The Creation and Validation of HIV-S Scale: A New Measure for HIV Stereotypes by Healthcare Professionals in Brazilian Community

Pedro M. Parreira¹, Denize C. Oliveira², Sérgio C. Marques³, Ana R. Pecora⁴, Fátima S. Abrão⁵, Lisete S. Monico⁶, Ana F. Ramos⁷, Ana P. Tavares⁸, and Cesar Fonseca⁹*
¹Coimbra Nursing School and Master's Program in Nursing, Coimbra, Portugal
²University of Estado do Rio de Janeiro (UERJ), Brazil
³University of Mato Grosso (UFMT), Brazil
⁴University of Pernambuco (UEPE), Brazil
⁵Faculty of Psychology and Educational Sciences of the University of Coimbra, Coimbra, Portugal
⁶Centre Hospitalar Médio Tejo, EPE, Portugal
⁷University of Évora (UE), Portugal

Received Date: January 09, 2017, Accepted Date: June 30, 2017, Published Date: July 07, 2017.
*Corresponding author: Cesar Fonseca, Nursing University of Evora, R. Romão Ramalho 59, 7000-671 Evora, Portugal; E-mail: cesar.j.fonseca@gmail.com

Abstract

Background: Stigma related to HIV is considered as one of the greatest challenges to deal with the disease by health professionals. It is the biggest barrier to the implementation of effective responses in the combat of this epidemic.

Objective: Create a valid and reliable tool to assess the stereotype by health professionals who take care of HIV patients.

Methods and Techniques: A stratified sample of 636 healthcare professionals working with HIV patients was composed from Community Health Centers of all states of Brazil. The applied questionnaires were composed by 20 Likert scale questions (1–6 point) to measure the HIV-related stereotypes and attitudes. It was performed an Exploratory Factor Analysis (EFA) with 50% of the sample randomly selected, and a Confirmatory Factor Analysis (CFA) with the remaining sample, to the 11 items of the scale that measures HIV-related stereotypes and attitudes of professionals.

Results: According to eigenvalue > 1, three factors were extracted with EFA (Sample 1), responsible for 48.64% of the total variance: F1 – Suffering, isolation, and death, F2 – Support, and F3 – Discrimination and fear. Reliability was only acceptable on a global scale (α = 0.70). This factorial structure was supported by CFA in sample 2, showing a good adjustment in all statistics. The scale showed discriminant validity, however there were some difficulties in convergent validity.

Conclusions: The HIV-S scale presented acceptable psychometric. The results suggest a probably cultural relationship to HIV discrimination and provide clues for further research.

Keywords: HIV stereotypes; Healthcare professionals; Psychometric properties

Background

Stigma related to HIV is considered as one of the greatest challenges to deal with the disease by health professionals, and at the same time the biggest barrier to the implementation of effective responses in the combat of this epidemic [1–3].

Strategies to combat stigma continue to be underestimated in HIV programs. The lack of consensus among policy makers and those who are responsible for program implementation, can be related to internal factors, like the level of stereotypes, which can be a relevant obstacle to the effectiveness of these programs. Consequently, quality of life of a person with HIV is damaged by many aspects, which mainly affect their psychological well-being, self-perception and humor [4,5]. In this sense, it is urgent to create valid and reliable tool to assess the stereotype by health professionals, who deals with HIV patients [6–11]. It can be an important instrument to increase the awareness of health professionals, to stimulate introspection and change of attitudes, with the aim of promotion of health and minimize suffer of people with HIV.

Materials and Methods

Sample

A non-randomized stratified sample of 636 healthcare professionals working on HIV was composed from Community Health Centers of all states of Brazil. All professionals belong to the randomized sample were invited and accepted to participate in the study. Written permissions were obtained from the health institutions and verbal consents of the participants. We guaranteed the anonymity and confidentiality of the answers.

The sample consists of a total 636 participants, 527 (82.9%) being females, with an average of 43.74 years-old. Above 24.4% are physicians, 23.6% are medical auxiliaries, 18.2% are nurses, and 10.8% are social assistants.

Materials

It was followed the propose of Angleitner et al. and Kline PA. [12,13] in relation to the scale development criteria. An expert panel was created with 20 items, measuring stereotypes, information, and support in a 5-point Likert scale (0–5 points). After analyzing the items, we selected 11 of them that measure stereotypes and attitudes, for exploratory and factorial confirmation analysis (HIV-S scale). The remaining nine (Table 1) were used in descriptive analysis and correlated with the dimensions of the scale.

Procedures

The study design was approved by the ethics committee of the University from the State of Rio de Janeiro, Brazil. This is integrated in an international Multi-Centric project named “Living in times of HIV: process of constitution and transformation of social representations and health memories in Brazil” funded by National Council of scientific and technology development CNPq (proc. 482248/2009-2) and Amparo Foundation for the research of the state of Rio de Janeiro (Edital FAPER nº 15/2011- Proc. E-26/110.088/2012), coordinated by professor Denize Oliveira. The main goal of the study was to known how to measure the Social Representation of Health Professionals, who takes care of HIV patients.

Data Analysis

All the analyses were completed using the statistical program SPSS and AMOS 2.0 for Windows operative system. Outliers were analysed according to Tabachnick BG et al. squared distance [14],
and no relevant values were found. The normality of the variables was assessed by the coefficients of skewness (Sk) and kurtosis (Ku), showing that no variable presented values normal distribution, |Sk| < 2 and |Ku| < 3.

The sample was randomly divided into two (sample 1 and sample 2; N = 318 for both), one to perform Exploratory Factor Analysis (EFA) and other to perform Confirmatory Factor Analysis (CFA). EFA was performed using SPSS by PCA – Principal Component Analysis. The PCA assumptions were tested through the sample size (ratio of five subjects per item and at least 100 participants [15]), the normality of the variables, measures of KMO > 0.70, and no relevant values were found. The normality of the variables was assessed by the coefficients of skewness (Sk) and kurtosis (Ku), showing that no variable presented values normal distribution, |Sk| < 2 and |Ku| < 3.

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Confirmatory factorial analysis was accomplished with AMOS (v. 22.0, SPSS Inc, Chicago, IL, estimation method by maximum likelihood [16]). Adjustement quality was analysed by the indexes of NFI (Normed Fit Index; CFI: Comparative Fit Index, PNFI: Parsimony Normed Fit Index, SRMR: Standardized Root Mean Square Residual, RMSEA: Root Mean Square Error of Approximation, CI: Confidence Interval, *p < 0.05).

Table 1: M: Means, SD: Standard Deviations, and Intercorrelations with F1, F2, and F3 of HIV-S. *F1 – Suffering, isolation, and death; F2 – Support; F3 – Discrimination and fear. *p < 0.05 ***p < 0.001 ***p < 0.001.

<table>
<thead>
<tr>
<th>Item</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sexual intercourse with many partners predispose to HIV infection</td>
<td>1.0</td>
<td>6.0</td>
<td>4.69</td>
<td>1.30</td>
<td>0.21***</td>
<td>0.22***</td>
</tr>
<tr>
<td>2. The effects of HIV can be controlled with proper treatment</td>
<td>1.0</td>
<td>6.0</td>
<td>5.33</td>
<td>0.78</td>
<td>0.04</td>
<td>0.10*</td>
</tr>
<tr>
<td>3. The current or previous existence of homosexual relationships is</td>
<td>1.0</td>
<td>6.0</td>
<td>3.77</td>
<td>1.30</td>
<td>0.19***</td>
<td>0.14***</td>
</tr>
<tr>
<td>common among people with HIV</td>
<td>1.0</td>
<td>6.0</td>
<td>5.25</td>
<td>0.88</td>
<td>0.14**</td>
<td>0.16***</td>
</tr>
<tr>
<td>4. The number of people with HIV in Brazil is large and continues to</td>
<td>1.0</td>
<td>6.0</td>
<td>4.75</td>
<td>1.16</td>
<td>0.27***</td>
<td>0.23***</td>
</tr>
<tr>
<td>increase</td>
<td>1.0</td>
<td>6.0</td>
<td>5.33</td>
<td>0.90</td>
<td>0.26***</td>
<td>0.32***</td>
</tr>
<tr>
<td>5. Infection with HIV causes immune suppression and the propensity</td>
<td>1.0</td>
<td>6.0</td>
<td>2.91</td>
<td>1.58</td>
<td>0.23***</td>
<td>0.11**</td>
</tr>
<tr>
<td>to develop opportunistic diseases</td>
<td>1.0</td>
<td>6.0</td>
<td>5.20</td>
<td>0.86</td>
<td>0.06</td>
<td>0.08</td>
</tr>
<tr>
<td>6. Treatment of HIV requires one to take on a regular basis, many</td>
<td>1.0</td>
<td>6.0</td>
<td>4.47</td>
<td>1.41</td>
<td>0.18***</td>
<td>0.16**</td>
</tr>
<tr>
<td>medications</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Fit statistics of the three factor model for the HIV stereotypes by healthcare professionals scale. (X$: \chi$-square, DF: degrees of freedom, NFI: Normed Fit Index, CFI: Comparative Fit Index, PNFI: Parsimony Normed Fit Index, SRMR: Standardized Root Mean Square Residual, RMSEA: Root Mean Square Error of Approximation, CI: Confidence Interval, *p < 0.05).

<table>
<thead>
<tr>
<th>NFI</th>
<th>SRMR</th>
<th>TLI</th>
<th>CFI</th>
<th>$X^2$/df</th>
<th>RMSEA</th>
<th>RMSEA 90% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.863</td>
<td>0.074</td>
<td>0.937</td>
<td>0.953</td>
<td>1.42*</td>
<td>0.037</td>
<td>0.009 - 0.057</td>
</tr>
</tbody>
</table>

Results

Exploratory Factor Analysis (sample 1; N = 318)

The requirements to a reliable interpretation of PCA were analysed. The questionnaire used here has 11 items, the proportion found was 318 subjects (sample 1)/11 items = 28.9 subjects/item, which enables a reliable utilization of PCA [15]. Additionally, the inter-correlation matrix differed from the identity matrix, since the Bartlett’s test showed a $X^2$(55) = 447.89, p < 0.001, and the sampling was adequate – the obtained value to Kaiser-Meyer-Olkin (KMO) measure was 0.739, higher than the required value of 0.70.

Given the eigenvalue criteria over one, and based on the screen plot, emerged a solution of three factors, responsible for 48.64% of the total variance, with the first factor explaining 17.20% of the total variance, the second factor 16.99%, and the third 14.46%. Factorial loadings are greater than 0.50 [14] in all dimensions and are organized in descending order in table 2, together with the commonalities, eigenvalues, and explained variances.

As it can be seen in table 3, Factor 1 aggregates items 5, 10, 13, and 18, which are related to the ideas of no hope, suffering, isolation, and death of people with HIV, reason why it was called F1 - Suffering, isolation, and death. Factor 2 aggregates items related to care and help, so it was designated F2 - Support. Factor 3 collects items related to feel sorry, discrimination and fear in dealing with HIV people, so it was named F3 - Discrimination and fear.

Reliability for HIV-S scale was acceptable on a global scale, Cronbach’s α = 0.70, despite for each factor the Cronbach’s α was lower than 0.70 (Table 2). This can be the small inter-item correlation for each factor was evaluated and described [23].
Standardized regression weights and squared multiple correlations are shown in figure 1. Standardized regression weights ranged from 0.27 to 0.72 and squared multiple correlations from 7% to 51%.

Cronbach alphas (Table 4) were acceptable for Global scale (α = 0.70) [20]. Composite reliability was low, being less than 0.70 [21]. Concerning the average variance extracted (AVE), no factor exceeded 0.40, not ensuring that the explained variance is greater than the residual variance, Diamantopoulos et al. [22] showing difficulties in convergent validity [2]. A discriminant validity is being presented, since the variance extracted from each factor is greater than the values of the square correlations between each pair of factors [23] (Table 1 for $R^2$). The descriptive statistics and inter correlations between the dimensions of the economic dimension measures are also indicated in table 1. Mean scores showed higher values for F2 - Support ($M = 5.23$), followed by F3 - Discrimination and fear ($M = 3.89$), and at last, F1 - Suffering, isolation, and death ($M = 3.76$).

Table 3: Principal Component Analysis of the HIV-S by healthcare professionals scale: Factorial loadings of F1, F2, and F3, communalities (h2), eigenvalues, and shared variance of the rotated component matrix.

<table>
<thead>
<tr>
<th>Items</th>
<th>F1 Suffering, Isolation, and Death</th>
<th>F2 Support</th>
<th>F3 Discrimination and Fear</th>
<th>h2</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. People with HIV have no feelings of hope and future prospects</td>
<td>0.698</td>
<td>-0.090</td>
<td>-0.013</td>
<td>0.495</td>
</tr>
<tr>
<td>10. The existence of HIV infection leads one to social isolation</td>
<td>0.618</td>
<td>0.202</td>
<td>0.053</td>
<td>0.464</td>
</tr>
<tr>
<td>18. The physical, psychological and social suffering is constant in people living with HIV</td>
<td>0.607</td>
<td>0.143</td>
<td>0.273</td>
<td>0.426</td>
</tr>
<tr>
<td>13. The existence of HIV infection leads one to feel the nearness of death</td>
<td>0.522</td>
<td>0.200</td>
<td>0.220</td>
<td>0.361</td>
</tr>
<tr>
<td>12. The existence of HIV infection leads one to require much care to live with the disease</td>
<td>0.144</td>
<td>0.735</td>
<td>0.167</td>
<td>0.589</td>
</tr>
<tr>
<td>14. The solidarity from others is an important aid to people with HIV</td>
<td>0.194</td>
<td>0.671</td>
<td>0.011</td>
<td>0.488</td>
</tr>
<tr>
<td>8. A family participation is important in combat HIV</td>
<td>-0.150</td>
<td>0.633</td>
<td>0.091</td>
<td>0.431</td>
</tr>
<tr>
<td>9. To live with HIV a person needs the support and help of others</td>
<td>0.322</td>
<td>0.603</td>
<td>-0.205</td>
<td>0.509</td>
</tr>
<tr>
<td>21. Being HIV positive awakens in others a sense of pity</td>
<td>0.012</td>
<td>0.042</td>
<td>0.761</td>
<td>0.581</td>
</tr>
<tr>
<td>20. Being HIV positive leads a person to be discriminated against in society and in health institutions</td>
<td>0.166</td>
<td>0.052</td>
<td>0.743</td>
<td>0.582</td>
</tr>
<tr>
<td>7. Health professionals often experience feelings of fear when caring for a person with HIV</td>
<td>0.411</td>
<td>0.004</td>
<td>0.506</td>
<td>0.424</td>
</tr>
<tr>
<td>Eigenvalues</td>
<td>5.01</td>
<td>1.51</td>
<td>1.06</td>
<td></td>
</tr>
<tr>
<td>Percentage of explained variance</td>
<td>17.20</td>
<td>16.99</td>
<td>14.46</td>
<td></td>
</tr>
<tr>
<td>M (SD)</td>
<td>3.76 (0.77)</td>
<td>5.21 (0.60)</td>
<td>4.08 (0.86)</td>
<td></td>
</tr>
<tr>
<td>Cronbach’s alfa</td>
<td>0.58</td>
<td>0.61</td>
<td>0.52</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1: CFA of HIV-S scale by healthcare professionals scale: Standardized regression weights and squared multiple correlations.
3.77). Inter-correlations are low between factors 2 and 3 ($R^2 = 6\%$ of shared variance), and moderate between factors 1 and 2 ($R^2 = 12\%$ of shared variance) and between factors 1 and 3 ($R^2 = 15\%$ of shared variance) [24], although all positive.

**Correlation with Other Items (total sample; N = 636)**

Table 1 presents the descriptive and inter-correlations of a set of items who measure opinions and attitudes of healthcare professionals about HIV patients. As it can be seen in, items 2 (The effects of HIV can be controlled with proper treatment) and 11 (Infection with HIV causes immune suppression and the propensity to develop opportunistic diseases) received the highest accordance among healthcare professionals. Item 15 (Contamination of other people is a present risk in living with HIV carriers) received the lower scores. Generally, the correlations with the three factors of the HIV stereotypes by healthcare professionals scale were low. Item 17 (The HIV virus has been primarily transmitted through sexual activity) was not associated with any factor ($p > 0.05$). Item 11 (Infection with HIV causes immune suppression and the propensity to develop opportunistic diseases) was the most correlated.

**Discussion**

The results showed two dimensions related to the HIV-related stereotype: negative feelings (F1) and information and support (F2). So, the need for information and support should be an integral part of the intervention programs. Improvements will be needed to improve the psychometric proportions of this scale, with the finality of increasing internal consistency [8].

A randomized controlled trial with 204 HIV-positive patients recruited tested a computerized system named CHESS: Comprehensive Health Enhancement Support System, that provided HIV-positive patients information, decision support about HIV infection, treatments and life with HIV, reported that the patients experiencing fewer and shorter hospitalizations. Users reported quality-of-life improvements: active life, positive emotions, cognitive function, social support and participation in health care. In this regard, the successful of patient education programs requiring a complex mix of competences by health professionals. It is relevant to increase conscious about the impact of the negative feeling and normative beliefs, which influence the behavioral skills and the effectiveness of interventions.

On another hand, the fear of stigma discouraged individuals from being tested for HIV and from revealing their seropositive status to sexual partners, family, and friends [11–13,21]. Stigmatizing attitudes are strongly correlated with misunderstanding of the mechanisms of HIV transmission and overestimating the risks of casual contact [15–21]. For this reason, it is necessary to continue to prepare the health professional to avoid this situation.

**Conclusions**

The results of this study provide a preliminary approach to the reliability and validity of the 20-item HIV-S Scale, but yet showing poor psychometric properties. Nevertheless, it was presented two interpretable factors, extracted from EFA and supported by CFA that presented acceptable psychometric properties, with two interpretable factors, extracted from EFA and supported by CFA with two randomized samples. Items showed good homogeneity, variability among answers, and suitable discriminant power. Negative feelings (F1) scored below middle point of the scale, showing low discrimination towards HIV infected people. Information and support (F2) scored above the middle point of the scale, suggesting that more information tends to reduce negative feelings, highlighting the need for education in HIV area. These results suggest a probably cultural change regarding discrimination towards HIV and give us dues for further research. It is suggested to carry out qualitative studies to improve different issues to include in the scale.

The potential limitations of the present study are the cross section approach and non-randomized samples. As possible future research, it is intended to refine the scale developed, applying in different contexts and increasing the number of professionals. It is proposed to integrate the stereotype assessment before starting an education program, or to include professionals with a need for reflection on HIV stereotypes.

**References**

1. Arbuckle JL. Amos 22 user’s guide. IBM, SPSS. Chicago, IL. 2013.


*Corresponding author: Cesar Fonseca, Nursing University of Evora, R. Romao Ramalho 59, 7000-671 Evora, Portugal; E-mail: cesar.j.fonseca@gmail.com

Received Date: January 09, 2017, Accepted Date: June 30, 2017, Published Date: July 07, 2017.

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