as independent.

[12].Regarding GPM-P records, we evaluated answers to each of its 24 items, assigning a value of 1 to positive answers and 0 to negative answers; as well as values from 0 to 10 to answers to questions 10 and 20 (related to pain intensity). The total score was obtained by the sum of the points attributed to each item (total ranging from 0 to 42) and adjusted (adjusted score) to a 0 to 100 score by multiplying the total score for 12,5. The adjusted score classifies the pain in mild (0-29), moderate (30-69) and intense (70-100).

### STATISTICAL ANALYSIS

We used the *Statistical Package for Social Science* (SPSS), version 17 and Microsoft Excel 2010 to analyze the data. The quantitative and qualitative variables were evaluated and the GPM-P was factorially explored, using the orthogonal rotation method Varimax, with "Kaiser" normalization and the Principal Components method (only the factors with eigenvalues of 1 or more were selected). In order to develop the short version, we established that at least one item relating to each multidimension of pain from the GPM-P, should be present (at least 1 item referring to pain intensity, 1 to disengagement because of pain, 1 to pain with ambulation, 1 to pain with strenuous activities and 1 to pain with other activities). Only the items with high factorial values were selected ( $\geq 0,75$ ). The internal consistency was analyzed by Cronbach's Alpha and the correlation between the short version and the original one was obtained by the Spearman test. The significance level was established at 5% ( $p \leq 0,05$ ).



### III. RESULTS

We obtained a sample of 138 elderly, with a mean age of 75.63 years (ranging between 60 and 97 years). There was a predominance of female sex (72.46%), white skin color (65.94%), marital status of widowhood (39.86%) and low educational level

(1-4 years; 36.23%). Regarding functional status, there was a predominance of partial dependency to BADLs and independence for IADLs (42.75% and 28.99%, respectively), and, for 3 participants, there was no data regarding functionality. (Table 1)

**Table 1:** Sample Characterization.

Age	N	%
Mean	75.63	
Min-Max	60 - 97	
60-70	54	39.13
71-80	42	30.43
81-90	32	23.19
> 90	10	7.25
<b>Sex</b>		
Male	38	27.54
Female	100	72.46
<b>Skin Color</b>		
White	91	65.94
Brown	22	15.94
Yellow	1	0.72
Black	23	16.67
Other	1	0.72
<b>Marital Status</b>		
Widower/Widow	55	39.86
Married	52	37.68
Single	20	14.49
Divorced	11	7.97
<b>Educational level (years)</b>		
Illiterate	18	13.04
1-4	50	36.23
5-8	42	30.43
9-11	14	10.14
>= 12	14	10.14
<b>BADL</b>		
Independent	53	38,41
Partially dependent	59	42,75
Dependent	23	16,67
<b>IADL</b>		
Independent	40	28,99
Mildly dependent	30	21,74
Moderately dependent	32	23,19



Severely dependent	33	23,91
<b>Pain intensity by vNRS</b>		
Mild (0-3)	32	23,19
Moderate (4-7)	48	34,78
Strong (8-10)	58	42,03
BADL: basic activities of daily living; IADL: instrumental activities of daily living.; vNRS: verbal numeric rating scale.		

Regarding the pain assessed by the GPM-P, we observed the presence of intense pain in 56.52% of the elderly, moderate pain in 38.41% and mild pain in 5.07%. When evaluating pain intensity by the vNRS, we observed mainly the presence of moderate pain (vNRS = 6) (Table 1). During the

short scale development process, we performed the factorial analysis of the GPM-P items and verified that, out of the 24 questions, 7 factors (groups of questions) were created, accounting for a total variability of 67.0%. Table 2 shows the factorial values for each of the items within each factor.

**Table 2: Factorial Values for each question within each factor.**

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
<b>Q11</b>	0.847						
<b>Q10</b>	0.827						
<b>Q9</b>	0.744						
<b>Q12</b>	0.742						
<b>Q15</b>	0.476						
<b>Q22</b>		0.838					
<b>Q21</b>		0.828					
<b>Q19</b>		0.716					
<b>Q20</b>		0.490					
<b>Q18</b>			0.622				
<b>Q8</b>			0.618				
<b>Q16</b>			0.576				
<b>Q14</b>			0.540				
<b>Q5</b>			0.512				
<b>Q1</b>				0.838			
<b>Q2</b>				0.730			
<b>Q3</b>				0.729			
<b>Q6</b>					0.838		
<b>Q7</b>					0.800		
<b>Q4</b>					0.404		
<b>Q13</b>						0.771	
<b>Q24</b>						0.616	
<b>Q17</b>							0.740
<b>Q23</b>							0.642

In this final process, we selected only the questions with high factorial values ( $\geq 0,75$ ) to be a part of the short version of the GPM-P. Thus, it was originated the GPM-P8, an instrument with only 8 questions (q1, q6, q7, q10, q11, q13, q21 e q22), comprehending all the dimensions of pain from the original version (pain intensity - items 13, 21 and 22; disengagement because of pain - items 10 and 11; pain with ambulation - items 6 and 7; pain with

strenuous activities - item 1; pain with other activities - item 13) (Figure 1).



Figure 1: Short Version GPM-P8	
<b>GPM-P8</b>	
<b>Please answer each question:</b>	<b>Resposta</b>
1. Do you or would you have pain with vigorous activities such as running, lifting heavy objects or participating in strenuous sports?	<input type="checkbox"/> No <input type="checkbox"/> Yes
2. Do you or would you have pain walking more than one block?	<input type="checkbox"/> No <input type="checkbox"/> Yes
3. Do you or would you have pain walking one block or less?	<input type="checkbox"/> No <input type="checkbox"/> Yes
4. Have you been accomplishing less than you would like because of pain?	<input type="checkbox"/> No <input type="checkbox"/> Yes
5. Have you limited the kind of work or other activities you do because of pain?	<input type="checkbox"/> No <input type="checkbox"/> Yes
6. Do you have trouble sleeping because of pain?	<input type="checkbox"/> No <input type="checkbox"/> Yes
7. Do you have pain that never completely goes away?	<input type="checkbox"/> No <input type="checkbox"/> Yes
8. Do you have pain every day?	<input type="checkbox"/> No <input type="checkbox"/> Yes
<b>SCORING:</b> Give one point to each “Yes” response. <b>TOTAL SCORE (0-8):</b> ____ <b>ADJUSTED SCORE:</b> (total score x 12,5) (0-100): ____	

As suggested in the original version, here we too propose the same rule for the calculation of the adjusted score in the GPM-P8. In other words, we calculate the sum of the answers to the 8 items (Total Score) and then multiply it for 12,5 to obtain the Adjusted Score, varying from 0-100. Thus, in the same way, we suggest the pain classification as mild (score 0-29), moderate (score 30-69) and intense

(score higher than 70). The analysis of the total scores obtained showed that they presented low variability (CV lower than 50%), which is good, because it demonstrates that the data were uniform. We obtained a mean adjusted score for the GPM-P8 of 72.74 ( $\pm 4,15$ ), with the majority of the patients presenting with intense pain. (Table 3).

	Original	Short
<b>Mean</b>	69.69	72.74
<b>Min</b>	11.90	0.00
<b>Max</b>	99.96	100
<b>N</b>	138	138

For the study of the psychometric properties of the GPM-P8, we analyzed the internal consistency using Cronbach’s Alpha, which resulted in 0.703, denoting a good reliability for the newly elaborated instrument.

For the short version’s validation, its correlation with the original version in Portuguese was performed by the Spearman test, and a high value was obtained ( $r = 0.842$ ;  $p < 0.001$ ). Therefore, the correlation is highly significant and strong, pointing to an adequate construct validity.

#### IV. DISCUSSION

It is noteworthy that this is the first study to propose a short version of the “GPM-P” in Portuguese, which will provide a multidimensional pain evaluation process in the elderly that is much faster and more practical.

In the present series, we obtained a sample composed mainly of women (72.46%), corroborating data from the scientific literature, that points to the feminization of aging.<sup>18</sup> It is also noted that most individuals had a functional status of partial dependence for BADLs (secondary to a





high prevalence of urinary incontinence on the participants); and independence to IADLs.

The analyses led to the elaboration of a short version of the GPM-P, which appeared to be extremely simple and more practical than the original version. [10]. Despite being brief, it includes the 5 multidimension of pain present in the original instrument (pain intensity, disengagement because of pain, pain with ambulation, pain with strenuous activities and pain with other activities).

[19]. The internal consistency obtained for the GPM-P8 was adequate, as a Cronbach's Alpha of 0.703 was found, which denoted good reliability. Cronbach's Alpha is an indicator that reflects the degree of covariance between the items (values equal to or greater than 0.70 are considered acceptable). [12]. Comparatively, the original Brazilian Portuguese version presented similar internal consistency (Cronbach's Alpha 0.727 - 0.791).

[20]. In the scientific literature, the existence of a short version of the GPM has already been described, this one in English and composed of 12 items. This, compared to the GPM-P8, includes a greater number of items, and therefore appears to be less practical in clinical practice. It is also noteworthy that the GPM-P8 is more encompassing as it comprehends more dimensions of pain (the 5 originally present on the GPM). The GPM 12 does not include all the dimensions of the original version (it does not include pain with strenuous activities and pain with other activities). Our short instrument does not include questions 19 and 20, regarding pain intensity, since the factorial value was not high, but we consider that these questions are made routinely during consultation and therefore their absence in the GPM-P8 should not impact clinical evaluation.

Some limitations of the present study should be pointed out. Among these, a sample of small size and from only one institution. [10]. Also, the reliability found here for the GPM-P8 was considered good; however it was lower than the one obtained by other authors who also analyzed the GPM (including the authors who developed the original instrument in English - Cronbach's Alpha of 0.94). [21]. Recently a Polish study also verified a high internal consistency for the 24 item GPM (Cronbach's Alpha 0.89) and yet another European study involving 3 countries (Great Britain, Germany and Switzerland) found the same high reliability for the GPM (Cronbach's Alpha 0.91). [22]. Additionally, a study conducted in Turkey demonstrated also a high reliability for the GPM (Cronbach's Alpha 0.85).

The authors in this study tried to correlate the pain assessed through the GPM-P8 with the

activities of daily living (ADLs), but the results were not statistically significant, which could be due to the small sample utilized.

It would be important for the short version obtained in this study to be applied to population samples from other regions in Brazil, thus allowing a better analysis of its psychometric properties. Also, it would be interesting if the GPM-P8 could be studied among other populations around the world.

## V. CONCLUSION

A short version of the GPM-P was developed, which proved to be much simpler and more practical for the multidimensional assessment of pain in the elderly. The GPM-P8 emerges as a tool with only 8 items that includes all the pain dimensions contemplated in the original Brazilian Portuguese version. It also presents itself as a reliable tool, with valid psychometric properties. Health professionals may now rely on an extremely simple measurement instrument, which will aid them in providing quality health care for the elderly with chronic pain.

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