WHO-5, a tool focusing on psychological needs in patients with diabetes: The French contribution to the DAWN study

G. Hochberg a,* , S. Pucheu b,c , L. Kleinebreil d , S. Halimi e , C. Fructuoso-Voisin f

a Department of Diabetes, Sud-Francilien Hospital, Corbeil-Essonnes, 9, rue Eugène-Gibez, 75015 Paris, France
b Department of Consultation Liaison Psychiatry, European Georges-Pompidou Hospital, AP–HP, Paris, France
c Pierre-and-Marie-Curie University, Paris, France
d UNFM, Department Santé Publique, Hôpital National Saint-Maurice, Saint-Maurice, France
e Department of Endocrinology, University Hospital, Grénoble, France
f Novo Nordisk, La Défense, France

Abstract

Aim. – In 2001, the international Diabetes Attitudes, Wishes and Needs (DAWN) programme was launched to evaluate the psychosocial impact of diabetes. In France, DAWN experts carried out an observational study to further understand the impact of diabetes on the psychological well-being of people with diabetes, using the French version of the WHO-5 questionnaire.

Methods. – The WHO-5, a unidimensional five-item questionnaire that measures positive psychological well-being, was completed by 2213 patients (1670 with diabetes). A total sum score was calculated, ranging on a scale from 0 to 25. A score less than 13 indicated impaired well-being and a score less than 8 reflected likely depression.

Results. – The mean total well-being score for the whole study population was 14.1 ± 5.5, and 14.3 ± 5.5 for patients with diabetes and 13.5 ± 5.4 for patients with other chronic diseases. The average score for patients with diabetes only (15.1 ± 5.2) was higher than those for the other subgroups (P = 0.005), whereas the average scores for those using insulin (14.8 ± 5.2) and women with diabetes (13.2 ± 5.6) were significantly lower compared with the whole diabetic group (15.6 ± 5.1 [P = 0.03] and 15 ± 5.2 [P < 0.001], respectively).

Conclusion. – The WHO-5 questionnaire showed satisfactory psychometric properties in a large sample of French diabetic patients. The scale is unidimensional and highlighted differences in well-being, which was lower in diabetic women, in patients with other chronic diseases and in those treated with insulin.

© 2012 Published by Elsevier Masson SAS.

Keywords: DAWN; Well-being; WHO-5 questionnaire; Diabetes; Chronic disease

Résumé

WHO-5, un outil centré sur l’impact du diabète sur le bien-être des patients : contribution française au programme DAWN.


Méthode. – Le questionnaire WHO-5 a été rempli par 2213 patients dont 1670 étaient diabétiques. Ce questionnaire est unidimensionnel et composé de cinq items qui mesurent le bien-être psychologique avec une note globale comprise entre 0 et 25. Un score inférieur à 13 indique un bien-être altéré, un score inférieur à 8 une probable dépression.

Résultats. – Le score moyen de bien-être dans l’ensemble de la population étudiée était de 14,1 ± 5,5 points. Il était de 14,3 ± 5,5 en considérant l’ensemble des patients atteints de diabète, et de 13,5 ± 5,4 pour les patients ayant une autre maladie chronique. Le score moyen des patients ayant un diabète seul était plus élevé (15,1 ± 5,2) que celui des autres sous-groupes (P = 0.005). Les diabétiques recevant de l’insuline (14,8 ± 5,2 versus 15,6 ± 5,1 [P = 0.03] et les femmes diabétiques 13,2 ± 5,6 versus 15 ± 5,2 [P < 0.001]) avaient des scores significativement plus faibles que la moyenne de l’ensemble des patients diabétiques.

* Corresponding author. Fax: +33 1 48 42 05 62.
E-mail address: ghp@noos.fr (G. Hochberg).
1. Introduction

The Diabetes Attitudes, Wishes and Needs (DAWN) international programme [1] was launched at the initiative of Novo Nordisk in partnership with the International Diabetes Federation [2] to evaluate the psychosocial impact of diabetes in large cohorts in different countries, and to describe how diabetes impacts relationships between patients and their families/friends and healthcare professionals (HCPs).

To measure the impact of chronic disease (CD) with long-term therapeutic constraints, different ways of scoring quality of life and well-being have been developed [3–7], such as the WHO-Five Well-Being Index (WHO-5), designed by the World Health Organization (WHO) [8]. These scales, often used as patient self-questionnaires, generally show a strong correlation with clinical assessment regardless of the disease concerned [9].

In 2005, French DAWN experts carried out an observational study to evaluate the usefulness of the WHO-5 questionnaire as a potentially quick and easy to use clinical tool for regular use in chronic care in France. The second objective was to compare the scores of patients with diabetes with those of patients with other CDs in a French sample population.

The WHO-5 is also used by HCPs to identify patients who require further evaluation for possible depression or related problems, and has been applied in many clinical contexts, especially in diabetes [10–15], the impact of which on well-being and quality of life has been extensively studied. The demands posed on diabetes patients on a daily basis as regards self-management of treatment and changes in lifestyle can be a burden, resulting in a negative view of the disease and/or its management [16–18].

Diabetes is also associated with an increased risk of emotional distress, especially for those who have more diabetes-related complications [16]. Both type 1 and type 2 diabetes patients appear to suffer from depression two or three times more frequently than patients without diabetes [17], suggesting a similar level of impact with the two diseases [17], and the impact of the disease on patients’ well-being overall cannot be dissociated from the nature and quality of its management. Yet, in France, there are few published reports on the well-being of patients who have diabetes [1,19].

2. Methods

2.1. Study population

The present observational study was conducted between December 2005 and February 2006. A number of physicians – specifically, general practitioners (GPs) and diabetologists (private or hospital practice) – was selected from an extensive list supplied by the study sponsor, with each receiving a letter explaining the study. The questionnaires were either given to patients who had CD by the physicians or were directly available in the physician’s waiting room. Patients filled out the questionnaires on their own and sent the questionnaires back (using a stamped self-addressed envelope).

2.2. The questionnaire

The French DAWN group implemented a short user-friendly questionnaire (Appendix A) to minimize the onus on respondents and facilitate recruitment efforts. The questionnaire included sociodemographic (age, gender) and limited medical information provided by the patients themselves. They were asked for their generic type of CD with no other details (diabetes, endocrine disease, cardiovascular disease, respiratory disease and other chronic disease, insulin treatment [yes or no]), and then questioned about the possible influence of the CD on their mood, according to a scale of 0 (“At no time”) to 5 (“All of the time”).

In addition, the questionnaire included an evaluation of well-being, using the WHO-5, which had been validated by the WHO and based on five questions: “I have felt cheerful and in good spirits”; “I have felt calm and relaxed”; “I have felt active and vigorous”; “I woke up feeling fresh and rested”; and “My daily life has been filled with things that interested me”). This was also answered using the 0 to 5 scale. The raw score was the sum total of the five answers, which ranged from 0 to 25, with 0 standing for the worst and 25 standing for the best sense of well-being. According to WHO recommendations, patients scoring less than 13 may be considered to have impaired well-being, while those with a score less than 8 are likely to have depression [8].

2.3. Data analysis

Statistical analyses were performed using STATA software. Percentage estimates and 95% confidence intervals (CI) were calculated for each item. Quantitative values were expressed as means ± standard deviation (SD), and qualitative values were expressed as percentages. Comparisons were performed using Kruskal–Wallis or Student’s t test and the chi-square test for quantitative and qualitative data, respectively. A probability value of $P \leq 0.05$ was considered significant. Factor analysis with oblimin rotation was also conducted on the WHO-5 items.

3. Results

Letters were sent to 6667 physicians (4965 GPs and 1702 diabetologists). Ultimately, a total of 508 GPs and 466
specialists participated in the present study. The response rate was 10% among GPs and 27% among specialists (15% global response rate). Also involved were 2253 patients, from whom 2213 questionnaires could be analyzed: 37% (n = 810) of the patients received their questionnaire from hospital diabetologists; 31% (n = 684) from private diabetologists; and 32% (n = 711) from GPs. Also included were eight patients recruited by other specialists.

3.1. General characteristics of the population

The study participants’ gender ratio was close to 1: 51% (n = 1125) were women; and 49% (n = 1088) were men. More than 75% were aged more than 50 years, 50% (n = 1110) were 50–70 years old and 26% (n = 576) were more than 70 years (Table S1; see supplementary material associated with this article online). The women were younger than the men: 29% (n = 327) were less than 50 years vs. 18% (n = 200), respectively (P < 0.001). Also, 75% (n = 1670) of them had diabetes, of whom more were men than women (52% [n = 867] vs. 48% [n = 803], respectively; P < 0.001).

3.2. Clinical profiles

Altogether, 41% (n = 916) of the patients presented with diabetes exclusively, and 34% (n = 754) had diabetes together with another CD, mainly cardiovascular disease (66%, n = 495) and endocrine disease (38%, n = 288). No details of the CD or its severity were collected. In addition, 57% (n = 952) of the patients with diabetes were being treated with insulin.

Taking the cohort as a whole, 25% (n = 543) reported at least one CD, excluding diabetes, and the CDs reported were mostly cardiovascular (35%, n = 768) and endocrine (21%, n = 459) diseases. Other CDs affected 15% (n = 342) of the patients, including respiratory disease in 8% (n = 171). Some patients declared having up to five CDs. Frequency of cardiovascular diseases was higher in men than in women (39 vs. 30%, respectively; P < 0.001), while endocrine diseases were reported more often in women than in men (29 vs. 12%, respectively; P < 0.001).

3.3. WHO-5 mean scores for the whole study population

In our recruited population, the distribution of WHO-5 answers is shown in Table 1. The mean WHO-5 score was 14.1 ± 5.5 for the overall study population (Table 2), while the women’s mean overall score was significantly lower than the men’s (13.2 ± 5.6 vs. 15.0 ± 5.2, respectively; P < 0.001).

The most frequent responses were those representing the lowest sense of well-being – 9% of patients (n = 204) scored between 0 and 5, 17% (n = 373) between 6 and 10, and 29% (n = 637) between 11 and 15 – with 36% (n = 798) having a score less than 13, which can be considered, according to WHO recommendations, as impaired well-being. In addition, 41% (n = 914) scored 0 or 1 for at least one of the five questions, while 7% (n = 146) of the patients with impaired well-being scored 0 or 1 for all five questions.

3.4. WHO-5 mean scores for the population with diabetes

Of the whole study population, the patients with diabetes had higher WHO-5 scores than those without diabetes (14.3 ± 5.5 vs. 13.5 ± 5.4, respectively; P = 0.005; Table 2), and those with diabetes as their only CD had the highest mean WHO-5 score (15.1 ± 5.2). In contrast, patients with diabetes associated with another CD had a significantly lower WHO-5 mean score (13.3 ± 5.8).

Analysis of the score classifications also showed a better evaluation for patients with diabetes: 66% (n = 1098) had a WHO-5 score more than 13 vs. 58% (n = 317) of those who had another CD (P = 0.002). When diabetes was not associated with another CD, this proportion increased to 71% (n = 653).

Although the questionnaire included no explicit question concerning chronic diabetes-related complications, the analysis divided the results into two subgroups: diabetes with supposed declared chronic complications (cardiovascular disease, arteriopathy, retinopathy, dialysis); and diabetes with no associated complications. The WHO-5 score differed between the two subgroups: in diabetes patients without complications, the mean score was 14.75 (n = 1170), while in those with diabetes and complications (n = 500), the mean score was 13.2 (P < 0.00001). In those with other CDs, but no diabetes (n = 543), the mean score was 13.5 (no significant difference vs. the latter group).

Among the patients with diabetes only (41%, n = 916), those treated with insulin (64%, n = 584) had a WHO-5 score significantly lower than the others (14.8 ± 5.2 vs. 15.6 ± 5.1, respectively; P = 0.03). However, in the subgroup of patients with a WHO-5 score less than 13, the difference between insulin-treated patients (30%) and non-insulin-treated patients (27%) was no longer significant.

In patients with diabetes associated with another CD, insulin treatment was reported by nearly half the patients (49%, n = 368), who had a mean WHO-5 score that was much lower than that for diabetics not using insulin (12.6 ± 7.7 vs. 13.9 ± 5.8, respectively; P = 0.002). Furthermore, 45% (n = 166) of those receiving insulin therapy had a WHO-5 score less than 13 compared with 37% (n = 143) of patients receiving treatments other than insulin (P = 0.03).

3.5. WHO-5 analysis

Factor analysis with oblimin rotation was performed on each of the five WHO-5 items. Their eigenvalues were 3.4, 0.49, 0.47, 0.35 and 0.28, respectively, clearly suggesting a one-factor solution. This one-factor solution explained 68% of the variance. Also, Cronbach’s alpha of the five-item scale was 0.88, confirming good internal consistency.

3.6. Influence of chronic disease on mood

The study patients all answered an additional question regarding the influence of their CD on mood: 55% (n = 1216) responded
that CD had “at no time” or “some of the time” any influence on their mood (scores 0–1), while 39% (n = 313) who were at risk of depression (WHO-5 score < 13) indicated that CD had an influence “all of the time” and “most of the time” (scores 4–5) on their mood compared with only 12% (n = 173) of the other patients (P < 0.001). This was also more marked in women than in men: 24% (n = 275) of women indicated that CD had an influence “all of the time” and “most of the time” on their mood (scores 4–5) compared with 19% (n = 211) of men (P < 0.01).

In addition, diabetics treated with insulin were significantly more affected by the disease than those not using insulin. Indeed, 48% (n = 278) of insulin-treated patients with no other CD more often reported that the disease affected their mood “less than half of the time” to “all of the time” (scores 2–5) vs. 30% (n = 101) of the other diabetes patients (P < 0.001). Furthermore, this trend was also marked in the group of patients with diabetes associated with other CDs (Table 3): 52% of those treated with insulin reported that it had a marked influence (scores 2–5) vs. 43% of patients not treated with insulin (P = 0.02).

### Table 1
Who-5 questionnaire mean score for the study population (n = 2213).

<table>
<thead>
<tr>
<th></th>
<th>All the time</th>
<th>Most of the time</th>
<th>More than half of the time</th>
<th>Less than half of the time</th>
<th>Some of the time</th>
<th>At no time</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have felt cheerful and in good spirits</td>
<td>2</td>
<td>14</td>
<td>14</td>
<td>28</td>
<td>34</td>
<td>9</td>
</tr>
<tr>
<td>I have felt calm and relaxed</td>
<td>4</td>
<td>15</td>
<td>15</td>
<td>27</td>
<td>31</td>
<td>8</td>
</tr>
<tr>
<td>I have felt active and vigorous</td>
<td>6</td>
<td>17</td>
<td>21</td>
<td>28</td>
<td>23</td>
<td>5</td>
</tr>
<tr>
<td>I woke up feeling fresh and rested</td>
<td>9</td>
<td>18</td>
<td>18</td>
<td>23</td>
<td>25</td>
<td>7</td>
</tr>
<tr>
<td>My daily life has been filled with things that interest me</td>
<td>3</td>
<td>16</td>
<td>12</td>
<td>26</td>
<td>31</td>
<td>11</td>
</tr>
</tbody>
</table>

Results are expressed as percentage of all responses

### Table 2
WHO-5 data reported by the study population according to various parameters.

<table>
<thead>
<tr>
<th>Classification of overall score (%)</th>
<th>Mean score</th>
<th>Patients scoring &lt; 13 (%)</th>
<th>Patients who answered 0 or 1 to all five questions (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall population (n = 2213)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men (n = 1088)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women (n = 1125)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–5</td>
<td>9</td>
<td>17</td>
<td>29</td>
</tr>
<tr>
<td>6–10</td>
<td>16</td>
<td>28</td>
<td>40</td>
</tr>
<tr>
<td>11–15</td>
<td>30</td>
<td>31</td>
<td>8</td>
</tr>
<tr>
<td>16–20</td>
<td>12</td>
<td>19</td>
<td>30</td>
</tr>
<tr>
<td>21–25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall population</td>
<td>14.1 ± 5.5</td>
<td>36</td>
<td>7</td>
</tr>
<tr>
<td>Men</td>
<td>15.0 ± 5.3</td>
<td>29</td>
<td>4</td>
</tr>
<tr>
<td>Women</td>
<td>13.3 ± 5.6</td>
<td>43</td>
<td>9</td>
</tr>
<tr>
<td>P &lt; 0.001</td>
<td>P &lt; 0.001</td>
<td>P &lt; 0.001</td>
<td>P &lt; 0.001</td>
</tr>
<tr>
<td>Diabetes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (n = 1670)</td>
<td>14.3 ± 5.5</td>
<td>34</td>
<td>7</td>
</tr>
<tr>
<td>No (n = 543)</td>
<td>13.5 ± 5.4</td>
<td>42</td>
<td>6</td>
</tr>
<tr>
<td>Diabetes without another CD (n = 916)</td>
<td>15.1 ± 5.2</td>
<td>29</td>
<td>4</td>
</tr>
<tr>
<td>Treated with insulin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (n = 384)</td>
<td>14.8 ± 5.2</td>
<td>30</td>
<td>5</td>
</tr>
<tr>
<td>No (n = 332)</td>
<td>15.6 ± 5.1</td>
<td>27</td>
<td>3</td>
</tr>
<tr>
<td>Diabetes with another CD (n = 754)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treated with insulin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (n = 368)</td>
<td>13.3 ± 5.8</td>
<td>41</td>
<td>10</td>
</tr>
<tr>
<td>No (n = 386)</td>
<td>12.6 ± 5.7</td>
<td>45</td>
<td>11</td>
</tr>
<tr>
<td>P &lt; 0.001</td>
<td>P &lt; 0.002</td>
<td>P &lt; 0.029</td>
<td></td>
</tr>
</tbody>
</table>

### 4. Discussion

#### 4.1. The study population

The mean global response rate of physicians to our letter explaining the study was 15%. This was distributed very differently among the GPs (10% only) and specialists, who were mostly diabetologists (27%). This might also explain why
our study population mainly comprised patients with diabetes (75%), while any other CDs were only minimally represented. It is also possible that the specialists following mostly diabetic patients were more interested in the impact of diabetes on well-being.

4.2. Main findings

The general well-being of our French diabetes population appears to be relatively low, as the mean WHO-5 score was 14.1 out of a possible 25, a value close to the threshold score of 13 suggested by the WHO to identify patients at risk of emotional distress. In fact, in our cohort, 36% of all patients had a score less than 13, and comparison with the other cohorts in the international DAWN study [20] showed that the French population with diabetes was in sixth position for self-declared scores of good psychological well-being (63% for patients with type 1 diabetes and 62% for patients with type 2), after Spain (88 and 84%, respectively), Germany (80 and 70%, respectively), Japan (58 and 72%, respectively), The Netherlands (68 and 62%, respectively) and Australia (54 and 78%, respectively). These heterogeneous data remain unexplained despite cultural differences, suggesting that management specificity and patients’ expectations may play a significant role [21]. In France, depression in the general population was rated at 14.9% by the 2002 French National Agency for Healthcare Accreditation and Evaluation (ANAES) survey. Thus, the present work highlights the fact that practitioners need to be aware of the frequent risk of impaired feelings of well-being in diabetic patients and, more generally, in patients with any CD. The lowest scores were observed for patients having both diabetes and another CD.

However, diabetes on its own appears to have less emotional impact than some other CDs, and diabetes patients with complications had the worst scores, similar to those with CD without diabetes, suggesting that chronic complications increase the burden of illness. Our findings have also suggested that a good time to use the WHO-5 questionnaire would be after initiating insulin treatment.

The WHO-5 questionnaire appears to be a relevant tool that allows the detection of patients with emotional distress. For this reason, physicians should be encouraged to evaluate this dimension of living with a CD, and to take it into account in the patient’s follow-up.

4.3. Study limitations

The present work has a number of limitations: although the French version of the WHO-5 questionnaire was able to identify patients with impaired well-being (scores < 13) or likely depression (scores < 8), no further psychological diagnosis was assessed by the physicians. In addition, no details were collected regarding the type of diabetes (type 1 or type 2), the severity of the other CDs or the number of comorbidities associated with diabetes. Furthermore, the patients who agreed to participate may not be representative of the whole population with diabetes, considering that most of our patients were being followed by specialists. In fact, in France today, the vast majority of diabetics are followed by GPs [19].

Nevertheless, our first objective was to evaluate the use of a simple tool, the WHO-5 questionnaire, for detecting emotional distress in patients with CD and, in particular, diabetes. Clearly, any diagnosis of anxiety and depression also requires the appropriate complementary specialist evaluation and management.

4.4. Comparisons with other studies

Whatever the differences found in the present study, they remained relatively modest between patients with diabetes and those with other CD. Indeed, our study confirms previous studies such as the 2008 French DIABASIS study [19], as half of our diabetes patients perceived their disease as severe, especially women who initially reacted with anxiety, insulin-treated patients and those actively involved in their disease management [19]. Insulin initiation represents, of course, a turning point for diabetes patients, as it marks their becoming more aware of their disease severity, making them more willing to follow any medical advice and to take greater control in treating their disease.

In our study, a WHO-5 score less than 13 was more prevalent in those using insulin therapy. Starting insulin and implementing insulin treatment is often scary for the patient. Thus, insulin therapy has often been described as a difficult therapeutic step [18] or as a failure of previous therapy by 54% of an insulin-naïve cohort of patients with diabetes [22].

In the DIABASIS study [19], a few gender differences were found: women seemed to take the disease more seriously, were more engaged in self-management and reported a greater impact on their daily life. Likewise, our present work also found that French diabetic women had lower WHO-5 scores than men, as has already been described in both cohorts of patients with diabetes and the general population of Sweden and the UK [23, 24]. In addition, a higher frequency of negative feelings and depression has been reported in the female population with diabetes in both Australia and Canada [25, 26]. The effect of CD on mood also appeared to be more marked in women than in men.

According to the literature, the well-being of patients with respiratory, rheumatological or gastrointestinal diseases is seriously impaired [27]. In our study, the CD with or without diabetes was mainly cardiovascular or endocrine.

5. Conclusion

The DAWN international programme includes aspects that deal with the perceptions of physicians in comparison to those of patients. From these predictive factors, it remains for HCPs to discover new approaches for patients with diabetes. The primary aim of our study was to make HCPs more aware of patients’ emotional distress to help them respond better to the demands in this field to help patients improve their feelings of well-being while living with the disease.

The WHO-5 questionnaire is an easy tool for HCPs to implement in their clinical practice; it focuses on the patient’s feelings...
about living with a CD, and can facilitate the development of a better relationship between HCPs and their patients.

To improve well-being, HCPs need to pay particular attention to patients with a poor WHO-5 score. Our present study found that three parameters were predictive of a low well-being score: being female; having other CD together with diabetes; and being insulin-treated. Given these findings, it may be of interest to suggest that HCPs use the WHO-5 questionnaire, an easy evaluation tool, more frequently and especially in these particular patients.

Disclosure of interest

Ghislaine Hochberg has received speaker and consulting fees from Novo Nordisk as well several other pharmaceutical companies (Eli Lilly, Novartis, Roche, Sanofi-Aventis, Orkyn’).

Sylvie Pucheu has received consulting fees from Novo Nordisk.

Line Kleinebreil is now retired but has received consulting fees from Novo Nordisk, Eli Lilly, Astra Zeneca, Sanofi Aventis, Johnson and Johnson Diabetes Institute.

Serge Halimi has received speaker and consulting fees from Novo Nordisk as well several other pharmaceutical companies (Eli Lilly, Roche, Sanofi-Aventis, MSD, BMS, Astra Zeneca, Novartis, Takeda).

Corinne Fructuoso-Voisin works for Novo Nordisk.

Acknowledgements

The authors thank Béatrice Hanicotte (nurse - Marcq-en-Barœul - [Maison du diabète], Diabetes House), André Hervouët (nurse - Nantes - AFD, [Association française des diabétiques], French Diabetics Association), Pr Jean-Jacques Robert (paediatrician and diabetologist - Paris - Président de l’AJD [Aide aux jeunes diabétiques], Helping Young Diabetics) and Fabrice Strnad (dietitian - Pontoise - Paramedical for ALFEDIAM [Association de langue française pour l’étude du diabète et des maladies métaboliques], French-Speaking Association for the Study of Diabetes and Metabolic Disorders).

They also particularly thank Pr Frans Pouwer and Soren Skovlund for their help and advice, and Novo Nordisk for its support.

Appendix A. WHO-5 WELL-BEING QUESTIONNAIRE.

Please, indicate for each of the five statements which is closest to how you have been feeling over the last few weeks. Notice that higher numbers mean better being.

Example: if you have felt cheerful and in good spirits more than half of the time during the last two weeks, please stick in the box with the number 3 in the upper right corner.
## WHO 5 WELL-BEING QUESTIONNAIRE

Please, indicate for each of the five statements which is closest to how you have been feeling over the last two weeks. Notice that higher numbers mean better well-being.

Example: if you have felt cheerful and in good spirits more than half of the time during the last two weeks, put a stick in the box with the number 3 in the upper right corner.

<table>
<thead>
<tr>
<th>Over the last two weeks</th>
<th>All the time</th>
<th>Most of the time</th>
<th>More than half of the time</th>
<th>Less than half of the time</th>
<th>Some of the time</th>
<th>At no time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 I have felt cheerful and in good spirits</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>2 I have felt calm and relaxed</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>3 I have felt active and vigorous</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>4 I woke up feeling fresh and rested</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>5 My daily life has been filled with things that interest me</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

### Your age (years old)
- < 30
- 30-50
- 50-70
- > 70

### Which chronic disease do you have
- Diabetes
- Endocrine disease (obesity, thyroid...)
- Cardiovascular disease (HTA, etc...)
- Respiratory disease (asthma, etc...)
- Other disease

### Influence of the chronic disease on the mood
- All the time
- Most of the time
- More than half of the time
- Less than half of the time
- Sometimes
- Never

### If diabetes, do you have an insulin treatment?
- Yes
- No

---

### Appendix B. Supplementary data

Supplementary data associated with this article can be found, in the online version, at [http://dx.doi.org/10.1016/j.diabet.2012.06.002](http://dx.doi.org/10.1016/j.diabet.2012.06.002).

### References


