Translation, adaptation and validation of a self-care scale for type 2 diabetes patients using insulin

Tradução, adaptação e validação de uma escala para o autocuidado de portadores de diabetes *mellitus* tipo 2 em uso de insulina

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Abstract

Objective: Translate, adapt and validate the Appraisal of Self-care Agency Scale-Revised (ASAS-R) for Brazil.
Methods: A descriptive method for adapting measurement instruments was used with 150 *diabetes mellitus* patients. The instrument underwent translation, synthesis of independent translations, evaluation by a committee of judges, back-translation and submittal of back-translation to original authors, semantic validation, submittal of the adapted version to original authors, and pretesting.
Results: The ASAS-R maintained semantic, cultural and conceptual equivalence. Cronbach's alpha was 0.74; the intraclass correlation coefficient for test-retest reliability was 0.81; and interobserver agreement was 0.84.
Conclusion: The Brazilian-Portuguese version maintained conceptual, semantic and cultural validity, as compared to the original version. In the discriminant validity, there was correlation between capacity for self-care, depression and perceived health, but not social support. There were significant differences between groups regarding age, education levels and insulin self-application.

Resumo

Objetivo: Traduzir, adaptar e validar a escala *Appraisal of Self Care Agency Scale-Revised* (ASAS-R) para o Brasil.
Métodos: Utilizou-se o método descritivo de adaptação de instrumentos de medidas, em 150 portadores de *diabetes mellitus*. As etapas foram: tradução, síntese das traduções independentes, avaliação pelo Comitê de Juízes, retrotradução, submissão das versões retrotraduzidas aos autores da versão original, validação semântica, submissão da versão adaptada aos autores da versão original e pré-teste.
Resultados: ASAS-R manteve as equivalências semântica, cultural e conceitual. O alfa de *Cronbach* foi de 0,74, e o coeficiente de correlação intraclasse, no teste e reteste, foi de 0,81, e na análise interobservadores, de 0,84.
Conclusão: A versão manteve as equivalências conceitual, semântica e cultural. Confirmou-se a correlação entre os construtos capacidade de autocuidado, depressão e percepção do estado de saúde, exceto apoio social. Na validade discriminante, observaram-se diferenças significantes entre grupos, quanto à idade, escolaridade e autoaplicação de insulina.

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Introduction

The recognition of chronic illnesses, in this case, of *diabetes mellitus* (DM), as serious public health problems[1] demands that different levels of the public health care system revise existing practices and implement actions for promoting self-care.

According to Orem's Self-Care Theory, self-care is defined as actions initiated and carried out by individuals in order to maintain their life, health and well-being; individuals are an active part of the decision-making process, identifying their needs, and the actions to be undertaken for their care.

In this context, it is essential for patients to take responsibility for home treatment, which is fundamental to controlling glucose levels and preventing acute and chronic complications. Such treatment involves behavioral changes in daily activities,[2] especially among patients of advanced age and who take insulin.[3]

Some requisites for reaching treatment goals that have been much discussed are knowledge about DM and development of psychomotor skills.[2] These requisites promote and facilitate self-care activity management. However, patients must also display the ability to commit to/engage in self-care activities.[4-6]

Self-care agency or power is a complex ability which is acquired and developed throughout one's daily life. It enables a person to discern factors which must be controlled and treated, decide what can and must be done, recognize needs, assess personal and environmental resources, and determine, commit to and carry out self-care actions.

Thus, an individual's capacity to engage in self-care has been widely studied to demonstrate what individual actions can lead to health promotion, well-being and the maintenance and/or prevention of illnesses and their complications.[4-6] Such capacity can be studied regarding its development or operativity.

Since capacity for self-care is a subjective construct which cannot be observed directly, but only through its attributes or indicators, it was necessary to find a measuring scale in the literature that could evaluate a person's capacity to engage in self-care activities according to new health care guidelines.

Among the international scales found (The Exercise of Self-care Agency, The Denyes Self-care Agency Instrument, The Perception of Self-Care Agency Questionnaire, The Self-as-Carer Inventory and The Mental Health-Related Self-Care Agency Scale),[4] the Appraisal of Self-care Agency Scale by Evers was chosen due to its popularity for use among the DM population, although it is not specific to this illness, and for being strongly correlated to other scales that measure self-efficacy, depression, social support, health status, health-promoting lifestyle and self-care management for DM patients, especially among those taking insulin.[4-6] This scale has been validated in the following countries: Sweden, Denmark, China, Norway, the Netherlands, the United States, Mexico and Colombia.[4]

This scale was created based on concepts presented in Orem's Theory of Self-Care Deficit, as analyzed by the Nursing Development Conference Group (NDCG). The items on the scale were constructed from the concept of capacity for self-care, based on enabling traits (10 power components), which are specific personal capacities for carrying out self-care activities. It is also based on operational traits, or the patient's capacity for organizing personal and environmental resources significant for their self-care.[4,6]

The scale does not mention the dimensions and does not aim at verifying whether capacity for self-care is developed, but rather whether it is in operation. The instrument provides a global and nonspecific measurement, and can be applied to groups of different ages and health conditions. Its objective is to evaluate capacity for self-care and measure the individual's power to execute productive actions towards self-care.

The revised version was chosen because it presented a better adjustment index, greater reliability and better validation results when compared to the original version. The changes presented in the new version were the exclusion of nine items and the description of three factors not reported in the original version.

The ASAS-R is answered on a 5-point Likert scale and comprises 15 items with five possible answer choices each, only one being correct. A scoring is: totally disagree = 1; disagree = 2; neither disagree or agree = 3; agree = 4; totally agree = 5. Of the 15 questions, four refer to negative aspects, and their scores must be inverted for data analysis. The possible scores run from 15 to 75; the closer to 75, the higher the operational self-care capacity exhibited by the individual.[6]

We believe that the use of the ASAS-R in Brazil will contribute towards nursing clinical practice and research on health care, especially regarding DM patients.

The objective of the present study was to translate, culturally adapt and validate the Appraisal of Self-care Agency Scale-Revised (ASAS-R) to the Portuguese language and Brazilian culture.

Methods

A quantitative methodological study which deals with the process of translating, adapting and validating the ASAS-R scale to the Portuguese language with a group of Brazilians with *diabetes mellitus* type 2, all taking insulin. The authorized scale responsible for the translation and validation for Portuguese language

The study was conducted in three public health units in a municipality of the state of Minas Gerais, an important economic center and regional reference in the field of health and education, in the period between November and September 2010.

The translation and adaptation process for the ASAS-R followed methodological references[7-9] with the following modifications: we submitted a synthesis of the two translations to a committee of judges before the back-translation phase and included a semantic validation phase, in order to detect problems with item comprehension which might not have been noticed after back-translation and also to assess scale acceptance and comprehension by the target audience.

Thus, the study went through the following phases: translation, synthesis of independent translations, evaluation by a committee of judges, back-translation, submitting back-translation to authors of the original version, semantic validation, submitting adapted version to the original authors and pretesting.[7-9]

In the first phase, two bilingual specialists and native English speakers, residing in Brazil, translated the scale; the first translator was informed of the study's objectives and had experience in the health field, unlike the second translator.

A synthesized version was created based on the two translations, and together with the original scale, was submitted to the committee of judges for an evaluation regarding its semantic, idiomatic, conceptual and cultural equivalence, in order to guarantee comprehensibility, as well as face and content validity.

The committee consisted of seven professionals with command of the English language that work in the fields of *diabetes mellitus*, self-care, methodology for adapting measurement instruments and translation. The minimum level of agreement adopted was 80% in order for a modification to be accepted.

Once the consensual version was ready, two American translators residing in Brazil who have command of the Portuguese language and Brazilian culture carried out a back-translation into English. However, they were not informed about the objective of the study, had no experience in the health care field, and worked independently.

The back-translations were presented to the authors of the revised original version. After the authors' agreement, the consensual version was submitted to a semantic validity analysis. During the semantic validation phase, it was submitted to 18 patients with *diabetes mellitus*, selected based on convenience. Participants were homogeneously distributed regarding gender and education level. There were six participants for every five items of the ASAS-R.

All participants answered all the items of the first consensual version. However, every sixth participant also answered an instrument evaluating text comprehensibility and pertinence, as well as registering suggestions for every other fifth item on

the scale. The scale was elaborated and the sample group selected based on methods used by researchers of the DISABKIDS Group.[10]

The pretesting phase was conducted with the participation of 50 type 2 *diabetes mellitus* patients taking insulin, being attended to by the Family Health Strategy (ESF) unit. The main goals of this phase were to identify the need for new linguistic and conceptual adjustments to the scale, estimate the duration of the interview in minutes and conduct a preliminary analysis of the internal consistency and distribution of the answers.

For analyzing the psychometric properties of the translated and adapted ASAS-R, 150 type 2 *diabetes mellitus* patients participated, all taking insulin and attended to by the three Family Health Strategy units, including those from the pretesting phase who fulfilled the following inclusion criteria: both genders; 18 years of age or older; over one year of having a type 2 *diabetes mellitus* diagnosis and of being registered in the ESF; using insulin; and a demonstrated capacity to answer the questions on the instrument.

During this phase, the answers to the ASAS-R were analyzed for frequency distribution, reliability (internal consistency and product-moment correlation), replicability (test-retest and interobservers) and validity (convergent and discriminant construct validity).

The internal consistency analysis of the items was obtained by means of Cronbach's alpha (α), with acceptable values between 0.5 and 0.9, since it is a scale with few items. For analyzing replicability, the retest was applied to a sample of 30 people, obtained by the statistics program Statistical Package for the Social Sciences version 16.0, with an interval of time between interviews of 15 to 20 days. The first and second interviews were carried out by the same interviewer and in the same location.

With regard to data collection for the interobserver agreement analysis, it was conducted on the same day, by different interviewers. The second interviewer was a nurse who received training about the studied construct, the instrument being validated and the interview method. The convenience sample comprised 30, and the intraclass correlation coefficient statistical test was used for test and retest and interobserver agreement.

For the analysis of convergent construct validity, we used the Depressive Cognition Scale (DCS) by Souza et al[11] (negative correlation), the Social Support Survey (MOS) by Griep et al[12] (positive correlation) and the instrument of Perceived Health Status questionnaire (SF-36) by Ciconelli et al[13] (positive correlation). The statistical test used was Pearson's correlation coefficient.

Regarding discriminant construct validity analysis, the results of comparisons between known groups were analyzed by means of Student's t-test. This was done to test the hypothesis that the greater the education level and insulin self-application ability, the greater the score on the capacity for self-care evaluation scale; and the higher the age, the lower the score obtained the scale.

Scales were applied to participants by the researcher of the present study, individually and through an interview. The study was developed according to national and international ethical norms for research with human beings.

Results

The two translated versions of the original ASAS-R displayed some differences in language. The version created by the translator who was informed about the study's objectives and had knowledge in the field of health was directed towards the target audience's culture and knowledge, while the version created by the translator who was not informed regarding the study's objectives and had no experience in the health field was a more literary translation.

The synthesized version submitted for evaluation by the committee of judges was subject to some modifications regarding word choice, subject-verb agreement and the conceptual definition of the term "self-care agency." The term suggested instead was "capacity for self-care," which is better known in Brazil and other Latin-American countries. This phase was concerned with preserving the meaning of the statements in order to ensure they remained

as close as possible to the original version, while also guaranteeing the measurement's replicability.

In the semantic validation phase, participants pointed out their difficulties in understanding the completion instructions, one of the answer choices and six items on the scale. For a better level of understanding, researchers evaluated the doubts and suggestions, and carried out some adjustments whenever the level of agreement was less than 80%, while always endeavoring to maintain the meaning of the original items.

We took measures, such as including an explanatory example in the completion instructions, to minimize random variation and increase measurement precision, substituting the answer choice "neither agree or disagree" for "undecided," finding substitutes for words not frequently used in daily life, such as: circumstances, adjustments, energy and effectiveness, and making some terms more colloquial, as displayed in chart 1.

After the suggested modifications were made, the second consensual version was submitted to the pretesting phase. In this step, a new modification was suggested; the interview time for completing the items was 5 minutes, the preliminary value of the items' internal consistency was satisfactory (Cronbach's alpha equal to 0.75) and ceiling and floor effects were observed for items ASAS-R 4, 7, 8, 11, 12 and 14 (more than 15% of the answers concentrated in the instrument's lowest or highest possible scores). Thus, this second consensual version culminated in the adapted ASAS-R version.

Analysis of the ASAS-R's psychometric properties was carried out with the participation of 150 people, with sociodemographic and clinical characteristics as displayed below in table 1.

In the same manner as in the pretesting phase, ASAS-R item distribution displayed ceiling or floor effects on items ASA-R 4, 7, 11, 12 and 14, except on item 8.

As shown in table 2, we observed correlations with magnitudes varying from moderate to strong (r=0.31 to r=0.69) between 13 items on the ASAS-R, with exception of items ASAS-R 2, 9 and 13, which presented weak correlations (r=-0.18 to r=0.22). Item ASAS-R 13 was negatively correlated to the entire scale, however, its exclusion was not justifiable, for the alpha was not significantly altered.

Chart 1. Items which underwent modification in the semantic validation phase

Item	ASAS-R VPC1 * BEFORE semantic analysis	ASAS-R VPF** AFTER semantic analysis
Instructions	Instructions: Mark the best answer for each of the statements below, according to the scale	Instructions: Mark the best answer for each of the statements below, according to the scale. Example: Do you agree with item 1? If so, you will say/mark X in the space for "agree or totally agree." The difference between "agree and totally agree" is that "totally agree" gives an idea of always and "agree" gives an idea of most of the time. Example: I usually sleep enough to feel rested. Answer: If you are a person who always sleeps enough to feel rested, you will say/mark "totally agree" for the phrase. However, if you sleep enough to feel rested most of the time, you will answer "agree." This example is also relevant for the choices "totally disagree" and "disagree."
Answer choices	Neither disagree nor agree	Undecided
ASAS- R 1	As the circumstances of my life change, I make the necessary adjustments to stay healthy.	As my life changes, I make the necessary changes to stay healthy.
ASAS- R 2	If my physical mobility is decreased, I make the necessary adjustments.	If my ability to move is decreased, I try to find ways to solve this difficulty.
ASAS- R 4	I frequently feel lack of energy to take care of myself as I know I should.	I frequently feel lack of enthusiasm to take care of myself as I know I should.
ASAS- R 8	In the past, I have changed some of my old habits to take better care of my health.	In the past, I have changed some of my old customs to take better care of my health.
ASAS- R 10	I regularly evaluate the effectiveness of the things I do to stay healthy.	I regularly evaluate if the things I do to stay healthy are working.
ASAS- R 11	In my daily activities, I rarely dedicate any time to care for my health.	In my day-to-day life, I rarely dedicate any time to care for my health.

*VPC1-first consensual version for Brazilian Portuguese; **VPF-final version for Brazilian Portuguese

Table 1. Clinical and sociodemographic characteristics, test phase

Clinical and sociodemographic characteristics	n(%)	Variation Interval	Median	Mean	SD
Gender					
Female	83(55.3)				
Male	67(44.7)				
Age (years)		18 - 94	64	58.6	16.4
<60	56(37.3)				
≥60	94(62.7)				
Marital Status					
Married/living together	72(48.0)				
Single	39(26.0)				
Widowed	33(22.0)				
Divorced/separeted	6(4.0)				
Occupation					
Retired/pensioner	76(50.7)				
Active	48(32.0)				
Homemaker	20(13.3)				
Unemployed	1(0.7)				
Student	5(3.3)				
Education Level					
Illiterate	17(11.3)				
No schooling/can read and write	14(9.3)				
1⊦9 years of schooling	74(49.4)				
≥ 9 years of schooling	45(30.0)				
Monthly family income (in minimum monthly wages*)		0 - 2,200.00	1,000.00	924.63	556.75
Time with DM (years)		1 - 41	13	10.5	8.78
Time of insulin use (years)		1 - 40	5	6.41	6.24

*value of monthly minimum wage at the time was 545.00 Brazilian reais; SD – Standard Deviation

Table 2. Item correlation coefficient-total and values of Cronbach's alpha (α) for the totality of items when each item was excluded from ASAS-R, test phase

Item	Item correlation coefficient-total	Cronbach's Alpha if item is excluded
ASAS-R (α = 0,74)		
ASAS-R 1	0.32	0.71
ASAS-R 2	0.22	0.69
ASAS-R 3	0.32	0.71
ASAS-R 4	0.31	0.70
ASAS-R 5	0.46	0.70
ASAS-R 6	0.32	0.70
ASAS-R 7	0.69	0.66
ASAS-R 8	0.35	0.71
ASAS-R 9	0.19	0.73
ASAS-R 10	0.35	0.71
ASAS-R 11	0.41	0.70
ASAS-R 12	0.51	0.70
ASAS-R 13	-0.18	0.76
ASAS-R 14	0.54	0.69
ASAS-R 15	0.44	0.70

The items' internal consistency, obtained by Cronbach's alpha, was 0.74. The values for the alpha of the totality of items suffered small alterations when each of the 15 items was excluded (Table 2).

The replicability of the adapted scale, through test-retest and interobserver reliability analysis, confirmed ASAS-R's stability (r=0.81; p<0.001) and equivalence (r=0.84; p<0.001).

Analysis of convergent validity confirmed the hypothesis of inverse correlation between ASAS-R and DCS scores (r =-0.70; p<0.001). It also confirmed our hypothesis of positive correlation with the following domains of the Perceived Health Status instrument (physical and social aspects were excluded): functional capacity (r=0.38; *p*<0.01), vitality (r=0.49; *p*<0.01), emotional aspects (r=0.36; *p*<0.01), mental health (r=0.41; *p*<0.01) and general state of health (r=0.52; *p*<0.01).

On the other hand, the hypothesis of positive correlation with the Social Support Scale (r=0.12; *p* 0.17) was not supported. It is important to highlight that 98% of the interviewees reported living with family members or other companions.

Regarding discriminant construct validity, the group of patients with over nine years of schooling obtained higher scores for capacity for self-care than did the group with under 9 years of schooling (p 0.002); patients over 75 years old displayed lower scores on capacity for self-care when compared to those under 75 (p 0.026); and patients who self-apply insulin obtained higher scores on capacity for self-care compared to those who do not ($p<0.001$).

Discussion

Throughout the various phases of the translation and cultural adaptation process, we observed that the translator's profiles resulted in differing word choices.

Thus, since the items' cultural and semantic equivalence would be prioritized in other phases, such as in the assessment by the committee of judges and semantic validation, we thought it pertinent to preserve the grammatical structure of the version closest to the original in its literary form, always observing and comparing the discrepancies and ambiguities between versions.

At the end of this process, the adapted ASAS-R was analyzed for its reliability, replicability and validation using a group of 150 type 2 *diabetes mellitus* patients taking insulin. The number of participants was according to the recommended number in traditional psychometrics, which prescribes a minimum of five and a maximum of 10 respondents for each item on the instrument.[9]

The items on the ASAS-R which presented ceiling or floor effects in the testing phase were: "I often lack the energy to take care of myself in the way that I know I should" (ASAS-R 4); "If I take a new medication, I obtain information about the side effects to better care for myself" (ASAS-R 7); and "I am able to get the information I need, when my health is threatened" (ASAS-R 12). The answer choices on the other extreme of "totally disagree" were: "In my daily activities, I seldom take time to care for myself." (ASAS-R 11); and "I seldom have time for myself" (ASAS-R 14).

This effect may have been influenced by: the sociodemographic characteristics of the sample, who were mostly elderly patients (62.7%) and retirees (50.7%) who had received less than 9 years of schooling (70.0%); time available time for self-care, since most are retired; limited reading comprehension; family participation in the decision-making process; and the easy access to information provided by the ESF unit's working methodology. As an example, it is very likely that a retired person has plenty of time for self-care, thus they may have completely agreed with this statement.

In the study by Sousa et al[4] the sample comprised 141 patients with DM taking insulin; the majority were married women with an average age of 48 years and a good income. However, in another of their studies,[6] the sample comprised 629 adults from the population in general; the majority were married women with an average age of 35, employed, and with a higher education degree.

Based on our assessment that the characteristics of the studied group might have influenced the answer distribution, we chose not to exclude or reformulate such items; however, these effects might have influenced the results obtained when analyzing internal consistency and item correlation. Cronbach's alpha for internal consistency was 0.74, lower than in the original revised version ($\alpha=0.89$).[6] The present version presented the highest value found in all the literature, including studies which used the original version with 24 items (alpha values ranging from 0.59 to 0.80).[4,6]

Although the values of total item correlation were lower compared to the original study,[6] most were moderate to strong in magnitude (r=0.31 to r=0.69), which makes for satisfactory results, when considering that the ideal value for initial validation studies must be higher than 0.30.[14]

Regarding the modes of reliability assessment for the ASAS-R, test-retest and interobserver analysis were used. The results pointed to strong correlations of the analyses (r=0.81; $p<0.001$) e (r=0.84; $p<0.001$), respectively, suggesting that the adapted scale is reliable, for its properties are stable and equivalent.

Among the scales used for measuring convergent validity,[4-6] we selected the versions which had already been adapted for Brazil, such as the Social Support Scale and the Depressive Cognition Scale. The Perceived Health Status instrument was used by other studies that used the original ASAS version with 24 items.

Regarding convergent validity, the hypothesis of a correlation between capacity for self-care and social support (r=0.12; p 0.17) was not supported, despite knowing that the environmental factor "social support" influences an individual's capacity for self-care[4,5] and is a strategy for increasing one's engagement with self-care.[12] One variable that might have influenced this result was patients' heightened perception about their access to emotional, affective and material support (98% of interviewees do not live alone).

On the other hand, there was correlation between ASAS-R and DCS scores(r=-0.70; p<0.001) and also SF-36 scores. The personal factor "depression" can affect an individual's capacity for self-care and adequate health-promotion behaviors for preventing illness and engaging in self-care management, especially in the case of DM. It is one of the causes of treatment abandonment and, consequently, results in worsened glycemic control and increased risk of complications.[11]

The correlation between capacity for self-care and perceived health was observed in the domains of functional capacity, physical and emotional aspects, pain, vitality and general state of health. There was no significant correlation between the social aspect domain and the total ASAS-R score.

Regarding discriminant construct validity among distinct groups, statistically significant differences between age, education level and insulin self-application ability were observed. We based our hypotheses on Orem's theoretical references, which state that intrinsic and extrinsic factors of basic conditioning, including age, education level and use of daily life resources to carry out activities, affect the development and maintenance of capacity for self-care.

The hypothesis that capacity for self-care presents different characteristics among groups of patients who self-apply insulin and those who do not is justified due to the fact that the evolution of DM, in addition to the senility process, act in favor of increasing the risk of the appearance of visual, motor and cognitive complications, problems which can interfere in one's ability for insulin self-application and, consequently, in the capacity for self-care.[3,4,15,16]

In this sense, the process undertaken resulted in a valid, reliable, replicable, comprehensible, brief and easily applicable scale. Thus, the present study contributes towards the Brazilian Unified Health System's proposals for primary health care and health promotion, especially among DM patients.

More evidence of this scale's validity must be gathered in order to increase the confidence surrounding its usage. In addition, the scale should preferably be applied to general population samples to strengthen the results of the psychometric analysis and demonstrate the dimensionality of the factorial structure proposed by the authors of the original revised version, which was not the objective of the present study.

Conclusion

The Brazilian-Portuguese version of the ASAS-R, obtained after translation and adaptation with a group of insulin-taking type 2 *diabetes mellitus* patients, maintained conceptual, semantic and cultural equivalence, according to the original version. Regarding convergent validity, we confirmed correlations between capacity for self-care, depression and perceived health, but not social support. In terms of discriminant validity, we observed significant differences between groups regarding age, education levels and insulin self-application.

Collaborations

Stacciarini TSG created the project, executed the research and wrote the article. Pace AE provided relevant critical reviews of intellectual content and obtained final approval for publication.

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