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Development and Validation of the Elderly Suicide Screening Scale

Sabrina Piccinelli Zanchettin Silva[1] [ID], Alison Phinney[2] [ID], Flávio Rebustini[3] [ID], Milena Temer Jamas[1] [ID] and Silvia Cristina Mangini Bocchi[1,*] [ID]

[1]Department of Nursing, Sao Paulo State University, Av. Prof. Mário Rubens Guimarães Montenegro, s/n - UNESP - Campus de Botucatu, Botucatu, Brazil

[2]School of Nursing, University of British Columbia, T201-2211 Wesbrook Mall, V6T 2B5, Canada

[3]Escola de Artes, Ciências e Humanidades, Universidade de São Paulo, Rua Arlindo Béttio, 1000 - Ermelino Matarazzo, Brazil

Abstract:

Background: This study stems from the need to develop and validate a tool for interprofessional teams in Primary health care for screening for suicide among the elderly in the community.

Objective: To evaluate the psychometric properties of the Non-Institutionalized Elderly Suicide Screening Scale (Escala de Rastreamento de Renúncia à Vida no Idoso não institucionalizado - ERRVI).

Methods: This is a psychometric study focused on evaluating evidence of content validity and internal structure. The ERRVI construction process followed the guidelines for scale development based on theoretical models derived from qualitative research, which followed the methodological and theoretical approaches of grounded theory and symbolic interactionism. It is a theory called "Symbolic Interactionism" (Joel M. Charon). The instrument underwent content validity evidence analysis carried out by a panel of experts, considering the Content Validity Index (CVR). After the pre-test, the internal structure was evaluated using Exploratory Factor Analysis (AFE). Reliability was assessed using three indicators: Cronbach's alpha, Omega, and ORION scores. It involved 300 elderly individuals from two municipalities in the central-western region of Sao Paulo, Brazil, and was conducted from September to November 2020.
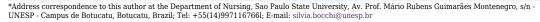
Results: The final version comprised 31 items, categorized into four dimensions: autonomy, self-governance, self-care, and life satisfaction. The total explained variance was 50.82%, with factor loadings ranging from 0.31 to 0.86. The reliability indicators revealed a Cronbach's alpha of 0.88, McDonald's Omega of 0.95, and scores for the dimensions assessed by the Overall Reliability of Fully-Informative Prior Oblique N-EAP (ORION) ranging from 0.78 to 0.84.

Conclusion: The ERRVI showed evidence of content validity and internal structure in accordance with the recommended psychometric parameters. This is an innovative tool with the social value, given the scarcity of tools that screen the risk of suicide among the elderly in the community. It is the first of its kind in Brazil and the third globally.

Keywords: Aged, Suicide, Behavior rating scale, Geriatric assessment, Public health, Primary health care, Autonomy, Self-governance.

*Address correspondence to this author at the Department of Nursing, Sao Paulo State University, Av. Prof. Mário Rubens Guimarães Montenegro, s/n - UNESP - Campus de Botucatu, Botucatu, Brazil; Tel: +55(14)997116766l; E-mail: silvia.bocchi@unesp.br

1. INTRODUCTION

This study stems from the need to develop and validate a tool for the interprofessional Primary Health Care (PHC) team to screen for suicide among elderly Brazilians in the community.

The elderly population has been steadily increasing, which has marked a considerable change in the age structure of Brazil. This change is characterized by a notable decline in the young population, a stabilization of the adult population, and a gradual increase in the number of elderly individuals [1]. Furthermore, life expectancy at birth has increased worldwide from 67 years in 2000 to 78 years in 2050 and 82 years by 2100 [2]. According to global trends, Brazil's life expectancy was 70 years in 2000, and projections suggest that it will increase to 82 years in 2050 and 88 years in 2100 [2].

The new context imposes demands, such as the creation of public policies that consider the process and characteristics of aging. Among these, mental health care is particularly important, as depression, combined with other factors such as physical suffering, existential issues, and social isolation, increases the risk of suicide among the elderly [3].

Suicide rates are increasing throughout the world and are a major public health issue. According to data from the World Health Organization, in 2016, Brazil had a suicide rate of 9.7 per 100,000 inhabitants [5], indicating the need to pay more attention to the mental health of the elderly [4].

In light of this situation, it is imperative to implement preventive health measures, which represent the primary approach to achieving disability-free ageing, as advocated by the National Health Policy for the Elderly [5]. A review of the literature has identified two scales to screen older people at risk of suicide in the community [6]. Both scales have not been translated into Portuguese, and the pool of items has not been generated from the experience of older people [7, 8]. The first scale was developed through a literature review and an expert proposal [7], while the second scale used items from other existing scales, such as the 15-item Geriatric Depression Scale and the 5-item Geriatric Depression Scale [8].

It is important to note that the innovative aspect of this study could have a considerable impact on the health and social conditions of the non-institutionalized elderly population. This is because it is the third instrument in the world and the first in Brazil to screen the risk of suicide in elderly people in the community [6]. Unlike other scales [7, 8], ERRVI was developed using items derived from a theoretical model from qualitative research using the grounded theory approach, which focused on the experiences of elderly individuals screened for depression in the community [9]. For the first time, this model served as the basis for the pool of items, as a criterion to build and validate a scale, thereby enabling members of the PHC team to screen elderly individuals at risk of suicide in the community.

Finally, this study aims to develop and assess the psychometric properties of the Non-Institutionalized Elderly Suicide Screening Scale (Escala de Rastreamento de Renúncia à Vida no Idoso não institucionalizado - ERRVI).

2. MATERIALS AND METHODS

2.1. Study Design

This study seeks evidence of the validity of the internal structure of ERRVI. Therefore, it presents the methodological components involved in the assembly and analysis of the tool. As this is a psychometric study focused on evaluating evidence of content validity and internal structure, it adheres to the current recommendations of the American Educational Research Association (AERA), the American Psychological Association (APA), and the National Council on Measurement in Education (NCME) [10].

2.2. Study Site

The study was carried out in two municipalities in the central-western region of the state of Sao Paulo, Brazil.

2.3. Construction of ERRVI

The process of assembling the ERRVI followed the guidelines for the development of scales outlined by DeVellis [11].

In the assembly of the items, we used theoretical models derived from qualitative research following the methodological and theoretical approaches of Grounded Theory and Symbolic Interactionism. We consider the experience of two sample groups of elderly individuals, one female and one male, with depression, low social support, and preserved cognition in regions covered by the Family Health Strategy. However, the structure of the theoretical model for women was used primarily, as it was more robust due to the difficulty that men experienced in extensively expressing their safety and risk of suicide experiences [9].

The structure of the theoretical model is based on two contexts: safety and risk of suicide. In this model, the elderly go through a process guided by an interdependent self-assessment called the exercise of autonomy-life satisfaction. This process is informed by indicators that allow them to perceive themselves as being in either a positive or negative state within this interaction. Consequently, in positive situations, they maintain a positive outlook, while in negative situations, they quietly give up on life [9].

This stage resulted in ERRVI version 1, comprising 81 items, which were initially organized into three dimensions (indicators of self-assessment of the elderly): (1) self-governance, (2) commitment to health, and (3) participation in life projects. A Likert-type measurement format was selected for the scale that features four response options: always, often, sometimes, and never. This format is considered appropriate for the intended purpose and is widely used in scale development [11].

Subsequently, the tool was subjected to an analysis of

the evidence of content validity carried out by a panel of 13 experts. This panel consisted of five nurses, three psychologists, two psychiatrists, one geriatrician, one gerontologist, and one professional with a degree in grammar and literature. They had experience with the concept they evaluated and knowledge of methodological procedures [12-14]. The experts digitally signed an Informed Consent Form and analyzed the relevance of each item, as well as its alignment with the proposed dimensions and/or domains, using a tool they received *via* email.

The data collection tool allowed experts to assess items based on criteria (1, not relevant; 2, needs a major revision; 3, needs a minor revision; and 4, relevant) and their alignment with the proposed dimensions and/or domains.

To analyze the agreement among experts, we calculate the Content Validity Ratio (CVR) using the formula CVR = (Ne - N/2)/(N/2), where 'ne' represents the number of experts who marked the item as essential, and "N" the number of experts [15, 16]. The experts' answer choices were converted into binary values by grouping options 1 and 2 (0) (3), and 4 (1). Items with a CVR below 0.54 were excluded or reformulated according to the recommendations, with a significance level set at 0.05 [17]. Additionally, to finalize version 2 of the ERRVI, comprising 53 elements, the relevance of each element was considered in assessing the latent variable.

After the experts' assessment, ERRVI version 2 was pretested on 43 non-institutionalized elderly individuals aged 60 years and older of both genders who had intact cognitive abilities and verbal communication skills. The elderly completed the scale and then responded to an evaluation tool designed to assess their understanding, applicability, and relevance of the scale items under the supervision of one of the researchers. Following the implementation of suggestions from the elderly, the 53-item ERRVI version 3 was concluded.

2.4. Analysis of Evidence of the Validity of the ERRVI's Internal Structure

ERRVI version 3 was administered to 300 elderly individuals from the target population who had intact cognitive abilities and verbal communication skills [11]. Because of the 330 invited, 30 refused to participate in the survey.

The internal structure was assessed using Exploratory Factor Analysis (EFA), initially determining whether the data were suitable for factor analysis by checking the Sampling Adequacy Measure. For this stage, Bartlett's sphericity, determinant of the matrix, and Kaiser-Meyer-Olkin (KMO) were evaluated. In addition to assess the database, the items were independently analyzed, as recommended [18]. In particular, the inadequacy of the items for factor analysis can impact the model results. Furthermore, missing data were addressed using the multiple imputation technique [19].

Dimensionality was evaluated using parallel analysis (PA) and according to the optimal implementation of PA and minimum rank factor analysis to minimize the common variance of the residuals [19]. PA implementation was carried out using permutation with 500 random matrices, and the polychoric matrix was estimated using Bayesian Modal Estimation [20] and Ridge Smoothing [21]. In particular, the use of tetrachoric or polychoric correlations tends to improve the accuracy of the model compared to using the Pearson correlation [22, 23].

Furthermore, PA is considered one of the most robust and accurate techniques for dimensionality testing [24]. Factors were extracted using the least squares unweighted technique, which reduces the residuals of the matrices [25]. As the instrument proved to be multi-dimensional, a robust Promax oblique rotation was used [26]. The robustness of the test was determined using bootstrap methods and extrapolating the sample size to 5000. Internal replication is a contemporary guideline that assesses the stability and replicability of the model [27, 28].

One-dimensional evaluation indicators were adopted [29]: Unidimensional Congruence > 0.95 (UNICO), Explained Common Variance > 0.80 (ECV) [30], and Mean of Item Residual Absolute Loadings < 0.30 (MIREAL).

The quality parameters for the instrument included an initial factor loading of 0.30, which is recommended for samples of 300 individuals [31] and communities with values higher than 0.40 [32]. The decision to maintain or exclude an item from the model was based on the magnitude of the factor loadings, communalities, absence of cross-loadings, presence of Heywood cases, and interpretability of the factors. To improve the precision of decision-making on whether to maintain or exclude items, we decided to use a unique directional correlation measured by Pratt's method [33, 34].

The Factor Determination Index (FDI) was used to evaluate the quality and effectiveness of the score estimates. Values greater than 0.90 [35, 36], marginal reliability Bayesian Expected a Posteriori (EAP) (> 0.80), Sensitivity Ratio (SR > 2), and Expected Percentage of True Differences (EPTD > 90%) were considered adequate estimates.

Reliability was assessed using three indicators: Cronbach alpha [37], Omega [38], and ORION scores [39]. Accuracy rates of 0.70 and above were considered acceptable.

The data was analyzed using the Factor statistical program version 12.01.01.

2.5. Data Collection

Data were collected from August to November 2020 in households and Family Health Units, based on participant preferences, using a data collection tool consisting of sociodemographic characterization (designed specifically for the study) and ERRVI version 3. It took an average of 25 minutes for an individual to complete the data collection tool.

The data collection process was overseen by one of the

researchers, with the help of trained and supervised undergraduate nursing students.

2.6. Ethical Procedures

This project was approved by the Ethics Committee, CAAE number 3,381,215, official letter number 13989419.6.0000.541, according to the recommendations of Resolution 466/2012 on the ethical standards of research involving humans [40] and the General Data Protection Law (LGPD) [41].

3. RESULTS

Based on the theoretical models [9], the first version of the ERRVI was proposed, comprising three dimensions: self-governance (34 items), commitment to health (21 items), and engagement with life projects (26 items), totaling 81 items.

After the development of ERRVI version 1, it was presented to a panel of experts with more than 20 years of training (53.8%) and working in mental health and / or geriatrics (30.8%). The suggestions of this panel of experts included changing the items from questions to statements and using simpler terms for easier understanding. At this stage, 28 items were excluded because their CVR was below 0.54, and 22 items were reformulated. Consequently, ERRVI version 2, which included 53 items, was pretested. This allowed for adjustments to the language of the items and a change to three answer options (always, sometimes, and never), as the elderly reported difficulty distinguishing between the "often" and "sometimes" options. This stage resulted in ERRVI version 3.

To assess the validity of the internal structure of ERRVI version 3, 300 elderly individuals, predominantly women (162; 54%), aged between 60 and 69 years (150; 50%), with primary education (186; 62%), a family income of one to two thousand reais (165; 55%), and living with family members (138; 46%). 123 elderly people (40.7%) took four or more medications, the main morbidities self-reported: Systemic Arterial Hypertension (218 cases;

72.7%), Diabetes Mellitus (94 cases; 31.3%), Osteoarticular Diseases (75 cases; 25.0%), and Depression (47 cases; 15.7%).

In the evaluation of the adequacy measures of the sample, six items of the preliminary version did not show adequate factorability and were therefore excluded from the analysis [18]. As this is an unrestricted model (EFA), these items could influence others' outcomes. Thus, after exclusion, the overall sample adequacy indices were KMO = 0.83, Bartlett sphericity = 3229.4 (df = 1378; p < 0.0001), and the determinant of the matrix was < 0.000001. In the dimensionality analysis, PA indicated a model with five dimensions and 47 items. Sixteen items were excluded due to fit issues, consistent with statistical and interpretive principles, according to the theoretical model that guided the development of the tool. The set of primary indicators considered for excluding items included factor loadings, communalities, Pratt's Importance Measure Eta, and model fit indices until the two principles were aligned. The exclusion of these items altered the dimensions of the instrument, which increased the accuracy of the four-dimensional model. The matrix of 31 items showed a KMO = 0.82, Bartlett's sphericity test = 3313.8 (df = 465; p < 0.0001), and the determinant of the matrix was < 0.000001. The explained variance of the model was 50.82%, and the closeness of the dimensionality values indicated a multidimensional model: Single = 0.86, ECV = 0.73, and MIREAL = 0.22.

Table 1 shows the factor loadings, communalities, and Pratt's measure of Eta for the final model. The first dimension, named "Autonomy," included items 1 to 9 with factor loadings ranging from 0.47 to 0.80. The second dimension was named "Self-governance" and covered items 10 to 15 with factor loadings ranging from 0.32 to 0.86. The third dimension, named "Self-care," covered items 16 to 21 with factor loadings ranging from 0.45 to 0.68. "Life satisfaction" was the final dimension, covering items 22 to 31, with factor loadings ranging from 0.39 to 0.78.

Table 1. Factor loadings, communalities, and *pratt's eta measure* for the final model of the elderly suicide screening scale (ERRVI).

-	Factor Loadings				-	Pratt's Measure - (ETA)			
Item	Autonomy	Self-governance	Self-care	Life satisfaction	h^2	Autonomy	Self-governance	Self-care	Life satisfaction
i1	**0.501**	-0.159	0.178	0.215	0.374	**0.497**	0.000	0.218	0.283
i2	**0.476**	-0.135	0.154	0.296	0.414	**0.491**	0.000	0.205	0.362
i3	**0.617**	-0.077	0.038	0.104	0.403	**0.606**	0.000	0.072	0.176
i4	**0.605**	0.128	0.104	-0.061	0.456	**0.621**	0.226	0.139	0.000
i5	**0.754**	-0.053	-0.138	0.000	0.526	**0.721**	0.000	0.076	0.009
i6	**0.698**	-0.033	-0.132	-0.034	0.448	**0.665**	0.000	0.081	0.000
i7	**0.801**	-0.031	0.019	-0.071	0.588	**0.765**	0.000	0.044	0.000
i8	**0.646**	0.084	0.028	-0.088	0.442	**0.640**	0.172	0.053	0.000
i9	**0.659**	0.102	0.005	-0.052	0.484	**0.666**	0.199	0.023	0.000
i10	0.048	**0.509**	0.085	0.085	0.351	0.126	**0.541**	0.132	0.160
i11	-0.054	**0.862**	0.075	-0.116	0.673	0.000	**0.813**	0.115	0.000
i12	-0.025	**0.786**	-0.056	-0.068	0.560	0.000	**0.749**	0.000	0.000
i13	0.161	**0.451**	0.029	0.152	0.393	0.263	**0.512**	0.071	0.237

(Table 3) contd.....

-	Factor Loadings				-	Pratt's Measure - (ETA)			
Item	Autonomy	Self-governance	Self-care	Life satisfaction	h^2	Autonomy	Self-governance	Self-care	Life satisfaction
i14	0.203	**0.326**	0.006	0.088	0.251	0.281	**0.384**	0.026	0.156
i31	-0.164	**0.443**	-0.100	0.276	0.263	0.000	**0.422**	0.000	0.290
i16	0.017	0.099	**0.601**	-0.215	0.344	0.034	0.116	**0.574**	0.000
i17	0.029	-0.079	**0.452**	0.103	0.238	0.052	0.000	**0.460**	0.153
i18	0.032	-0.015	**0.680**	-0.073	0.438	0.055	0.000	**0.660**	0.000
i19	-0.018	0.050	**0.661**	-0.022	0.438	0.000	0.086	**0.656**	0.000
i20	-0.017	-0.054	**0.520**	0.260	0.403	0.000	0.000	**0.548**	0.320
i21	-0.037	0.028	**0.531**	-0.023	0.276	0.000	0.052	**0.523**	0.000
i15	0.224	0.036	-0.126	**0.396**	0.265	0.284	0.095	0.000	**0.418**
i22	0.041	-0.022	0.036	**0.476**	0.248	0.092	0.000	0.082	**0.482**
i23	-0.015	0.069	-0.022	**0.693**	0.500	0.000	0.141	0.000	**0.693**
i24	-0.033	0.092	-0.090	**0.738**	0.544	0.000	0.166	0.000	**0.719**
i25	0.009	-0.009	0.080	**0.713**	0.552	0.050	0.000	0.156	**0.724**
i26	0.058	0.083	-0.086	**0.535**	0.328	0.126	0.149	0.000	**0.538**
i27	-0.126	0.005	-0.016	**0.655**	0.380	0.000	0.028	0.000	**0.616**
i28	-0.084	0.029	0.043	**0.621**	0.383	0.000	0.075	0.099	**0.606**
i29	0.022	-0.175	0.099	**0.471**	0.235	0.052	0.000	0.147	**0.459**
i30	0.046	0.040	0.053	**0.316**	0.139	0.093	0.084	0.094	**0.338**

Note: Source: Authors' own compilation, 2024.

Table 2. Summary of the final model of the elderly suicide screening scale (ERRVI).

-	Index	Technique	Initial Theoretical Model (Three Dimensions)	Final Model (Four Dimensions)
Measures of Sample Adequacy and Primary Indices	Correlation Matrix Adequacy	The determinant of the matrix	< 0.000001	< 0.000001
		Bartlett	3229.4 (df = 1378)	3313.8 (df = 465)
		KMO (Kaiser-Meyer-Olkin)	0.83	0.82
	Explained Variance (AP)	-	32.98%	50.82%
	Polychoric Correlation (r_p =)		- 0.50 a 0.75	- 0.08 a 0.76
Reliability	Cronbach's Alpha		0.91	0.88
	McDonald's Omega		0.96	0.95
	ORION*		0.90; 0.96; 0.80; 0.91	0.88; 0.84; 0.78; 0.87
Score Quality and Effectiveness	Factor Determinacy Index (FDI)*		0.95; 0.90; 0.95	0.94; 0.91; 0.88; 0.95
	Sensitivity Ratio (SR)*		3.11; 5.2.12; 3.14	2.80; 2.31; 1.92; 2.62
	Expected percentage of true differences (EPTD)*		92.8%; 89.3%; 92.9	91.9%; 90.1%; 88.3%; 91.3%

Note: * Respectively for the domains; *df = Degrees of freedom*.
Source: Authors' own compilation, 2024.

The reliability indicators showed Cronbach's alpha and omega of 0.88 and 0.95, respectively. The ORION values for the dimensions ranged from 0.78 to 0.84. Table **2** summarizes the initial and final models for all indicators.

The results of EFA, which sought evidence of the validity of the scale's internal structure, revealed a 31-item model across four dimensions, after excluding 22 items (Chart **1**).

4. DISCUSSION

4.1. Development and Psychometric Evaluation of ERRVI

This study introduced the development and analysis of a scale designed to assess suicide among the elderly in the community. This scale is based primarily on a theoretical model derived from studies on women, developed through qualitative research within the framework of grounded theory and symbolic interactionism [9]. The assembly resulted in an initial version consisting of 81 items. After analyzing the internal structure, the final version of the tool was reduced to 31 items and distributed in four dimensions: autonomy, self-governance, self-care, and life satisfaction.

The theoretical model identified two groups of elderly people in the community in two dimensions: risk (quietly giving up on life) and security (claiming to be resilient). They are mediated by an intervening self-assessment subprocess named exercise of autonomy-life satisfaction [9].

The elderly showed a more positive self-assessment of this subprocess despite being identified with low social support and depression. This contrasts with those who had a negative view and consequently quietly gave up on life, frequently relying on religion [9].

Chart 1. Final version of the scale for the elderly suicide screening scale (ERRVI).

		Answer Options		
	Items	**Always**	**Sometimes**	**Never**
		1	**2**	**3**
i1	I have the autonomy to make my own decisions.	-	-	-
i2	I consider myself free to make my own decisions.	-	-	-
i3	I take care of my money without needing help.	-	-	-
i4	I go to the bank/lottery office or use internet *banking* to pay my bills.	-	-	-
i5	I can get up without help.	-	-	-
i6	I can dress myself without help.	-	-	-
i7	I can prepare my own meals without help.	-	-	-
i8	I leave the house to go shopping.	-	-	-
i9	I do my homework without needing help.	-	-	-
i10	I take part in social/leisure activities such as lunches, dinners, dances, birthdays, weddings, and trips.	-	-	-
i11	I take part in group activity(ies), such as church, senior citizens, or others.	-	-	-
i12	I attend religious activities such as masses/cults/prayer groups.	-	-	-
i13	I do voluntary work.	-	-	-
i14	I do physical activity.	-	-	-
i31	I feel supported by religion.	-	-	-
i16	I usually go to the health services.	-	-	-
i17	My healthcare needs have been met by the services.	-	-	-
i18	I regularly monitor my health with consultations and tests.	-	-	-
i19	I attend scheduled appointments at health services.	-	-	-
i20	I follow the advice of health professionals.	-	-	-
i21	I go to the health team and/or doctor when treatment isn't solving my problem.	-	-	-
i15	I'm satisfied with my health.	-	-	-
i22	I remain hopeful about my health.	-	-	-
i23	I enjoy living.	-	-	-
i24	I'm motivated to live.	-	-	-
i25	I have hope in life.	-	-	-
i26	My living situation could improve.	-	-	-
i27	I feel recognized by my family.	-	-	-
i28	I'm satisfied with my family relationship.	-	-	-
i29	I am satisfied with my earnings/financial assets.	-	-	-
i30	My financial situation allows me to fulfill the dreams/desires I have.	-	-	-
	SUBTOTALS	-	-	-
	TOTAL	-		

This scale aims to assess the renunciation of life among the elderly, considering their self-governance, commitment to health, and involvement with their life goals. Please read the items carefully and indicate with an X the response option that best reflects your feelings over the last week.

Note: Source: Authors' own compilation, 2024.

According to this model, the elderly views their autonomy as crucial for maintaining resilience in life. They believe in their ability and capacity to tackle challenges, thus thereby upholding their moral, intellectual, and physical rights to make their own decisions without facing restrictive impositions, allowing them to enjoy and relish freedom and independence of movement, thus ensuring their rights for self-governance. This concept is indicated by three behaviors: seeking strategies to exercise autonomy, voluntarily seeking and following health treatments, and remaining engaged in life projects [9].

Consequently, they prioritize their self-care, demonstrating motivation to seek and adhere to health treatments voluntarily through spontaneous, persistent, and committed efforts to maintain and improve their health, as well as their quality of life. Consequently, they remain engaged in life projects, unlike those who silently give up on life and engage in self-destructive behaviors that are frequently hidden from family and society. This is particularly true for older people who have lost or experienced a reduction in the exercise of their independence. Feeling discouraged and seeing no possibility of alleviating this suffering, they find no pleasure or meaning in life and, therefore, decide to give up [9].

The literature has associated the loss of personal

autonomy in the elderly with a decline in biopsychosocial health, requiring researchers to develop and validate tools for health professionals to assess personal autonomy in the elderly, such as the Maastricht Personal Autonomy Questionnaire [42]. This is why the autonomy assessment has been used as a subscale to assess the quality of life among the elderly. Additionally, research shows that social support and spirituality, along with cognitive impairment, anxiety, and limitations in activities of daily living, considerably influence the self-perceived level of autonomy in this population. This study recommends that healthcare professionals use this information to encourage the participation of the elderly in decision-making processes by implementing programs that improve their quality of life [43].

Regarding the analysis of the internal structure of the ERRVI, assessed using EFA, all factor loadings and Pratt's measure of Eta were adequate, and there were no Heywood cases or instances of double saturation. The factor loadings of the items in the dimensions where they did not saturate were lower than those in the dimensions where they aligned, demonstrating that each item discriminates well between domains.

The reliability indicators showed good levels of Cronbach's alpha, omega, and ORION. The quality indices of the factorial solution were satisfactory for FDI, SR, and EPTD.

This is an innovative tool with social value, given the scarcity of tools that assess suicide among the elderly. It is the first of its kind in Brazil and the third globally.

An important point to consider is that the data collection period coincided with the COVID-19 pandemic, which profoundly affected people's routines. Measures such as social distancing indirectly or directly affect people's mental health, including that of the elderly, and may have influenced the results.

More studies should be conducted to analyze the psychometric properties and standardization of the scale, with the aim of establishing it as a tool to screen the risk of suicide among the elderly. It should be emphasized that the proposed scale was designed for elderly individuals living in the community; therefore, the results of other populations may not be applicable.

It is crucial to highlight that this study elucidates a topic that has received limited attention in the Brazilian and international literature and considerably advances the operational aspects of the PHC team's work process, particularly in the area of the mental health of the elderly, as it introduces a screening tool to screen for suicide in this age group.

Finally, the psychometric properties of ERRVI indicate that it is a reliable and effective tool that can facilitate improvements in the care of the elderly. This would enable PHC teams to alleviate psychological distress and prevent suicide, which often goes unnoticed.

In particular, the process of standardizing the scores on the scale used for screening for suicide among the elderly in the community will be detailed in a subsequent article.

4.2. Implications for Nursing

Nursing accounts for 59% of the health workforce worldwide [44] and 70% of this workforce in Brazil [45]. Community nurses and nursing technicians will be able to use ERRVI as a tool to prevent suicide among the elderly and improve the quality of mental health in this population, together with the interprofessional PHC team.

CONCLUSION

The ERRVI showed evidence of content validity and internal structure consistent with the recommended psychometric parameters.

AUTHORS' CONTRIBUTION

It is hereby acknowledged that all authors have accepted responsibility for the manuscript's content and consented to its submission. They have meticulously reviewed all results and unanimously approved the final version of the manuscript.

LIST OF ABBREVIATIONS

AFE	=	Exploratory Factor Analysis
APS	=	Primary Health Care
CVR	=	Content Validity Ratio
DF	=	Degrees of Freedom
EAP	=	Bayesian Expected a Posteriori
ECV	=	Explained Common Variance
EPTD	=	Expected Percentage of True Differences
ERRVI	=	*Escala de Rastreamento de Renúncia à Vida no Idoso não institucionalizado* (Elderly Suicide Screening Scale)
ESF	=	Family Health Strategy
UDC	=	Unique Directional Correlation
FDI	=	Factor Determination Index
KMO	=	Kaiser-Meyer-Olkin
LGPT	=	General Data Protection Law
MAS	=	Measure of Sampling Adequacy
MIREAL	=	Mean of Item Residual Absolute Loadings
ORION	=	Overall reliability of fully-informative prior oblique N-EAP scores
PA	=	Parallel Analysis
ICF	=	Informed Consent Form
ULS	=	Unweighted Least Squares
UNIQUE	=	Unidimensional Congruence

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study was evaluated and approved by the Research Ethics Committee of the Botucatu School of

Medicine - UNESP, Brazil. This project was approved by the Ethics Committee, CAAE number 3,381,215, official letter number 13989419.6.0000.541.

HUMAN AND ANIMAL RIGHTS

All human research procedures followed were in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki Declaration of 1975, as revised in 2013.

CONSENT FOR PUBLICATION

Data were collected after participants had signed an informed consent form.

AVAILABILITY OF DATA AND MATERIALS

This article is the result of a doctoral thesis defended at the Academic Graduate Program in Nursing, Botucatu Medical School, São Paulo State University (Unesp), Brazil. This thesis is deposited in the Unesp repository, link: http://hdl.handle.net/11449/218034.

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CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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