

Comparisons between the Nottingham Health Profile and the Short Form-36 for assessing the quality of life of community-dwelling elderly

Comparação dos instrumentos de qualidade de vida Perfil de Saúde de Nottingham e Short Form-36 em idosos da comunidade

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Abstract

Background: The aging population and associated high disability rates make the assessment of health-related quality of life (HRQOL) a high priority for elderly people. **Objectives:** To compare the Brazilian versions of the Nottingham Health Profile (NHP) and the Short Form Health Survey-36 (SF-36) regarding their measurement properties, such as, ceiling and floor effects, inter-rater/test-retest reliabilities, internal consistency, and the associations between the total scores and those of similar domains. **Methods:** The NHP and the SF-36 were randomly administered through interviews to 40 community-dwelling elderly (mean age 70.57; SD=7.42 years). The scores of the five similar domains of the NHP and the SF-36, in percentages, were compared: Energy level/Vitality (EL/V), pain, emotional reactions/mental health (EM/MH), social isolation/social functioning (SI/SF), and physical mobility/physical functioning (PA/PF). Descriptive statistics, Spearman Correlation Coefficient, α -Cronbach, and Intraclass Correlation Coefficients (ICCs) were used for analyses ($\alpha=0.05$). **Results:** Both instruments demonstrated ceiling and floor effects for all similar domains, however the NHP showed, on average, higher scores for individual domains and total scores, as well as, floor effects for the SI domain. The internal consistency (NHP=0.86; SF-36=0.80), the inter-rater reliability (NHP=0.99; SF-36=0.96) and the test-retest reliability (NHP=0.94; SF-36=0.83) were considered adequate. Positive and statistically significant correlations were found between all similar domains ($p \leq 0.01$; $0.41 \leq r_s \leq 0.70$), except for those related to EL and vitality ($r_s=0.21$; $p=0.19$). **Conclusions:** The SF-36 demonstrated to be more adequate regarding the ceiling and floor effects, whereas the NHP presented a higher internal consistency and reliability levels. These findings should be considered for selecting instruments for the assessment of HRQOL of community-dwelling elderly.

Keywords: rehabilitation; physical therapy; Nottingham Health Profile; SF-36; quality of life; elderly.

Resumo

Contextualização: O envelhecimento populacional, associado ao aumento das incapacidades, torna a avaliação da qualidade de vida relacionada à saúde (QVRS) essencial nessa população. **Objetivos:** Comparar a versão brasileira dos instrumentos de QVRS, Perfil de Saúde de Nottingham (PSN) e *Medical Outcomes Study 36 – Item Short Form Health Survey/Short Form-36* (SF-36), quanto aos efeitos teto/chão, confiabilidade teste-reteste/interexaminadores, consistência interna e pontuação total nos domínios similares. **Métodos:** Os instrumentos PSN e SF-36 foram aleatoriamente administrados sob a forma de entrevista em 40 idosos da comunidade (70,57±7,42 anos). A pontuação total e a obtida nos cinco domínios similares do PSN e SF-36 foram comparadas: nível de energia/vitalidade (NE/V), dor/dor, reações emocionais/saúde mental, interação social/aspectos sociais (IS/AS) e habilidades físicas/capacidade funcional. Estatística descritiva, teste de Correlação de Spearman, α -Cronbach e Coeficientes de Correlação Intraclass (CCI) foram usados para análise ($\alpha=0,05$). **Resultados:** Ambos os instrumentos apresentaram efeito teto em todos os domínios comparáveis, mas o PSN apresentou maior pontuação em cada domínio e no escore total, efeito teto na pontuação total e efeito chão no domínio de IS. Os valores de α -Cronbach foram adequados para ambos (PSN=0,86; SF-36=0,80), assim como o CCI da confiabilidade interexaminadores (PSN=0,99; SF-36=0,96) e teste-reteste (PSN=0,94; SF-36=0,83). Todos os domínios similares e a pontuação total correlacionaram-se significativa e positivamente ($p \leq 0,01$; $0,41 \leq r_s \leq 0,70$), excetuando os de NE/V ($p=0,19$; $r_s=0,21$). **Conclusões:** O SF-36 mostrou-se mais adequado com relação aos efeitos teto/chão, enquanto o PSN apresentou níveis mais altos de consistência interna e confiabilidade. Esses achados devem ser considerados na escolha do instrumento de avaliação da QVRS de idosos da comunidade.

Palavras-chave: reabilitação; fisioterapia; Perfil de Saúde de Nottingham; SF-36; qualidade de vida; idoso.

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Introduction

The proportion of people over the age of 60 years is growing faster than any other age group worldwide^{1,2}, and in Brazil, the aging process is fast and intense^{3,4}. During the aging process there are several changes that may lead to disability and dependency^{1,3-12} and may directly affect the Quality of Life (QoL) of the elderly, making the evaluation of the QoL essential for this population^{1,13,14}. In addition, beside the technological progress there is a substantial increase in life expectancy and therefore an increasing demand of new conducts in the healthcare field and also in the society as a whole. The decision-making process with regards to the implementation of these new conducts require new measurements parameters to be used as a reference, being QoL one of the recommended parameters^{1,5,15-20}.

The concept of QoL is broad and there is no consensus about its definition^{1,5}. In the last decades the term health-related quality of life (HRQOL) has been widely used to indicate the subjective evaluation of a personal satisfaction in relation to at least three domains: physical, emotional and social¹⁴.

The Nottingham Health Profile (NHP)²¹ and the Short Form Health Survey-36 (SF-36)²² are the most widely used HRQOL instruments in the elderly; and both have been already adapted for the Brazilian population. Both instruments are simple, easy to understand and not time-consuming, which make them very useful in clinical practice²¹⁻²³. Moreover, their adequate psychometric properties had already been investigated²³⁻²⁶, including in the Brazilian population^{21,22}.

Despite the similarities between these two instruments there are some important differences, such as, the assessment of specific domains, the answering form and the scoring system²¹⁻²⁵. These differences inspired the development of studies with the objective to compare these instruments in different populations to determine which one would be the most suitable for the assessment of HRQOL^{23-25,27}. However, to our knowledge, there has been no study that compares these two assessment tools in a community-dwelling elderly population. Therefore, the aim of this study was to determine which one of these instruments, the NHP or the SF-36, would be the most suitable to evaluate HRQOL in a community-dwelling elderly population by comparing their common domains, as well as the total score, the presence or not of ceiling and floor effects, the test-retest/inter-rater reliability and the internal consistency.

Methods

Participants

Forty elderly residents from the community of Belo Horizonte, MG, Brazil, from both genders, aged ≥ 60 years were evaluated. All participants signed the informed consent form which has been

approved by the Ethics Committee in Research of the Universidade Federal de Minas Gerais (UFMG), Belo Horizonte, MG, Brazil (n° ETIC 494/06).

Instruments

The NHP and the SF-36, which are considered generic instruments that reflect QoL of any individual regardless of any associated health condition were used²⁸.

The NHP, originally developed to evaluate the HRQOL of patients with chronic diseases²⁹, is commonly used in the elderly population²¹. It is a self-report instrument composed of 38 items based on the International Classification of Impairments, Disabilities, and Handicaps described by World Health Organization, with answering in a "yes/no" format, grouped into six domains: energy level (3 items), pain (8 items), emotional reactions (9 items), social isolation (5 items), physical mobility (8 items) and sleep (5 items). Originally, each positive answer corresponds to a score of 1 and each negative answer corresponds to 0, being the maximum score of 38 points. The higher the score the worse is the perception of HRQOL^{21,29}. This instrument is considered clinically valid to distinguish patients with different levels of disability and to detect changes in health condition over time^{26,27}.

The SF-36 is also an instrument of easy administration and understanding, considered valid, reliable, and not time-consuming²². It has been globally used to evaluate HRQOL in healthy, elderly participants and also in patients with chronic diseases²⁵⁻²⁷. The SF-36 is a multidimensional instrument, composed of 36 items, being one item related to changes in health over time and 35 items grouped into eight dimensions: physical functioning (ten items), role limitations caused by physical problems (four items), bodily pain (two items), general health perceptions (five items), vitality (four items), social functioning (two items), role limitations caused by emotional problems (three items) and mental health (five items). Each item presents from two to six answer possibilities and the final score ranges from 0 to 100, being 0 representing the worst HRQOL and 100 the best HRQOL²². The measurement properties, such as reproducibility, validity and sensitivity to change have already been already reported as adequate^{22,25-27}.

According to the literature^{24,25} the five common domains to both NHP/SF-36 are: energy level/vitality (EL/V); pain/pain; emotional reactions/mental health; social isolation/social functioning (SI/SF) and physical mobility/physical functioning.

Procedures

Two examiners, last year undergraduate physical therapy students, who received previous training of approximately six hours performed the assessment of HRQOL. The examiners also discussed the items that could raise doubts at the moment of the

interview to ensure similarity between them during interpretation of the answers. During the training the examiners applied the instruments to four elderly, whose data were not considered in the analysis. Although both instruments are originally self-report, they were applied in a form of individual interviews to avoid the heterogeneity of the education levels of the participants to influence the results, as recommended by previous studies performed in a Brazilian population^{21,22} and to ensure the validity of the information obtained from the adapted instruments for the Brazilian population, even though the interview method may compromise the reliability of the information.

Social-demographic and clinical data, history of falls over the last year, physical activities and participation in social groups were collected from all participants by examiner 1. The order of application of the instruments was randomly chosen. The randomization procedure was carried out by simple draw performed by the participant.

To evaluate the inter-rater reliability each examiner consecutively applied the instruments in an independent manner and in a random order, in 15 participants. For the test-retest reliability, the instruments were applied twice by the examiner 1, with a time interval ranging from 7 to 10 days³⁰ and, in the other 25 participants; the same application order was used.

Data analysis

Only the scores from the common domains and the total score were used for the comparison between the instruments. In addition, the NHP score was not quantified in the traditional form^{31,32} in order to allow that the scores of both instruments could be compared. Therefore, to quantify of the total and of the domains scores of the NHP, the number of negative answers was added and converted as a proportion³¹. For SF-36, the score of each domain was calculated by the traditional form²², and the total score was obtained from the average scores of each domain²². For both instruments, lower scores (close to 0) indicated a worst HRQOL perception and higher scores (close to 100) indicated a better HRQOL perception.

Descriptive statistics were used to characterize the sample and to determine the ceiling and floor effects, considering the frequency of answers (%) with the lowest and the highest possible score in each considered domain. Spearman Correlation Coefficients were calculated with the objective of verifying the association between the common domains of the two instruments, as well as between their total score and, therefore, to determine if both instruments evaluated similar constructs, as previously performed in study with similar objectives²⁷. The test-retest inter-rater reliability was evaluated by Intraclass Correlation Coefficient (ICC) and the internal consistency by the α -Cronbach. All analyses were performed in SPSS for Windows (Version 15.0) ($\alpha < 0.05$).

Results

Forty elderly who lived in the community, with age ranging between 60 and 93 years (70.57; SD=7.42), being 22(55%) female, 28(70%) married and nine (22.5%) widowers were evaluated. Eighteen participants (45%) had up to four years of school education, 21 (52.5%) from 4 to 11 years, and only one participant (2.5%) had a university degree.

From the participants, 35 (87.5%) had medical diagnosis of up to two diseases and 33 (82.5%) used up to three types of medication (mean=2.3; SD=1.69). Most of the participants (77.5%) reported no falls in the previous year, and 24 (60%) were physically active. With regards to occupation, most of them were retired (65%) and have participated in some social group (62.5%).

The descriptive statistics regarding the common domains, as well as the total score of both instrument are presented in Table 1. As observed in Table 1 and Figure 1, on average, the total score and the scores obtained in all common domains were higher for the NHP, which showed a ceiling effect for all common domains, as well as for the total score (4%); being the frequency of this effect highest in the EL domain (75%) and lowest in the physical mobility domain (32.5%). The floor effect was only observed in the SI domain, with a percentage of 2.5%. The SF-36 also showed a ceiling effect in all common domains, being the lowest frequency of this effect occurred in the V domain (5%) and the highest frequency in the SF domain (42.5%). However, there were no ceiling/floor effects for the total score and a floor effect for the common domains of SF-36.

Positive and statistically significant associations between the common domains and the total score of the instruments were observed, except between the EL/V domains ($r_s = 0.21$; $p = 0.19$). The highest correlation observed was between pain domains ($r_s = 0.70$; $p = 0.001$) and physical mobility/physical functioning ($r_s = 0.64$; $p = 0.001$) (Table 1).

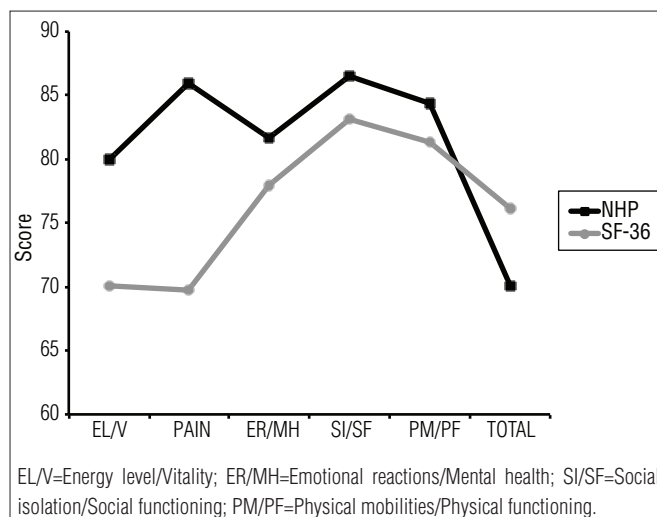


Figure 1. Mean values of the total scores and the common domains of the NHP and SF-36 (n=40).

Table 1. Descriptive statistics, Pearson's correlation coefficients (r_s) and p values between the total scores and the common domains of the NHP and SF-36 (n=40).

Variable	Instrument	Mean	Standard Deviation	Median	Minimal Score	Maximal Score	Floor Effect (%)	Ceiling Effect (%)	r_s (95%CI)	p
Energy level	NHP	80	13.79	100	33.33	100	0	75	0.21	0.19
Vitality	SF-36	70.13	17.74	70.0	25	100	0	5	(-0.10 to 0.52)	
Pain	NHP	85.94	17.94	87.5	12.5	100	0	45	0.71	<0.001
Pain	SF-36	69.7	25.81	66	21	100	0	35	(0.58 to 1.20)	
Emotional reactions	NHP	81.67	21.44	88.89	22.22	100	0	40	0.55	0.008
Mental health	SF-36	78	18.34	80	24	100	0	10	(0.31 to 0.93)	
Social isolation	NHP	86.5	24.13	100	0	100	2.5	67.5	0.41	<0.001
Social functioning	SF-36	83.13	19.72	87.5	25	100	0	42.5	(0.13 to 0.75)	
Physical mobilities	NHP	84.36	14.36	87.5	50	100	0	32.5	0.64	<0.001
Physical functioning	SF-36	81.38	20.22	87.5	10	100	0	15	(0.45 to 1.07)	
TOTAL	NHP	70.13	17.74	70.00	25.00	100	0	4	0.43	0.03
TOTAL	SF-36	76.19	16.50	79.31	39.31	97.12	0	0	(0.15 to 0.77)	

NHP=Nottingham Health Profile; SF-36=Short Form-36.

With regards to the internal consistency, the values of $\alpha=0.86$ and 0.80 to the NHP and the SF-36 were observed, respectively. The test-retest reliability, investigated in 25 participants (mean age of 70.64; SD=6.16 years-old, 14 female) yielded an ICC of 0.94 and 0.83 to the NHP and the SF-36, respectively ($p<0.001$). The inter-rater reliability, investigated in 15 participants (mean age of 70.47; SD=9.41 years-old, eight female) yielded an ICC of 0.99 and 0.96 to the NHP and the SF-36, respectively ($p<0.001$).

Discussion

The present study aimed to compare two instruments of HRQOL, the NHP and the SF-36, in a population of community-dwelling elderly. When the ceiling and floor effects were considered, the SF-36 instrument seemed to be more appropriated, as it neither presented any floor effect in the common domains scores, nor ceiling/floor effects in the total score. However, both instruments presented adequate values of internal consistency and reliability, being slightly higher for the NHP. In addition, the correlations between the four out of the five common domains were positive and statistically significant, indicating that both instruments measure similar constructs in those domains. Although, the EL (NHP) and V (SF-36) domains are considered to be similar⁷, they seemed not to measure the same construct when applied in elderly with characteristics similar to the ones of this study, and this needs to be carefully investigated further.

Overall, the sample of the present study is similar to previous studies regarding age, the female predominance, marital status and the number of associated diseases^{4,12}. Ramos⁴, analyzing the multidimensional profile of the elderly in the city of São Paulo/Brazil, reported an average age of 69 years old, predominantly women (60%), with the majority of the

participants (86%) reporting at least one disease. Differently from the subjects investigated by Ramos⁴, in the present study, no illiterate elder has been evaluated. However, the education level of the majority was ≤ 4 years.

The medians of the NHP domains were higher than 87.5, and the total score was 89.4. Teixeira-Salmela et al.²¹, in an active elderly population indicated that a major limitation of the NHP is the absence of items difficult enough to distinguish participants with a good HRQOL. Therefore, the presence of high medians does not mean that all participants have an excellent HRQOL, or a similar HRQOL perception, but rather that some items refer to basic skills that there were not among the evaluated elderlies, participants with such bad HRQOL to answer in a different way. In contrast to the NHP, the SF-36 showed lower medians, greater than 66 in the domains and greater than 79 in the total score, indicating a greater ability to discriminate between different nuances of HRQOL perception²⁶.

Some studies^{23-25,27} have already compared these instruments considering the ceiling/floor effects, the correlation between the common domains and the reliability, as in the present study, however, in samples with specific health conditions, making the comparison of the results difficult. Prieto et al.²⁵ observed similarities between the health status measured by the two instruments, with the highest percentage of ceiling/floor effect to the NHP (NHP ceiling/floor effect: 17.2 - 61.6/0.6 to 15.6%, SF-36: 2.8 - 47.9/0 - 2.5%) in patients with chronic obstructive pulmonary disease. Boyer et al.²⁶ in participants with muscular dystrophy, observed a higher floor effect (28%) in the aspects of physical functioning/physical mobility and a higher ceiling effect in the pain domains (25% and 23%), emotional reactions/mental health (35% and 52%) and SI/SF (53% and 29%), for the NHP and the SF-36, respectively. Falcoz et al.²³ in patients with heart disease, observed similar results to the ones of the present study, except for the pain and V domains

of SF-36. In the present study, ceiling effect was observed for all common domains of both instruments, which demonstrates the predominance of very easy items for the evaluated participants. On the other hand, a floor effect was observed in only one of the common domains of the NHP, which illustrates the presence of more difficult items in all common domains of the SF-36 and in most of the domains of the NHP. These results indicate a very positive evaluation of HRQOL, and this may be explained by the samples' characteristics of this study (i.e., independent elderly, from the community, physically active and participating in social groups). As stated by Blake et al.³³ and Freitas et al.² the involvement in social activities and/or being physically active are important instruments of HRQOL promotion.

Between the common domains, the floor effect was observed only for the SI of the NHP. Falcoz et al.²³ evaluating participants with heart disease, observed floor effects in all comparable domains. Prieto et al.²⁵ observed floor effects in all common domains, except in the mental health, when they applied the SF-36 in a sample of participants with chronic obstructive pulmonary disease. Wann-Hansson et al.²⁴ in participants with chronic lower limb ischemia, reported the presence of floor effects in all common domains, except for physical abilities and emotional reactions of the NHP and for mental health domain of the SF-36.

The result of this study regarding the presence of floor effects only in the SI domain of the NHP may be related to a common characteristic in elderly people that is loneliness and depression², questions clearly approached by the items that constitute this domain. The change of the professional status which accompanies the retirement, loss of dear people, marriage or being away from their son/daughter may lead participants with a good health and participation levels to feel alone and have no one to trust². Then, in spite of the participants of the present study to be independent, physically active and participating in social groups, they may feel alone and have no one to trust. However, specific evaluations that support these hypotheses were not performed which should be investigated in future studies.

The higher the frequency of ceiling/floor effects for the NHP may be explained by the dichotomy pattern of the answers for each item, while the SF-36 offers a greater number of possibilities of answers and a greater amount of items for each domain. The lower the number of items for evaluation, the greater the likelihood of presenting ceiling/floor effects²⁴. However, it is necessary to consider that the dichotomization of answers and a lower number of items in the evaluation for each domain makes the application of NHP simpler and less time-consuming²¹, which increases its clinical applicability.

Regarding the correlation between the common domains, statistically significant and positive coefficients were observed for the majority of the domains, except for the EL/V. These results are similar to the ones described by Meyer-Rosberg et al.²⁷ ($r=0.29-0.79$) and Prieto et al.²⁵ ($r=0.25-0.77$), that also reported statistically significant and positive correlations for the majority of the common domains of both instruments. However, in the present study, the domains which did not correlate significantly were the EL/V domain, while, in the studies of Meyer-Rosberg et al.²⁷ and Prieto et al.²⁵, were the SI/SF domains. A possible explanation for these results may be related to a combination of the sample's characteristics and the items that constitute each of the instruments' domains. The EL domain of the NHP has only three items, the one with the lowest number of items, while, the V domain of the SF-36 has four items. This allows the capture of different levels of HRQOL perception. Possibly, the NHP dichotomous answers, associated with the low number of items of the EL domain, induced a answer "no", since HRQOL of the sample was not bad enough to answer positively to the NHP questions, but also not good enough so the highest score of SF-36 was obtained, which might explain the absence of correlation. The positive correlation between the SI/SF domains in the present study, does not corroborate the results of Meyer-Rosberg et al.²⁷ and Prieto et al.²⁵. This may be explained by the fact that NHP items related to this domain are focused more to the psychological aspect, which interferes in the social relationships, while the SF-36 items are more related to psychological and physical aspects. Possibly, the characteristics of the samples justify this result: in the studies of Meyer-Rosberg et al.²⁷ and Prieto et al.²⁵, the participants had a specific health condition which lead to physical disability, and, therefore, their answers might have been indicative of a good QoL in the SI domain of NHP and of a worst QoL in the SF domain of SF-36. On the other hand, community elderly evaluated in the present study, in which the psychological aspect shows greater influence in their social lives, demonstrated answers that are an indicative of a same sense of QoL in these common domains.

Either the NHP or the SF-36 showed significant and adequate estimates of internal consistency and test-retest/inter-rater reliability. For both NHP and SF-36, Falcoz et al.²³ ($0.58 \leq \alpha\text{-Cronbach} \leq 0.78$ and $0.73 \leq \alpha\text{-Cronbach} \leq 0.89$) and Boyer et al.²⁶ ($0.51 \leq \alpha\text{-Cronbach} \leq 0.88$ and $0.74 \leq \alpha\text{-Cronbach} \leq 0.94$) also reported adequate estimates of internal consistency for both instruments. Boyer et al.²⁶ reported adequate estimates of test-retest reliability for both instruments being slightly higher for the NHP (ICC=0.73-0.95) when compared to the SF-36 (ICC=0.63-0.85). Studies that investigated the inter-rater reliability of these instruments were not found in the literature. Comparing the reliability estimates of the present study, it may be observed that both instruments have high inter-rater

reliability. Therefore, the influence of the examiner's change in the results was lower than the time interval between the two evaluations performed by the same examiner. The time interval from seven to ten days was necessary to avoid recall bias in the results of the second evaluation and therefore could compromise the internal validity of the study³⁰. However, the time factor may lead to some modification in QoL and, then, modify the answer given between one and other evaluation, which possibly occurred.

Some limitations should be considered. In spite of the social-demographic characteristics of the sample be similar to the profile described by other studies with community-dwelling elderly^{4,12}, other characteristics (independence and being physically active) determine a specific group of elderly. Future studies should investigate a HRQOL instrument more suitable to evaluate elderly who are physically dependent, frail and institutionalized. Another limitation of this study is related to the comparison of only two instruments of HRQOL. In spite of SF-36 and NHP be commonly used in elderly people other instruments such as the WHOQOL-OLD are also commonly used.

In spite of the limitations, the results of this study are of extreme relevance for the physical therapy and rehabilitation area: firstly because the evaluation of HRQL is essential in the elderly population^{1,13,14}, including those with characteristics similar to the participants of this study. Secondly because the professionals of rehabilitation area are very interested in outcomes guided to the client and that do not only reflect the absence or presence of disease, but a evaluation of the participants' satisfaction in relation to essential domains of health¹⁴. Finally, the results of this study

guide these professionals in the selection of the HRQOL instruments that would be more adequate for the clinical situation in which they work, providing consistent reasons and standardization of this evaluation between professionals in similar situations, which facilitates comparisons and discussions.

Therefore, considering the ceiling/floor effects, the SF-36 seemed to be slightly more adequate for the evaluation of the HRQOL in community-dwelling elderly. However both instruments showed adequate internal consistency and reliability estimates, which were slightly greater in favor of the NHP. Moreover the NHP is less time consuming, and the score system is easier to understand which increases its clinical applicability. These results, associated with the particularities of each instrument, such as the presence of certain non common domains, should be take into consideration when selecting one of these instruments for the evaluation of HRQOL in community-dwelling elderly. Nevertheless when selecting an instrument to evaluate the HRQOL the sample's characteristics should be carefully considered, because previous studies presented specific behaviors of the same evaluated properties when participants were different.

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