


# BMJ Open The Problem-Solving Decision-Making scale – translation and validation for the Portuguese language: a cross-sectional study

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## ABSTRACT

**Objectives** To translate and validate the Problem-Solving Decision-Making scale instrument into the Portuguese language.

**Design** Cross-sectional study.

**Setting: participants** The Problem-Solving Decision-Making scale was translated from English to Portuguese and then back-translated to obtain a final version. The questionnaire was then applied face-to-face from January to March 2019 in a representative sample of the Portuguese population (n=301 people aged 20 years or more) to validate the Problem-Solving Decision-Making scale in a Portuguese population.

**Outcomes** Principal component analysis and Cronbach's alpha.

**Results** Principal component analysis was used to evaluate the validity of the internal structure of the scale. The results identified two components: problem-solving and decision-making with an explained variance of 65.9%. For internal consistency, three different techniques were used and applied to the two components. All of the items have very good internal consistency (problem-solving Cronbach's alpha=0.931 and decision-making Cronbach's alpha=0.951).

**Conclusions** The validation of the Portuguese scale agreed well with the existing literature. The scale can be divided into two components: the problem-solving component and the decision-making component. The translated scale demonstrated good internal consistency and can therefore be used in future studies.

## INTRODUCTION

For centuries, physicians' decisions have been unquestionably accepted. In the early and mid-1980s the concept of patient centredness emerged in many studies,<sup>1–3</sup> but it was only during the 1990s when the idea of shared decision-making moved to the centre stage.<sup>4</sup>

The increasing influence of societal, philosophical and economic forces changed the perspectives about patient–physician relationship.<sup>5</sup> Physicians began to understand that their patients have a role to play in the decision-making process and that they must

## Strengths and limitations of this study

- This is a cross-sectional study. The questionnaire was face-to-face applied in a representative sample of the Portuguese population from mainland Portugal (301 participants).
- Before the validation step, the questionnaire was translated and back-translated using a rigorous methodology, which is a strength of this study.
- The sample was selected by the Nomenclature of Territorial Units for statistical purposes (NUTS II) geographical region quota method considering the distribution of gender, age and area of residence.
- This study only included mainland residents, which might be a limitation.

be empowered to adopt an autonomous attitude. However, while rejecting the paternalistic model, we must also realise that a decision-making approach based on absolute patient autonomy is not an acceptable solution.<sup>6</sup>

Glyn Elwyn describes postmodern medical consultation as a consultation where a significant number of potential voices are present.<sup>7</sup> The voice of the patient may be more present at the consultation, but the increased number of other voices in the consultation contributes to more uncertainty and greater complexity in the decision-making process. For example, we may also have the voice of the patient's family, the voice of patient's friends, the voice of the internet or social media, the voice of the doctor's social network, of the doctor's scientific society, of the guidelines, of the evidence-based medicine and of the pharmaceutical industry.<sup>7</sup> Facing this reality, family doctors increasingly need to play new roles. These roles may include helping their patients in the information navigation, helping interpret symptoms and different

tests or therapeutic options, and also facilitating decisions and preferences.

Not all patients want the same degree of participation. Many studies have reported a high variability of preferred roles.<sup>8–14</sup> Multicultural societies require special attention.<sup>15</sup> Thus, it is important to assess patients and their families' preferences in order to provide care accordingly. Physicians should be flexible and must adapt to the decision-making process and individual differences of their patients.<sup>16</sup>

The Problem-Solving Decision-Making scale measures preferred roles in health-related decision-making. This scale has already been used in Canada but the preferred roles of Portuguese populations in health-related decision-making have not yet been studied. This seems to be even more relevant in the context of the transformations implemented in the Portuguese Health Service in the last two decades. In 2006, the Primary Health Care Reform implemented a new pay-per-performance system with some of the indicators being related to decisions about tests, screenings and treatments.<sup>17</sup> At the same time, a significant number of guidelines have been issued—many of them also addressing tests and treatment prescriptions.<sup>17</sup> All of these measures are directed to physicians and may limit the role of shared decision-making.

Despite this, recent evidence shows two relevant aspects. One, there is a significant gap between the Portuguese population's opinions and attitudes about routine medical tests and the evidence-based recommendations.<sup>17 18</sup> Two, an important part of the Portuguese population chooses to undergo medical tests through their initiative rather than through their doctors' initiative or by mutual agreement with their doctors.<sup>17</sup> In this context, the aim of this study was to translate and validate the Problem-Solving Decision-Making scale for the Portuguese language.

## METHODS

We conducted a cross-sectional study via a questionnaire during face-to-face surveys of a representative Portuguese sample residing in mainland Portugal aged 20 years or more.

### Questionnaire

The questionnaire consisted of three sections: questions about the general state of health, the Problem-Solving Decision-Making scale and sociodemographic questions. The Problem-Solving Decision-Making scale is a validated scale<sup>19</sup> that presents three short vignettes: the *morbidity vignette* ('Suppose you often experience a burning sensation when you go to the bathroom. You usually have to push to begin to urinate and sometimes dribbling occurs after urination'); the *mortality vignette* ('Suppose you had mild chest pains for 3 days and decided that you should visit your doctor about this'); and the *quality of life vignette* ('Suppose you and your partner have been trying for pregnancy but have been unsuccessful for more than a year').

Each vignette presents six tasks: Who should determine (diagnose) what the likely causes of your symptoms are? Who should determine what the treatment options are? Who should determine what the risks and benefits for each treatment option are? Who should determine how likely each of these risks and benefits are to happen? Given the risks and benefits of these possible treatments, who should decide how acceptable those risks and benefits are for you? and Given all the information about risks and benefits of the possible treatments, who should decide what treatment option should be selected?

An example of the *morbidity vignette* can be found in [table 1](#). Respondents are asked 'who should decide' for each task, and the answers are categorised according to a 5-point Likert scale: 1 the doctor alone; 2 mostly the doctor; 3 doctor and you equally; 4 mostly you; and 5 you alone.

### Translation of the Problem-Solving Decision-Making scale

The translation of the Problem-Solving Decision-Making scale for Portuguese was carried out based on the Principles of Good Practice for the Translation and Cultural Adaptation Process for Patient-Reported Outcomes Measures.<sup>20</sup> First, we obtained permission from the questionnaire's author to translate and validate the questionnaire for the Portuguese population. We then recruited a 'key in-country consultant', the main contact to perform and help with the translation, who was a native speaker of Portuguese, fluent in English, with a health and research background and experience in translating documents.

Two independent translations of the questionnaire were produced. One was done by the key in-country consultant, and the other was done by a forward translator (native speaker of Portuguese and fluent in English). The two previous translations were then reconciled by the research team to obtain a final consensus translation ready for back-translation.

The back-translation (from Portuguese to English) was done by a professional translator (native speaker of English and fluent in Portuguese) with no prior knowledge of the original questionnaire. In the end, the back-translation was compared with the original by the investigation team to identify any significant differences or discrepancies.

Finally, the questionnaire was applied to a group of 15 people (relatives and/or colleagues of the first author of this paper) to verify that there were no problems of interpretation and to assess the time required for the application of the questionnaire (an average of 12 min). After analysing the results of the questionnaire application, no changes were required, and the final version was prepared.

### Validation and reliability

Two types of validity were analysed: face validity and validity of the internal structure of the scale. To test face validity of the final version of the translated questionnaire, a pilot study was carried out on 20 people with

**Table 1** Problem-Solving Decision-Making scale: morbidity vignette

**1. Scenario A**

‘Suppose you often experience a burning sensation when you go to the bathroom. You usually have to push to begin to urinate and sometimes dribbling occurs after urination.’

(Choose one number for each question)

	Doctor Alone	Mostly the Doctor	Doctor and You Equally	Mostly You	You Alone
<b>Diagnosis:</b> Who should determine (diagnose) what the likely causes of your symptoms are?	1	2	3	4	5
<b>Options:</b> Who should determine what the treatment options are?	1	2	3	4	5
<b>Risks and Benefits:</b> Who should determine what the risks and benefits for each treatment option are?	1	2	3	4	5
<b>Probability:</b> Who should determine how likely each of these risks and benefits are to happen?	1	2	3	4	5
<b>Utility:</b> Given the risks and benefits of these possible treatments, who should decide how acceptable those risks and benefits are for you?	1	2	3	4	5
<b>What is Done:</b> Given all the information about risks and benefits of the possible treatments, who should decide what treatment option should be selected?	1	2	3	4	5

data analysis to verify the adequacy of the questions and answers. After that, the investigation team met with some of the interviewers to listen to their considerations. No changes were required to the questionnaire; however, these 20 interviews were not included in the final sample. To test the internal structure validity—and since the scale of responses is a 5-point Likert scale, that is, an ordinal scale—the questionnaire was applied to a sample of 301 people, and then the technique of principal component analysis was applied. For reliability testing of the Portuguese Problem-Solving Decision-Making scale, the internal consistency was evaluated via interitem correlation (mean of the interitem correlation), corrected item-total correlation and Cronbach's alpha because internal consistency implies reliability.

### Sample size

Principal component analysis was used for the internal structure validity study. A large sample is required to reduce the subject variance. An adequate sample size has been discussed by many authors.

Comrey<sup>21</sup> and Kline<sup>22</sup> indicated that a sample of 200 was adequate for principal component analysis. Nunnally stated that in scale development, the sample size should be 300.<sup>23</sup> Hill stated that the minimum sample size should be  $n=5k$  when the investigator intends to analyse  $k$  variables ( $k>15$ ) via a factor analysis, and  $n=10k$  when  $k<15$ .<sup>24</sup> The Problem-Solving Decision-Making scale consists of 18 items ( $k=18$ ), and thus a sample of 301 persons satisfies all the rules described by the different authors.

### Sampling

The sample was selected by the Nomenclature of Territorial Units for statistical purposes (NUTS II) geographical region quota method considering the distribution

of the variables: gender (male or female), age (in age groups every 5 years, except for the last group defined for individuals aged 75 or over, for a total of 12 age groups (20–24, 25–29, 30–34, 35–39, 40–44, 45–49, 50–54, 55–59, 60–64, 65–69, 70–74 and  $\geq 75$ )) and area of residence (North, Centre, Lisbon, Alentejo and Algarve). Given the geographic dispersion, surveys were conducted in all district capitals guaranteeing the proportionality that they represent the population of mainland Portugal.

Households were randomly selected by applying the sampling process ‘random route’ method.<sup>25</sup> Each interviewer was assigned a number of surveys, and the daily visitation plan was set based on a totally random choice of street, door number and floor (the starting point). Individuals (one from each household) were randomly selected using the last birthday method. That is, the person in each home who had most recently celebrated a birthday.

Exclusion criteria included cognitive or physical disabilities that make it impossible to perform face-to-face surveys, residents of a group home or those who refuse informed consent for participation in the study.

To find as many people as possible in the household, field work occurred between 17:00 and 21:00 on weekdays. On weekends and holidays, the field occurred between 11:00 and 21:00. Recontacts were made in cases where it was not possible to get in touch with the household. If there was still no response, then the household was replaced by another domicile following the rules of the random route method. The protocol of this study was approved by the Ethics Committee of the São João Hospital Center/Faculty of Medicine of the University of Porto.

Verbal informed consent was obtained from all participants at the beginning of the survey, and interviewers were specifically trained to initiate the application of the survey only after the consent from the participant has been received. Interviewers were also instructed to apply the questionnaire in a standardised way. They read a text explaining the voluntary nature of the participation, the estimated duration of participation and the possibility of ending participation at any point in the conversation. The participation was voluntary, and anonymity and confidentiality were guaranteed.

The hypothesis of obtaining a written informed consent was considered. However, after discussing the possibility of implement the questionnaires through computer-assisted telephone interviews with the field interviewers, the information that the answering rates of telephone interviewing studies has dropped considerably in Portugal since the General Data Protection Regulation (GDPR) implementation was obtained. At the same time, the telephone databases have become less representative of the Portuguese population due to the new GDPR rules. In these circumstances, we decided to implement face-to-face questionnaires, even knowing it would be a more expensive methodology. The GDPR implementation was, in Portugal, accompanied by an extensive debate in society around the privacy and security of personal data. For this same reason, if a signed consent would be requested, a considerable number of persons would refuse to answer the questionnaire. It would be a barrier. That was the reason why we decided to use verbal informed consent.

There is some debate around the way consent may be obtained in this kind of face-to-face questionnaires. For example, a qualitative study conducted to explore factors that influence the informed consent process among patients recruited for research reports that ‘Most of the patients preferred oral over written consent and face-to-face interview over telephone interview.’<sup>26</sup>

### Patient and public involvement

Patients and public were not involved in the development of the research question.

online supplementary information

### Statistical methods

Data analysis used statistical software SPSS Statistics V.25. Categorical variables are described by the absolute and relative frequencies,  $n(\%)$ . Continuous variables are described by the mean and the respective SD,  $\bar{x} \pm s$ , and by the minimum and the maximum values, min and max.

Principal component analysis was used to study internal structure validity with varimax rotation and a cut-off of absolute value higher than 0.4 for loading factors. The applicability of principal component analysis will be tested by calculating the Kaiser-Meyer-Olkin - KMO (measure of sampling adequacy index)—the recommendations indicate that this index should have values higher than 0.6 to apply the principal component analysis. We also used the

Bartlett test that compares the correlation matrix with the identity matrix.

The internal consistency was measured using three different techniques: interitem correlation (mean of the interitem correlation), corrected item-total correlation and Cronbach's alpha. The mean of the interitem correlation should be greater than 0.4 to indicate adequate internal consistency. The corrected item-total correlation is ‘very good’ if the values are between 0.4 and 1.0; ‘good, can improve’ if between 0.3 and 0.39; ‘sufficient but needs improvement’ if between 0.2 and 0.29; and ‘weak, reject or revise’ if between  $-1.0$  and 0.19. P values  $<0.05$  were considered significant.

## RESULTS

Data collection was done from January to March 2019 and replies were recorded manually in each questionnaire by the interviewers ( $n=301$ ). For quality control, all surveys were monitored by a data collection supervisor, and at least 20% of the surveys were randomly supervised by members of the investigation team.

### Sociodemographic characteristics

The sociodemographic characteristics of the sample are presented in table 2. The participant's age ranged between 20 and 96 years with a mean of 51.6 years. About 53.5% were women, and 95.3% were of Portuguese nationality. The majority of the sample was married (58.8%), and 28.9% has completed high school. About 89.4% work in the tertiary professional sector.

Reported health status was mainly good (45.8%) or reasonable (36.2%). In the last 12 months, 39.5% of the sample had no health problems. The most common health problem was back, bone, joint or muscle pain (38.5%).

In order to compare our sample with the Portuguese population we produced a table with the sociodemographic data of the population that could be obtained from the PORDATA website (PORDATA, Available from: [www.pordata.pt](http://www.pordata.pt). Accessed in: 2 July 2019, online supplementary appendix 1).

### Validation of the internal structure of the Problem-Solving Decision-Making scale

Internal structure validity was verified by applying the principal component analysis technique that was applied to the 18 items, and the KMO and Bartlett test confirmed that it is possible to apply this technique to this sample (KMO=0.874;  $p$  value $<0.001$ ). Principal component analysis defined three components (considering the method of the eigenvalues  $>1$ ) with 72.91% explained variance (the output produced by principal component analysis can be found in online supplementary appendix 2). The principal component analysis divided the 18 items into three components: component I (Options, Risks and Benefits and Probability questions of *morbidity*, *mortality* and *quality of life vignettes*), component II (Utility and

**Table 2** Sociodemographic characteristics of the sample, n=301

Characteristics	
Age (years), $\bar{x} \pm s$ , min, max	51.6±18.2, 20, 96
Sex, n (%)	
Male	140 (46.5)
Female	161 (53.5)
Marital status, n (%)	
Not married	54 (17.9)
Married	177 (58.8)
Married (in the situation legally separated from persons and property)	9 (3.0)
Divorced	22 (7.3)
Widowed	39 (13.0)
Does not know	0 (0)
Higher educational level completed, n (%)	
None	10 (3.3)
Elementary school—1st cycle (fourth year)	69 (22.9)
Elementary school—2nd cycle (sixth full year)	18 (6.0)
Elementary school—3rd cycle (ninth full year)	69 (22.9)
High school (12th year)	87 (28.9)
Higher education	48 (15.9)
Does not know	0 (0)
Profession, n (%)	
No job	112 (37.2)
Job	189 (62.8)
Does not know	0 (0)
Professional sector, n (%)	
Primary	1 (0.5)
Secondary	19 (10.2)
Tertiary	169 (89.4)
Area of residence (NUTS II), n (%)	
North	110 (36.5)
Centre	69 (22.9)
Lisbon	87 (28.9)
Alentejo	24 (8.0)
Algarve	11 (3.7)

NUTS II, Nomenclature of Territorial Units for statistical purposes.

What is Done questions of *morbidity*, *mortality* and *quality of life vignettes*) and component III (Diagnosis question of *morbidity*, *mortality* and *quality of life vignettes*).

Considering that the validated original questionnaire only had two components and since we intend to compare our results with the original scale, principal component analysis was applied considering only two components. In this case, the percentage of variance explained is 65.87%.

Although the percentage of variance explained with two components is slightly lower than that of three components, since the validation of the original scale considered only two components, it was considered that it would be more appropriate to apply the principal component analysis technique with two components.

The principal component analysis divided the 18 items by the two components according to the division that has been seen in the literature: component I (Diagnosis, Options, Risks and Benefits and Probability questions of *morbidity*, *mortality* and *quality of life vignettes*) and component II (Utility and What is Done questions of *morbidity*, *mortality* and *quality of life vignettes*).

These two components are based on Deber and Baumann's theory of patient participation.<sup>27</sup> Component I corresponds to the problem-solving tasks that encompass questions related to Diagnosis, Options, Risks and Benefits and Probabilities.<sup>19</sup> In problem-solving, the aim is to discover the correct answer for a search problem and that requires both problem-solving skills and a knowledge base to identify the possible alternatives and the probabilities of each likely outcome.<sup>27</sup> Component II corresponds to the decision-making tasks that relate to Utility and What is Done questions.<sup>19</sup> According to Deber and Baumann, decision-making requires clarification of values to assign utilities to each potential outcome.<sup>27</sup>

Problem-solving and decision-making tasks are not independent of each other. They represent a continuum in the decision process, incorporating each other. According to these authors, in medicine, the problem-solving can represent the diagnosis process, while decision-making represents the choice of a treatment.<sup>27</sup>

### Internal consistency

Cronbach's alpha was calculated to evaluate the internal consistency in each of the two components. Table 3 contains interitem correlation (mean of the interitem correlation), corrected item-total correlation and Cronbach's alpha in case the item in question was excluded.

The two components present an interitem correlation mean higher than 0.4 (0.530 and 0.764; table 3). All items in the two components display a very good corrected item-total correlation. In both components, deleting each item decreases the Cronbach's alpha versus the Cronbach's alpha based on standardised items (0.931 and 0.951).

Next, the Cronbach's alpha was calculated for each of the components defined by the principal component analysis, for the vignettes separately, for the vignettes together, as well as for the entire scale (table 4).

## DISCUSSION

### Comparison with existing literature

Here, we translated and validated the Problem-Solving Decision-Making scale for use in a Portuguese population. The validation of the Portuguese scale agreed with the existing literature. The scale can be divided into two components: the problem-solving component (composed

**Table 3** Item analysis (18 items)

Item	Mean of the interitem correlation	Corrected item total correlation	Cronbach's alpha if item deleted
<b>Problem-solving component</b>			
<i>Morbidity vignette</i>			
Diagnosis question	0.530	0.544	0.925
Options question		0.704	0.918
Risks and Benefits question		0.765	0.914
Probability question		0.722	0.916
<i>Mortality vignette</i>			
Diagnosis question		0.588	0.922
Options question		0.731	0.917
Risks and Benefits question		0.780	0.914
Probability question		0.731	0.915
<i>Quality of life vignette</i>			
Diagnosis question		0.574	0.923
Options question		0.736	0.916
Risks and Benefits question		0.773	0.914
Probability question		0.725	0.915
Cronbach's alpha based on standardised items	0.931		
<b>Decision-making component</b>			
<i>Morbidity vignette</i>			
Utility question	0.764	0.852	0.940
What is Done question		0.871	0.938
<i>Mortality vignette</i>			
Utility question		0.866	0.939
What is Done question		0.855	0.940
<i>Quality of life vignette</i>			
Utility question		0.825	0.943
What is Done question		0.817	0.945
Cronbach's alpha based on standardised items	0.951		

of the first four items on the scale regarding patient's attitudes towards active participation in the problem-solving component) and the decision-making component (composed of the last two items of the scale measuring the desire to be actively involved in the decision-making component).<sup>19</sup> The total extracted variance for the two components was 65.87%. This is more than the variance extracted previously (55.3%).<sup>19</sup>

Deber and Baumann<sup>27</sup> present a distinction of these two terms as being two relatively distinct elements of the clinical reasoning process. Problem-solving refers to the 'search for the single 'correct' solution to a problem', and decision-making refers to a 'situation in which a choice, often requiring trade-offs, must be made from several possible alternatives'.

The translated scale had good internal consistency (Cronbach's alpha=0.931 and 0.951 for problem-solving and decision-making components, respectively); therefore, it can be used in future studies. Also, the internal

consistency results were superior to prior work<sup>19</sup>: Cronbach's alpha=0.901 and 0.903 for problem-solving and decision-making components, respectively.

### Strengths and limitations

Before the validation step, the questionnaire was translated and back-translated using a rigorous methodology, which is a strength of our study. The sample was selected by the NUTS II geographical region quota method considering a distribution in terms of gender, age and area of residence. However, this study only included mainland residents, which might be a limitation because island residents are excluded.

### Implications for practice and research

The theme of shared decision-making in health has generated much discussion. While it is common ground that patients should be included in medical decision-making, it is necessary to know whether they are interested in

Table 4 Cronbach's alpha

Variable	Alpha	Number of cases	Items
Problem-Solving (three vignettes)	0.931	301	12
Problem-Solving ( <i>morbidity vignette</i> )	0.820	301	4
Problem-Solving ( <i>mortality vignette</i> )	0.823	301	4
Problem-Solving ( <i>quality of life vignette</i> )	0.864	301	4
Decision-Making (three vignettes)	0.951	301	6
Decision-Making ( <i>morbidity vignette</i> )	0.906	301	2
Decision-Making ( <i>mortality vignette</i> )	0.910	301	2
Decision-Making ( <i>quality of life vignette</i> )	0.922	301	2
Problem-Solving and Decision-Making (three vignettes)	0.939	301	18
Problem-Solving and Decision-Making ( <i>morbidity vignette</i> )	0.839	301	6
Problem-Solving and Decision-Making ( <i>mortality vignette</i> )	0.847	301	6
Problem-Solving and Decision-Making ( <i>quality of life vignette</i> )	0.837	301	6

The alpha values vary from 0.820 to 0.951 indicating good internal consistency between the items.

participating. In Portugal, to the best of our knowledge, this subject has never been studied. More studies are needed to understand at which degree patients want to participate in decisions regarding their health and what factors may influence this position. Future work could also include island residents. We next intend to apply the translated and validated Problem-Solving Decision-Making scale to a larger representative sample of the Portuguese population in order to further investigate the preferred roles of patients in health-related decisions.

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**Contributors** CM and MG had the original idea of this research project. CM, MG and ASCT developed the research protocol. MG, ASCT, RP and RC performed the field work. RC introduced the data in a SPSS database. ASCT performed the data analysis. MG, ASCT and CM wrote the final manuscript. RP and SB reviewed the manuscript. CM, MG, ASCT, RP, RC and SB approved the version to be published and agreed to be responsible for all aspects of the paper.

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