

# Development of the Brazilian brief version of the Diabetes Quality of Life Measure (DQOL-Brazil-8)

## *Desenvolvimento da versão brasileira resumida do Diabetes Quality of Life Measure (DQOL-Brasil-8)*

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**ABSTRACT:** *Objective:* To provide for Brazil, through the selection of items of the Brazilian version of the Diabetes Quality of Life Measure (DQOL-Brazil), a concise instrument. *Methods:* This is a cross-sectional study in which the DQOL-Brazil was administered to 150 type 1 diabetic patients and 146 type 2 diabetic patients. The items of the instrument were selected according to the analysis of the principal components and Spearman's correlations with treatment satisfaction, glycated hemoglobin level, and Nottingham Health Profile. *Results:* From a total of 44 items, only 8 were selected to compose the summary instrument (DQOL-Brazil-8). The DQOL-Brazil-8 presented Spearman's correlation of 0.873 with the DQOL-Brazil and a Cronbach's alpha coefficient of 0.702. *Conclusion:* The Brazilian health professionals now have a brief tool for a fast application that preserves the best features of the full DQOL-Brazil.

**Keywords:** Diabetes mellitus, type 1. Diabetes mellitus, type 2. Adult. Quality of life. Psychometrics. Validation studies.

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**RESUMO:** *Objetivo:* Disponibilizar para o Brasil, através da seleção de itens da versão brasileira do *Diabetes Quality of Life Measure* (DQOL-Brasil), um instrumento resumido. *Métodos:* Estudo transversal em que o DQOL-Brasil foi administrado a 150 pacientes diabéticos tipo 1 e 146 pacientes diabéticos tipo 2. Os itens do instrumento foram selecionados com base na análise de componentes principais e correlações de Spearman com a satisfação ao tratamento, hemoglobina glicada e Perfil de Saúde de Nottingham. *Resultados:* De um total de 44 itens, apenas 8 foram selecionados para compor o instrumento resumido (DQOL-Brasil-8). O DQOL-Brasil-8 apresentou correlação de Spearman de 0,873 com o DQOL-Brasil e um coeficiente alfa de Cronbach de 0,702. *Conclusão:* Os profissionais de saúde brasileiros têm agora um instrumento curto e de aplicação rápida, que preserva as melhores características do DQOL-Brasil completo.

**Palavras-chave:** Diabetes mellitus tipo 1. Diabetes mellitus tipo 2. Adulto. Qualidade de vida. Psicometria. Estudos de validação.

## INTRODUCTION

In general, in Brazil, assistant doctors of diabetes mellitus (DM) patients are dedicated to preventing the secondary complications of the disease. For such cases, they constantly monitor the biochemical parameters, especially the blood glucose and glycated hemoglobin (A1c) levels, and from these parameters, they decide the therapeutic approaches to be taken. However, paradoxically, the same doctors take the monitoring of health-related quality of life (HRQOL) as a secondary priority<sup>1</sup>.

It is considered that the improvement of the HRQOL is to be confused with the very reason for medicine itself; after all, except in emergency rooms or in critical surgeries, in which lives are effectively saved, the focus is directed into the improvement of health conditions and people's well-being. Thus, our team of researchers identified some reasons that led to a precarious monitoring of this important parameter for diabetic patients. Among the reasons are the complexity and excessive time required for the completion and analysis of the study and the low sensitivity and therapeutic changes of specific evaluation instruments of the HRQOL in DM<sup>1</sup>. Therefore, optimizing the process of some of these instruments becomes essential for the use of clinical routine.

The natural choice for optimization relapsed on the Diabetes Quality of Life Measure (DQOL), which, besides being the most consecrated specific instrument of evaluation of HRQOL in DM worldwide, is also the only one validated in Brazil for both type 2<sup>2</sup> and type 1 DM<sup>3</sup>. The Brazilian version was called DQOL-Brazil. The DQOL-Brazil uses the Likert scale of 5 points, consisting of 4 domains: "satisfaction" (15 questions), "impact" (18 questions), "concerns: social/vocational" (7 questions), and "concerns related to diabetes" (4 questions). The scores are calculated by the mean of the individual items: the closer to 1 (one), the better the HRQOL (Table 1).

Similar to the Nottingham Health Profile (NHP), an instrument conceived in order to detect the changes in the health of carriers of chronic diseases over time, the DQOL-Brazil

Table 1. Brazilian version of the Diabetes Quality of Life Measure (DQOL-Brazil)\*.

<b>SATISFACTION</b>	
Very satisfied (1) – Quite satisfied (2) – Satisfied (3) – Little satisfied (4) – Not at all satisfied (5)	
1.	Are you satisfied with the amount of time you take to control your diabetes?
2.	Are you satisfied with the amount of time you spend getting tested in general?
3.	Are you satisfied with the time it takes to verify your blood sugar levels?
4.	Are you satisfied with your current treatment?
5.	Are you satisfied with the flexibility of your diet?
6.	Are you satisfied with the apprehension your diabetes raises in your family?
7.	Are you satisfied with your knowledge about your diabetes?
8.	Are you satisfied with your sleep?
9.	Are you satisfied with your social life and friendship?
10.	Are you satisfied with your sex life?
11.	Are you satisfied with your work, school, or domestic chores?
12.	Are you satisfied with your body?
13.	Are you satisfied with the time you spend practicing physical exercises?
14.	Are you satisfied with your leisure time?
15.	Are you satisfied with your life in general?
<b>IMPACT</b>	
Never (1) – Almost never (2) – Sometimes (3) – Almost always (4) – Always (5)	
16.	How often do you feel the pain associated with your diabetes treatment?
17.	How often do you feel embarrassed about having to treat your diabetes in public?
18.	How often do you feel physically ill?
19.	How often does your diabetes interfere in your family life?
20.	How often do you have a bad night's sleep?
21.	How often do you find your diabetes is limiting your social life and friendship?
22.	How often do you feel bad about yourself?
23.	How often do you feel restricted by your diet?
24.	How often does your diabetes interfere in your sex life?
25.	How often does your diabetes deprive you from driving a car or operating a machine (eg. typewriter)?
26.	How often does your diabetes interfere with your physical exercises?
27.	How often do you miss work, school or domestic chores owing to your diabetes?
28.	How often do you explain yourself what it is to have diabetes?
29.	How often do you think your diabetes interrupts your leisure activities?
30.	How often do you feel embarrassed to tell others about your diabetes?
31.	How often do you feel bothered about showing diabetes?
32.	How often do you feel that, because of diabetes, you go to the restroom more often than others?
33.	How often do you eat something you should not instead of saying you show diabetes?

Table 1. Continuation.

CONCERNS: SOCIAL/VOCATIONAL	
Never (1) – Almost never (2) – Sometimes (3) – Almost always (4) – Always (5)	
34.	How often do you worry whether you will get married?
35.	How often do you worry whether you will have children?
36.	How often do you worry whether or not you will get the job you want?
37.	How often do you worry whether you will be refused an insurance?
38.	How often do you worry whether you will be able to finish your studies?
39.	How often do you worry whether or not you will lose your job?
40.	How often do you worry whether you will be able to go on vacations or to travel?
CONCERNS RELATED TO DIABETES	
Never (1) – Almost never (2) – Sometimes (3) – Almost always (4) – Always (5)	
41.	How often do you worry whether you will pass out?
42.	How often do you worry whether your body looks different because you show diabetes?
43.	How often do you worry whether you will have complications dues to your diabetes?
44.	How often do you worry whether or not anyone will go out with you because of your diabetes?

The items should be answered in the Likert scale of 5 points according to the subtitles.

\*Public domain instrument.

did not prove to be an appropriate predictor of secondary complications of DM<sup>4</sup>. Besides that, when subjected to the factor analysis (FA), it presented a high prolixity, which compromises accuracy, being recommended the selection of the most associated items with the clinical characteristics of DM, excluding the remaining ones<sup>3</sup>.

There is a short version of the HRQOL, which has been successfully used in the United States, the 15-item DQOL Brief Clinical Inventory. However, the optimization process, from the complete version of the HRQOL, was eminently statistical and based only on the data from the North American population<sup>5</sup>. Thus, its transcultural validation is not recommended, in contrast with short versions of other HRQOL instruments, such as the SF-36 and SF-12, whose optimization processes were based on theoretical concepts<sup>6</sup>.

The objective of this study was to provide, for clinical and epidemiological uses in our country, a short and quick to use instrument, developed through the selection of items in the DQOL-Brazil. The short version of the instrument must preserve the structure and refine the contents of the original scale and, yet, focus on the satisfaction of the DM patient with their treatment.

## METHODS

This cross-sectional, exploratory study was conducted in two parts, with researchers approaching all diabetic patients who attended to the routine medical appointments.

The first part of the study, in the period from January to May 2008, included 146 patients with type 2 DM, who were monitored by the Jardim Gabinete family Health unit (Curitiba, Paraná). The second part, between January and September 2012, consisted of 150 type 1 DM patients, who were monitored by the endocrinology service of the *Hospital de Clínicas* of the Federal University of Paraná (Curitiba, Paraná).

The inclusion of patients occurred independently from gender, as long as they were older than 18 years of age; no patient refused to take part in the study. The excluding criteria for the selection were the presence of psychiatric diagnosis (except for mood disorders), individuals who did not dose A1c within the previous three months to the application of the instruments, and pregnant or lactating women.

DQOL and NHP were used simultaneously; other variables collected were: age, gender, time of DM diagnosis, list of health problems, values of A1c within the last three months, and DM therapy. For the patients with type 2 DM, we also used the Diabetes Complications Index (DCI), a psychometric instrument used to identify secondary complications of type 2 DM and quantify its intensity<sup>7</sup>. All the instruments were self-used, and the patients were in charge of its understanding, filling them out while waiting for their appointments, in a silent and isolated location, where other people could not influence their answers; the time for filling them out varied from 20 to 40 minutes.

Both the groups of patients were gathered in the optimization process of the DQOL-Brazil, so that the short version of the instrument was validated for both the DM variables.

In order to maintain the validity of the content and the structure of the DQOL, a FA was performed, by the main components' method (MCs), with oblique rotation, in all the domains separately. It is a *sine qua non* condition that at least one of the items in each domain remained in the final short instrument. The number of MCs was determined by the Kaiser criterion. When extracted up to two MCs, the items that showed commonality below 0.3 were excluded. When more than two MCs in the domain were extracted, the commonality items below 0.5 were excluded<sup>8</sup>.

Then, in order to optimize the specificity of the instrument to the DM, secondary complications, and treatment, the items that did not present significant correlations were excluded, measured by the Spearman coefficient, with A1c levels, NHP scores, and with the item 4 of the DQOL-Brazil, "Are you satisfied with your current treatment?", respectively. The covariance between the scores of DQOL-Brazil and the levels of A1c of patients suggest the responsiveness of these items for the different levels of control of the disease, considering, obviously, that the monitoring of the A1c is specific for the DM. The same is said of the covariance with the NHP, a proven predictor of secondary complications of DM<sup>4</sup>. The imposing of also having a correlation with item 4 of the DQOL-Brazil was used as a mechanism to select only the items in the instrument, which were somehow associated with the psychological impact, in the sense of satisfaction, regarding the therapeutic approaches proposed to patients, which directly influences the adherence to the treatment. These procedures aimed at supporting the utility parameters to the shortened instrument in order to model medical routines.

In order to establish the construct validity, the new MCs analysis, with oblique rotation, was carried out in the complete set of remaining items using the same exclusion criteria already mentioned.

Finally, a multiple linear regression was performed, aiming at identifying the possible redundant items and determining the best-adjusted predictive ability. The total DQOL-Brazil score was used as a dependent variable. The Cronbach's alpha of the remaining items was calculated.

A comparative analysis of the psychometric instruments was conducted, determining the Spearman correlation between the total scores and the A1c levels. Through the Mann-Whitney U test, the instruments are evaluated whether they are able to separate the distinct groups of patients.

The statistical calculations were performed using the SPSS software, version 17.0, and the confidence interval levels were set at 95%.

The research was conducted within the standards required by the Declaration of Helsinki and approved by the Ethics Committee of the Federal University of Paraná, registration numbers CEP/SD 373.053.07.06 and CEP/SD: 813.148.09.10.

## RESULTS

The age of type 2 DM patients, 41 men and 105 women, varied between 31 and 86 years of age, with a mean of 60.84 and standard deviation (SD) of 11.55 years, considering 28 of them were taking insulin. The time for diagnosis was on average 7.62 (SD 6.16) years and the average levels of A1c, 7.95% (SD 1.8%).

As for the type 1 DM patients, 55 men and 95 women, the age varied between 18 and 56 years of age, with a mean of 27.9 (SD 8.84) years; 11 of them reported secondary complications of the disease. The mean diagnosis time and the mean A1c values were 14.17 (SD 7.45) years and 9.04% (SD 1.92%), respectively.

The FA process led to the exclusion of the following items of the DQOL-Brazil, which did not meet the minimum commonality, in relation to the MCs extracted in the respective domains:

- “satisfaction”: items no. 6, 7, and 8;
- “impact”: items no. 16, 18, 20, 21, 23, 24, 25, 27, and 32.

Of the remaining items, those which did not present, simultaneously, significant correlations with the A1c and the NHP scores were excluded:

- “satisfaction”: items no. 1, 2, 3, 4, 9, 11, 12, 13, 14, and 15;
- “impact”: items no. 17, 19, 29, and 30;
- “concerns: social/vocational”: items no. 34, 36, 37, 38, 39, and 40;
- “concerns related to diabetes”: item no. 44.

It should be mentioned that the correlations with item no. 4 of the DQOL-Brazil, which directly questions the satisfaction with the treatment, were not decisive for the selection. This occurred because all the correlated items, with the levels of A1c and NHP scores, also did so with the referred item no. 4.

The remaining set, after fully submitted to the FA, showed the following items eliminated from the domains, after failing to meet enough commonality with the MCs:

- “impact”: items no. 22 and 28;
- “concerns related to diabetes”: item no. 42.

The eight items approved do not show multicollinearity when submitted to the multiple linear regression. Considering that the model with the best-adjusted predictive capability ( $r^2 = 77.4\%$ ), in relation to the total DQOL-Brazil score, was in fact the complete set. The Cronbach's alpha coefficient was calculated at 0.702. Up next, the items of the short version of the DQOL-Brazil (DQOL-Brazil-8) (Table 2) were classified according to the original domains:

Table 2. Brazilian short version of the Diabetes Quality of Life Measure (DQOL-Brazil-8).

Satisfaction	Very satisfied	Quite satisfied	Satisfied	Little satisfied	Not at all satisfied
5. Are you satisfied with the flexibility of your diet?	1	2	3	4	5
10. Are you satisfied with your sex life?	1	2	3	4	5
Impact	Never	Almost never	Sometimes	Almost always	Always
26. How often does your diabetes interfere with your physical exercises?	1	2	3	4	5
31. How often do you feel bothered about showing diabetes?	1	2	3	4	5
33. How often do you eat something you should not instead of saying you present diabetes?	1	2	3	4	5
Concerns: social/vocational	Never	Almost never	Sometimes	Almost always	Always
35. How often do you worry whether you will have children?	1	2	3	4	5
Concerns related to diabetes	Never	Almost never	Sometimes	Almost always	Always
41. How often do you worry whether you will pass out?	1	2	3	4	5
43. How often do you worry whether you will have complications dues to your diabetes?	1	2	3	4	5

- “satisfaction”: items no. 5 and 10;
- “impact”: items no. 26, 31, and 33;
- “concerns: social/vocational”: item no. 35;
- “concerns related to diabetes”: items no. 41 and 43.

The mean DQOL-Brazil-8 score was 2.48 (SD 0.73); 2.42 (SD 0.72) for male subjects and 2.51 (SD 0.73) for female subjects; 2.68 (SD 0.71) for type 1 DM and 2.28 (SD 0.69) for type 2 DM. The mean DQOL-Brazil score was 2.24 (SD 0.59); 2.21 (SD 0.62) for male and 2.25 (SD 0.58) for female subjects; 2.46 (SD 0.62) for type 1 DM and 2.01 (SD 0.46) for type 2 DM.

Considering the total scores, the DQOL-Brazil-8 presented a correlation of 0.873 with the DQOL-Brazil and 0.284 with the NHP. The DQOL-Brazil showed a correlation of 0.350 with the NHP.

The NHP strongly correlated with the DCI. It was able to differentiate the insulin users among type 2 DM patients and identified type 1 DM patients with secondary complications, although it did not correlate with the levels of A1c and the time of DM (Table 3).

Both the DQOL-Brazil and the DQOL-Brazil-8 significantly correlated with the levels of A1c, time of DM and DCI. Still, they were able to differentiate type 2 DM patients and the users of insulin. However, they did not identify type 1 DM patients who showed secondary complications (Table 3).

## DISCUSSION

The sample was considered representative because, most type 2 DM patients, in Curitiba, are monitored by the primary health services and, in general, the type 1 DM patients are monitored in specialized clinics. Although individuals of opposite gender may present different perceptions as for the items in the DQOL-Brazil, the inferior number of men ( $n = 96$ ), when compared with women ( $n = 200$ ), reaches out to establish the population sample,

Table 3. Association of the Brazilian version of the Diabetes Quality of Life Measure (DQOL-Brazil), short Brazilian version of the Diabetes Quality of Life Measure (DQOL-Brazil-8) and the Nottingham Health Profile (NHP) with the characteristics related to diabetes mellitus.

	Time of DM	Levels of A1c	DCI (DM2)	Identifies complications (DM1)	Identifies insulin (DM2)
DQOL-Brazil	0.287	0.264	0.377	No	Yes*
DQOL-Brazil-8	0.222	0.241	0.265	No	Yes*
NHP	–	–	0.557	Yes	Yes

Analysis of the correlation using the Spearman coefficient ( $p < 0.01$ ); comparison of the groups using the Mann–Whitney U test ( $p < 0.05$ ); \* $p < 0.01$ .

DM: diabetes mellitus; DCI: diabetes complication index; DM1: type 1 diabetes mellitus; DM2: type 2 diabetes mellitus.



which effectively seeks for clinical care and the age ranges approached, reminding that the DQOL-Brazil is not directed to individuals younger than 18 years of age<sup>2,3</sup>.

Both the filters to which the scores of DQOL-Brazil, in this population sample, were submitted to, were proven to be competent to establish a short instrument, of only eight items, which kept the best characteristics of the original instrument, the DQOL-Brazil-8.

The first of the filters, the FA, eliminated the items that did not identify to the psychological latent traits, in each one of the domains, determined in the primary construction of the DQOL<sup>9</sup>. Besides maintaining the structure of the theoretical contents of the original scale, we established a critical inner consistency in the short instrument, measured through the Cronbach's alpha coefficient of, approximately, 0.7, which identifies a consistent instrument and at the same time with almost no redundancy<sup>10</sup>.

The second filter—which used the correlation indexes, selected only items associated with the satisfaction with the treatment, clinical monitoring by A1c, and NHP, indicative of secondary complications<sup>4</sup>—kept the specificity characteristics of the DM in the complete scale of the DQOL-Brazil, despite having not been able to improve them (Table 3).

It is noteworthy that all the original items of the DQOL-Brazil had been previously validated for the population of the study<sup>2,3</sup>, even those from the domain “concerns: social/vocational,” which at first glance may appear little relevant for the elderly patients. In the DQOL-Brazil-8, it was kept the item referring to the concern of having children; consequently, a high importance attributed to such cases by younger patients; who, in that specific case, statistically diluted the answers of the population in the elevated age range.

The isolated use of the DQOL-Brazil-8 will possibly show a higher accuracy, because a shorter questionnaire, often determines a low number of errors during filling out and, remarkably, the total DQOL-Brazil-8 scores presented a higher variance than the total scores of the complete instrument.

The DQOL-Brazil-8 presents as limitation the fact of not being interchangeable to other countries, considering that the elaboration process was based exclusively on the statistical analysis of the Brazilian population data, representing only adult patients, with type 1 or 2 DM, under clinical follow-up.

## CONCLUSION

The Brazilian health professionals have now, for their clinical and epidemiological routine, the option of using an instrument that shares, through the Spearman coefficient, 87% of correlation with the DQOL-Brazil, with only 18% of their items.

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