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Evidence of Internal Validity of the Social Skills Inventory for Caregivers (SSI-CE) in Brazil

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Abstract

With population aging, it is important to develop studies on psychological skills that can facilitate the task of caregivers of a dependent older adult. The Social Skills Inventory for Caregivers of the Elderly (SSI-CE) is an assessment tool for this purpose. Even considering that the instrument already has evidence of validity, the aim of this study is to seek additional evidence of validity for the SSI-CE. To this end, 533 family caregivers of older adults with an average age of 49.7 years were investigated by responding to the following instruments: Sociodemographic Questionnaire, Brazil Economic Classification Criteria, and SSI-CE. Initially, two factor models for the SSI-CE were compared (second-order and bifactor models). Then, analyses were performed for measurement invariance and sample heterogeneity of the SSI-CE in relation to the variables age, gender, presence of dementia in the elderly care receiver, and type of data collection (online or in-person). Finally, the instrument's reliability values were checked. After comparing the models, the second-order model was the most appropriate, as it displayed reliability values ranging from $\omega = 0.66$ to $\omega = 0.89$. In invariance analysis, variability was found for sample heterogeneity in the variables gender, presence of dementia, and type of data collection. In conclusion, the calculation of a global score for the SSI-CE is pertinent, with good evidence of internal validity. However, specific rules should be established, considering different sample characteristics.

Keywords

caregivers, elderly, aging, social skills, psychological assessment, social competence, family

The world population is aging, mainly due to the decreasing birth rate of women and the better medical and sanitary conditions offered to the population (United Nations Department of Economic and Social Affairs Population Division, 2020). Following this aging trend, the number of older persons in the world is expected to more than double in the next three decades (United Nations Department of Economic and Social Affairs Population Division, 2020). This trend also implies an increase in the need for assistance and care for the older population, since approximately half of older adults have some type of dependence, therefore needing assistance in their activities of daily living (Pampolim et al., 2017). Assistance to older adults can be provided by professional caregivers (who exercise care activities as a form of paid work) or informal caregivers (usually family members or friends; Queluz, Kervin, et al., 2020). In developing countries, family members are usually the primary caregivers of older persons, as the network of home care services and long-term care facilities is limited or non-existent (United Nations Department of Economic and Social Affairs Population Division, 2020).

In this sense, besides paying attention to the care of this growing elderly population, it is also necessary to understand the difficulties and potential of caregivers. According to the review conducted by Queluz, Kervin, et al. (2020), the maintenance of caregivers' health appears as their main need. In general, studies have indicated that caring for another person can lead to feelings of stress, depression, and overload (Barham et al., 2015; Pereira & Soares, 2015; Pinto et al., 2016). Thus, in addition to investigating ways to mitigate these impacts, it is also important to investigate skills that can help caregivers to minimize or suppress potential negative consequences arising from the care activity. In this context, social skills have contributed to promoting better interpersonal relationships in caregivers of older adults (Pinto et al., 2016; Queluz, Barham, et al., 2019).

Conceptualized as "social behaviors valued in a given culture, with a high probability of quality interpersonal relationships for the individual, their group and community" (Del Prette & Del Prette, 2017, p. 24), social skills can be relevant in situations in which relationships between two or more people take place, as in the care of a dependent older adult. These skills are composed of classes of behaviors present in the individual's repertoire, contributing to the success of their social performance in social interactions. Some of these classes are communication, teamwork, expression of feelings, control of aggressiveness, assertiveness, empathy, exercise of rights, civility, self-exposure to new situations, and self-assertion (Del Prette & Del Prette, 2017, 2019).

In the case of caregivers of older adults, interpersonal relationships happen directly not only with the older relative, but also between the caregiver and the people indirectly involved in this care (e.g., other family members or health professionals). Some of the most relevant social skills for this population are expressing positive feelings, being

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able to ask for help from others, seeking information about the illness of the care-recipient, and assertive communication (Pinto et al., 2016). Furthermore, evidence on the importance of these skills for caregivers shows that the burden experienced by such individual is related to a concentration of several care tasks in a single person (Grazziotin & Scortegagna, 2018; Pereira & Soares, 2015). According to the authors, this feeling could be mitigated by sharing these tasks, which could be agreed based on good quality interpersonal relationships.

It is worth noting that a person's social skills repertoire can also be related to sociodemographic variables. Scheufler et al. (2017), for example, found that 1) the presence of depressive symptoms, 2) the years of education, and 3) the socioeconomic level of older adults was related to their social skills repertoire, indicating that a broader repertoire of social skills could be linked to less depressive symptoms, more years of education and a higher socioeconomic level of older adults in their communities. Similar studies could be developed to assess these differences in other populations, such as the growing population of caregivers of older adults. However, specifically for caregivers, Queluz, Barham, et al. (2019), conducted a review of the literature in which they found that, despite the relationship between social skills and 1) a lower feeling of burden and 2) better psychosocial adjustment on the part of caregivers, the research on social skills in caregivers' older adults is still recent, and it is necessary to deepen the existing knowledge on this subject. Thus, an instrument that could measure the social skills of caregivers would contribute to the advancement of studies in this field.

In order to fill this gap, Queluz et al. (2017) developed the Social Skills Inventory for Family Caregivers of the Elderly (SSI-CE), an instrument that aims to assess the social skills of family caregivers of older adults. After semantic and content evaluation of the SSI-CE, the authors sought evidence regarding the internal structure and measurement reliability. A 24-item structure, divided into three factors: Emotional Expressiveness ($\alpha = 0.87$), Assertive Communication ($\alpha = 0.79$), and Information Seeking ($\alpha = 0.60$) was identified as appropriate for the instrument.

Additional evidence of validity based on the relationship between the SSI-CE and measures that assess theoretically related constructs was found by Queluz et al. (2018). As expected, the SSI-CE was positively correlated with quality of life ($r = .30$; $p < .01$) and positive interaction with senior ($r = .48$; $p < .01$), and negatively correlated with burden ($r = -.43$; $p < .01$), presence of depressive symptoms in caregiver ($r = -.28$; $p < .01$) and conflict in their relationship with senior ($r = -.34$; $p < .01$). Subsequently, analyses were also conducted to evaluate a potential social-desirability bias of the instrument. In this sense, Queluz et al. (2021) found no correlation between the SSI-CE and the Marlowe-Crowne Social Desirability Scale ($r = .07$; $p = .52$), indicating evidence of discriminant validity for the measure.

A psychological assessment instrument needs to present good evidence of validity so that its scores can be accurately measured and interpreted, for example, relation-

ship with variables already known in the literature and good fit indices, when testing the model statistically (American Educational Research Association [AERA], American Psychological Association [APA], & National Council on Measurement in Education [NCME], 2014). As demonstrated, the SSI-CE already presents several types of evidence of validity, indicating its potential for use. However, as it is a cumulative process (AERA et al., 2014), additional evidence is still needed, so that SSI-CE scores can be properly interpreted. For example, when evaluating a particular construct, it can be hypothesized that different related domains comprise a single general factor of interest. In this case, evidence justifying the calculation of a general score for the construct is needed. Confirmatory Factor Analysis (CFA) is adequate to show (or not) the existence of a general factor, as it aims to identify latent variables (factors) manifested by directly observable variables (instrument items; Laros, 2012).

Different factor models can be tested in CFA to verify which one best represents the factor structure of a set of items, such as correlated-factor models, second-order hierarchical models, or bifactor models (Reise et al., 2010). Some models assume the existence of a general factor that directly or indirectly encompasses all the items of the instrument, such as the bifactor model and the second-order model, respectively. In the bifactor model, there are only first-order latent factors (directly linked to the items), including a general factor (that generically represents the construct that the instrument should measure) and specific factors (that represent more restricted conceptual subdomains of the same construct; Reise, 2012). Thus, each item loads on a specific factor and on the general factor (Rios & Wells, 2014), and there is no relationship between the general and the specifics factors.

In the second-order model, in turn, there are two types of latent variables: first and second order. The second-order factor, which broadly represents the construct to be measured, is directly linked to first-order factors, which reflect specific skills or domains of this construct (Wolf et al., 2011). Therefore, an assessment of both models (bifactor and second-order) would bring empirical support to investigate the presence of a general factor for the social skills of caregivers of older adults, indicating the relationship between the observable variables and the latent factors of the instrument. In addition, invariance assessment of the internal structure of the SSI-CE in relation to variables already recognized as related to social skills in other populations might be important.

Given the above, the objective of this study is to seek additional evidence of validity to confirm that the SSI-CE is fit for use. Hence, the study aims to check for evidence of validity based on the instrument's internal structure, empirically testing the existence of a general factor. To this end, the plausibility of a second-order and bifactor structure for the SSI-CE was evaluated. In addition to performing an invariance analysis of the most suitable structure for the SSI-CE in relation to the variables gender, age, presence of dementia, and type of data collection (online or in-person), the reliability values for the general score, if feasible, and for each specific factor of the instrument were also verified.

Method

Participants

A total of 533 family caregivers of older adults participated in this study, with an average age of 49.7 years (*SD* = 14.1), ranging from 18 to 87 years. The majority were females (88.5%), children of the elderly care receiver (62.5%), married or in a stable relationship (57.6%), with complete higher education (40.5%), and belonging to the Brazilian B2 soci-oeconomic group (27.8%). Considering the relationship with the elderly care-recipient, other could be neighbors or even formal caregivers who continued care, when the elderly could no longer pay for the service. The sample was non-probability and of convenience. In each state, caregivers were recruited from a national Brazilian program called *Serviço de Atendimento Domiciliar* (SAD; Home Care Service) or referred by other caregivers or researchers' acquaintances. The inclusion criteria were being over 18 years of age and being relative of the senior they cared for. Caregivers who received any payment to care for the senior were removed from the sample. Data collection was performed at caregivers' homes, at the units of the SAD, or somewhere chosen by them, in order to ensure confidentiality and privacy. Data was also collected online, through a Google Forms interview. From the total sample, 76 participants (14.3%) responded remotely (online). Participants' sociodemographic data are shown in Table 1.

Table 1

Participants' Sociodemographic Data (N = 533)

Variable	*n*	%
Gender		
Female	472	88.6
Male	61	11.4
Marital Status		
Single	134	25.2
Married/Stable Union	307	57.7
Divorced	63	11.9
Widow(er)	27	5.2
Education		
Illiterate/Incomplete Elementary School	28	5.3
Elementary/Incomplete Middle School	68	12.9
Middle School/Incomplete High School	39	7.3
High School/Incomplete Higher Ed	178	33.4
Complete Higher Education	216	40.5
Did not answer	4	0.6

Variable	n	%
Economic Class		
A	54	10.1
B	245	46.0
C	192	36.0
D	39	7.3
E	3	0.6
Relationship with Senior		
Child	343	64.4
Grandchild	47	8.8
Spouse	59	11.1
Child-in-law	36	6.8
Sibling	6	1.1
Friend	9	1.7
Other	32	6.1
Age		
18 to 60 years	406	79.2
61 years or older	127	20.8
Type of Data Collection		
In-person	457	85.7
Online	76	14.3

Instruments

Sociodemographic Questionnaire

Prepared by the authors of this study to raise the sample characteristics, such as gender, age, education, marital status, and relationship with the senior they cared for. In addition, caregivers were asked whether the senior had been diagnosed with some sort of dementia.

Brazil Economic Classification Criteria

The Brazil Economic Classification Criteria (ABEP, 2016) aim to assess the socioeconomic level of families based on their purchasing power, number of durable consumer goods, presence of domestic workers, head of household education level, access to tap water, and whether the household is located on a paved street. Classes are divided into seven tiers: A, B, C, D and E.

Social Skills Inventory for Family Caregivers of the Elderly

The Social Skills Inventory for Family Caregivers of the Elderly (SSI-CE; Queluz et al., 2017) aims to assess the interpersonal repertoire related to the social skills of family caregivers of older adults. The instrument consists of 24 items, divided into three fac-

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tors: Affective Expressiveness (10 items, α = 0.87), Assertive Communication (10 items, α = 0.79) and Training/Information Seeking (4 items, α = 0.60), and has a total Cronbach's alpha of 0.89. The first and second factors generate a score ranging from 10 to 40, while the third generates a score ranging from 4 to 12. The sum of the factors results in an overall score ranging from 24 to 96. The higher the score, the greater the repertoire of social skills reported by the caregiver. Caregivers respond to the instrument by indicating whether they *never*, *sometimes*, *often* or *always* behave in a certain way in a given situation. Item examples are: "When a family member praises the way I care for our elderly relative, I say thank you"; "I show affection to the older person that I care for through words or gestures."

Procedure

The first step of the research was contacting the elderly healthcare service to obtain authorization to recruit the caregivers they had access to. After approval, the project was submitted and approved for execution by the Ethics Committee of the *Universidade São Francisco* (No. 1.876.754/2017). Then, a pre-selection of caregivers who fit the desired profile within the contact institutions was carried out. When caregivers accepted to be part of the research, an in-person data collection interview was scheduled. Initially, a Free and Informed Consent Form was read and potential questions were answered. Subsequently, caregivers responded to the following instruments: Sociodemographic Questionnaire, Brazil Economic Classification Criteria, and SSI-CE. Data collection sessions were conducted individually, and participants could choose if they preferred to have items read aloud by the researcher (e.g., in case of low education level) or if they would like to read and answer the questions by themselves. Online data collection was conducted via Google Forms, and participants were recruited from caregiver groups on social media (Facebook and WhatsApp). At the beginning of the survey, caregivers would read the Free and Informed Consent Form and indicate if they accepted to participate. If they did not agree with the consent form, the survey was interrupted. In addition, the e-mail address of the first author of this work was made available in case they wanted to get in touch to have their questions answered. The order of application of the instruments was the same: Sociodemographic Questionnaire, Brazil Economic Classification Criteria, and SSI-CE.

Data Analysis

The data were analyzed using the MPlus software. Descriptive statistics were used to characterize the sample according to sociodemographic aspects. The KMO index (*Kaiser–Meyer–Olkin*) and Bartlett's sphericity test were examined to apply factor analysis to the data matrix (Hair et al., 2006). Factor analysis was performed using the Weighted Least Squares Mean and Variance (WLSMV) estimation method. The adjustment indices

considered were: Comparative Fit Index (CFI ≥ 0.90), Standardized Root Mean Square Residual (RMSEA, ≤ 0.08), Tucker Lewis Index (TLI ≥ 0.90), and Chi-square divided by degrees of freedom (χ^2/df < 5; Hu & Bentler, 1999). Factor weights greater than 0.40 were considered adequate (Hair et al., 2006; Pituch & Stevens, 2016). The second-order model was found to be more suitable. Therefore, Pearson's correlation was used to verify the level of association between the factors of the SSI-CE and its general factor. The magnitude of the correlations was classified as: weak (< 0.30), moderate (0.30 to 0.59), strong (0.60 to 0.99) or perfect (1.0; Barrett et al., 1981).

For the invariance analysis, measurement invariance and sample heterogeneity models were compared using the software JASP 0.12, and CFI changes greater than 0.01 in relation to the previous model were considered an indication of invariance violation (Damásio, 2013). The variables evaluated were: age, gender, presence of dementia in the elderly care receiver, and type of data collection. The internal consistency indices used were Cronbach's Alpha and McDonald's Omega, and values above 0.60 were considered acceptable (Dunn et al., 2014; Ventura-León & Caycho-Rodríguez, 2017). The software JASP 0.14.0 was used for invariance analysis and reliability measures (Love et al., 2019).

Results

Comparison of the Proposed Factor Models for the SSI-CE

The first part of data analysis was to verify if the data matrix is possible for factoring. The KMO value was = 0.92 and p = .001, for Bartlett's Test, indicating that the correlation matrix is factorable (Damásio, 2012). Then, the plausibility of calculating a global score for the SSI-CE was tested, by checking CFA results for the second-order and bifactor models. Subsequently, the results of these models were compared to check which would be more suitable for the instrument. The adjustment index values found for both models are shown in Table 2. In addition, both models are shown in Figure 1, including factor loadings for all items and factors.
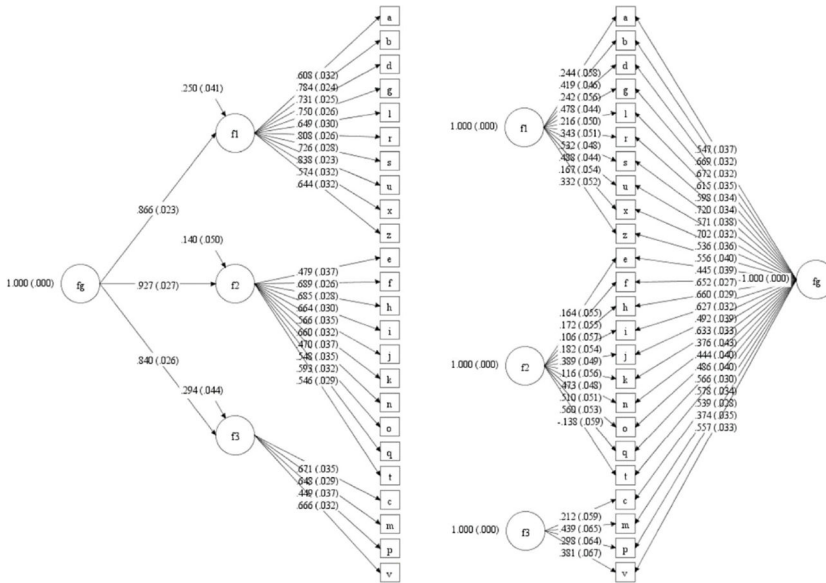
Table 2

Adjustment Indices of the SSI-CE Model Proposed by Queluz et al. (2017) Tested with Second-Order and Bifactor Models

Model	Factor Loadings	Adjustment Indices			
		χ^2/df	CFI	RMSEA	TLI
Reference Value	> 0.40	< 5	≥ 0.90	< 0.08	≥ 0.90
Second-Order Factor	≥ 0.45	3.44	0.93	0.07	0.92
Bifactor	≥ 0.11	2.92	0.95	0.06	0.94

Note. CFI = Comparative Fit Index; TLI = Tucker Lewis Index; RMSEA = Root Mean Square Error of Approximation.

Figure 1

SSI-CE Factor Structure When Second-Order and Bifactor Models Are Evaluated, Respectively

Based on the data shown in Table 2, all the adjustment indices evaluated for the second-order and bifactor models were suitable. However, the bifactor model presented factor loadings below the 0.40 cutoff. Thus, the fit index of the results for the second-order model may empirically justify the existence of a general factor for the SSI-CE, indicating that this is the most plausible model for the instrument. The fact that the SSI-CE is represented by a second-order model means that specific factors are related, and the variations found in these factors can be explained by a broader construct (second-order factor), justifying the calculation of a general score for the latent variable (in this case, social skills), which is supported by theory (Del Prette & Del Prette, 2019). In addition to the adjustment indices, the correlations between the factors of the instrument and of these factors with the general score were also evaluated. Results are shown in Table 3.

Table 3

Correlations Between SSI-CE Total Score and the Scores of the Three Factors

Factor	Total Score	Factor 1	Factor 2
Factor 1 Affective Expressiveness	0.89*		
Factor 2 Assertive Communication	0.89*	0.62*	
Factor 3 Training/Information Seeking	0.74*	0.55*	0.55*

*$p < .001$.

According to the results shown in Table 3, all factors were significantly correlated with each other and with the general score. The correlations found were either moderate or strong.

SSI-CE Invariance Assessment

Tables 4–7 show the adjustment indices for the factor structure of the SSI-CE for six invariance models (configural, metric, scalar, residual, structural, and latent mean). The variables analyzed were: age, gender, presence of dementia in the elderly care receiver, and type of data collection.

Table 4

SSI-CE Age Invariance Analysis

Modeling	χ^2/df	CFI	TLI	SRMR
General Model	1.45	0.99	0.99	0.05
Measurement Invariance				
Configural Invariance	1.19	0.98	0.98	0.06
Metric Invariance	1.19	0.98	0.98	0.07
Scalar Invariance	1.19	0.98	0.98	0.07
Residual Invariance	1.24	0.98	0.98	0.07
Population Heterogeneity				
Structural Invariance	1.33	0.98	0.98	0.07
Latent Mean Invariance	1.37	0.97	0.97	0.08

Note. CFI = Comparative Fit Index; TLI = Tucker Lewis Index; SRMR = Standardized Root Mean Square Residual.

Table 5

SSI-CE Gender Invariance Analysis

Modeling	χ^2/df	CFI	TLI	SRMR
General Model	1.45	0.99	0.99	0.05
Measurement Invariance				
Configural Invariance	1.10	0.99	0.99	0.06
Metric Invariance	1.10	0.99	0.99	0.06
Scalar Invariance	1.09	0.99	0.99	0.07
Residual Invariance	1.09	0.99	0.99	0.07
Population Heterogeneity				
Structural Invariance	2.05	0.94	0.94	0.08
Latent Mean Invariance	2.07	0.93	0.93	0.08

Note. CFI = Comparative Fit Index; TLI = Tucker Lewis Index; SRMR = Standardized Root Mean Square Residual.

Table 6

SSI-CE Invariance Analysis for Presence of Dementia

Modeling	χ^2/df	CFI	TLI	SRMR
General Model	1.45	0.99	0.99	0.05
Measurement Invariance				
Configural Invariance	1.13	0.99	0.99	0.07
Metric Invariance	1.11	0.99	0.99	0.07
Scalar Invariance	1.12	0.99	0.99	0.08
Residual Invariance	1.11	0.98	0.99	0.08
Population Heterogeneity				
Structural Invariance	1.82	0.92	0.92	0.11
Latent Mean Invariance	1.92	0.91	0.91	0.11

Note. CFI = Comparative Fit Index; TLI = Tucker Lewis Index; SRMR = Standardized Root Mean Square Residual.

Table 7

SSI-CE Invariance Analysis for Type of Data Collection (Online or In-Person)

Modeling	χ^2/df	CFI	TLI	SRMR
General Model	1.45	0.99	0.99	0.05
Measurement Invariance				
Configural Invariance	1.33	0.98	0.98	0.06
Metric Invariance	1.35	0.98	0.98	0.06
Scalar Invariance	1.32	0.98	0.98	0.06
Residual Invariance	1.36	0.98	0.98	0.07
Population Heterogeneity				
Structural Invariance	3.07	0.87	0.89	0.11
Latent Mean Invariance	3.17	0.86	0.87	0.11

Note. CFI = Comparative Fit Index; TLI = Tucker Lewis Index; SRMR = Standardized Root Mean Square Residual.

Considering the values found for TLI and the comparison with the previous hierarchical model, the variable age did not show measurement invariance. In Table 5, measurement invariance was tested in relation to the variable gender.

Table 5 shows that the SSI-CE presented structural and latent mean invariance, confirming that there is latent covariance in relation to the sample. That is, in this case, there is sample heterogeneity in relation to gender. In Table 6, measurement invariance was tested in relation to the variable presence of dementia in the elderly care receiver.

Similarly to gender, results in Table 6 show that the SSI-CE presented structural and latent mean invariance for presence of dementia, indicating sample heterogeneity for this variable (or care condition). Table 7 shows measurement invariance in relation to type of data collection (online or in-person).

According to the results in Table 6, the SSI-CE presented structural and latent mean invariance considering the type of data collection (online or in-person), indicating sample heterogeneity depending on how data collection was performed.

SSI-CE Reliability Analysis

In regard to SSI-CE reliability, $\omega = 0.89$ and $\alpha = 0.89$ were found for the general score. The Affective Expressiveness factor presented $\omega = 0.86$ and $\alpha = 0.86$, the Assertive Communication factor presented $\omega = 0.77$ and $\alpha = 0.76$, and the Training/Information Seeking factor presented $\omega = 0.66$ and $\alpha = 0.65$. All of them are considered suitable reliability values, and the value found for the total score is excellent (Ventura-León & Caycho-Rodríguez, 2017).

Discussion

Many older adults require specific assistance and care from others to obtain or maintain an adequate quality of life for their biopsychosocial well-being. For this reason, taking care of older adults is a task that, in order to be effective, often involves seeking knowledge (about potential illnesses that may affect them, for example), and also developing skills to adequately meet the set of requirements of this task. Assisting a dependent senior involves daily interactions both with the assisted person and with other people included in this context, such as professionals, other family members, or friends. For this reason, it is essential to develop social skills to help caregivers to adequately meet all the interpersonal demands that may arise from these social exchanges, ensure the well-being of the care receiver, and preserve caregivers' mental health (Pinto et al., 2016; Queluz, Barham et al., 2019).

In order to contribute to research on this subject, the SSI-CE specifically evaluates the social skills associated with the care of elderly family members. Previous studies indicate that the instrument shows good evidence of validity (Queluz et al., 2017, 2018, 2021). However, following the recommendations of AERA et al. (2014), the aim of this study was to expand the evidence of internal validity of the instrument.

Considering the results of previous studies on the factor structure of the SSI-CE (Queluz et al., 2017), first, it was analyzed whether the items responded better to a bifactor or a second-order hierarchical factor structure. Although the adjustment indices of both models were satisfactory, the second-order factor model fits better to the data and is more parsimonious. It was found that the factors showed high and significant correlations both with each other and with the general factor. This result is a indicator that the general factor explains a greater proportion of item variance compared to the specific factors (Dominguez-Lara & Rodriguez, 2017), and is another indication of the relevance of the second-order model. This result is also supported by the theory, as in previous studies correlations were found between the classes of social skills, which are represented by the factors of different instruments in the area of social skills (Del Prette & Del Prette, 2010, 2019; Del Prette et al., 2021).

Furthermore, comparing both models, it was found that the factor loadings of the second-order factor model were higher than 0.40 for all items. However, this was not true for the bifactor model, once it had items with poor factor loadings, which did not support the viability of the model (Pituch & Stevens, 2016). The factor weight of each item indicates the amount of variance explained by the factor (Pituch & Stevens, 2016). Thus, the greater the weight, the better indicator of the construct's dimension is the item. According to the postulates of several theorists on this analysis, factor weights higher than 0.40 in samples greater than 350 cases indicate an acceptable and significant proportion of explained variance for each item, which is a valid criterion not only for decision making on the permanence of items (Costello & Osborne, 2005; Hair et al., 2006; Pituch & Stevens, 2016), but also to assess the suitability of different models. For this reason, the

results obtained for the second-order factor model show that the relationships between observable and latent variables are sufficiently consistent and replicable.

Another objective of this study was to analyze SSI-CE measurement invariance according to different variables related to specific social skills for the care of older adults. Results showed that the scores provided by the test have the same meaning in the different conditions assessed (Damásio, 2013): age, gender, presence of dementia, and type of data collection. First, there is evidence that the factor configuration is invariant in the groups formed according to these variables, that is, the number of factors and items that make up each factor is the same for all sets (Kline, 2015). Second, the metric invariance of the scale shows that factor loadings are similar in terms of their latent factors (Putnick & Bornstein, 2016), demonstrating that there was no differential item functioning according to the mentioned variables.

Third, the scalar invariance of the SSI-CE shows that, if there are differences between the group means, they are due to differences in the levels of the latent variables, not to differences in the average scores of the items (Marsh et al., 2018). Finally, results also showed that, in the proposed factor model, it can be assumed that the specific variance and the variance due to the measurement error of each item are the same for all groups, according to the proposed variables. That is, in general, social skills are equally measured, regardless of the effect of age, gender, presence of dementia, and type data collection (Putnick & Bornstein, 2016).

In addition to measurement invariance, invariance was also analyzed due to population heterogeneity. Regarding structure, differences were found according to gender, presence of dementia, and type of data collection. This indicates that the relationships between factors are not equivalent across groups (Damásio, 2013). However, it is important to consider that these results do not indicate deficiencies in the measures of the scale, but rather characteristics of these measures that respond to the heterogeneity the latent trait (i.e., social skills and their dimensions) presents in the different groups (Brown, 2006). In this sense, the information provided by this analysis is extremely useful when complemented with the results of invariance analysis of latent means. In this study, it was found that the means of the latent variables (i.e., the three factors and the general factor) were different across the groups gender, presence of dementia in the elderly care receiver, and type of data collection. In view of this, developing different interpretation standards for each variable would be recommended (Hogan, 2018).

Furthermore, in order to understand the nature of the differences found, it would be important to investigate them in more depth, to find out how they manifest in each group. However, previous studies have already shown an association of social skills with gender (Anme et al., 2010; Coelho et al., 2015; Crombie, 1988; Gaspar et al., 2018; Scheufler et al., 2017). Regarding age, although longitudinal studies that explain changes in social skill levels in different age cycles have not been found, there are studies showing that different age-related variables influence people's social competence,

including neuroplasticity and preservation of cognitive functions (Taborsky & Oliveira, 2012). With regard to the presence of dementia in the elderly care receiver, other studies have also shown that caring for highly dependent people, such as older adults with dementia, impacts the psychological well-being of caregivers and the use they make of cognitive resources and adaptation to the environment (Keating et al., 2019; Pinto & Barham, 2014; Queluz et al., 2019). Finally, considering the differences in how data collection was performed, and that there are no previous studies comparing both types of data collection methods with regard to social skills, new analyses should be carried out with larger and more equitable samples between online and in-person data collection, in order to be able to more accurately establish the magnitude of these differences and the size of the effect.

A final analysis carried out was an assessment of the internal consistency of each latent measure of the SSI-CE, in which values considered adequate by the literature were found for all factors (Ventura-León & Caycho-Rodríguez, 2017). However, for the factor Training/Information Seeking, the value found was below 0.70, which indicates that caution is needed when using this measure for diagnosis or classification (Hogan, 2018). Nevertheless, when the factors are composed of few observable indicators or items, the internal consistency coefficients tend to be low because the variability between items is lower and there is a greater susceptibility to underestimating its coefficients, which may be a reason why the reliability values found were low (Ventura-León & Caycho-Rodríguez, 2017).

Some limitations of this study are the need for further analysis of the differences found and the use of samples of equivalent sizes, across groups. In addition, a non-probabilistic sampling method was used, which is a weakness regarding the sample's representativeness, although different age groups, economic classes, and education levels were included to reduce this bias. Future studies should consider these limitations and continue inquiring about the instrument's evidence of external validity, especially about the predictive power of its scores. It would also be interesting if the authors could establish normative tables for the SSI-CE, considering the heterogeneities for the sample found in this study.

Finally, the data obtained here show that the SSI-CE has new evidence of internal validity, is represented by a second-order factor structure, and has good reliability indices. These results, together with those of previous studies on the instrument (Queluz et al., 2017, 2018, 2021), allow it to be consolidated as a relevant and extremely useful measure to continue developing and expanding the field of study of social skills in caregivers of elderly family members. In addition, these results also favor the use of SSI-CE in prevention and intervention programs, in search of quality of life and well-being for this population, care receivers, and others involved in the task of caring for a dependent senior.

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