Available online at www.sciencedirect.com
Diabetes & Metabolism 38 (2012) 352–358

Original article

Health-related quality of life and stages of behavioural change for exercise in overweight/obese individuals

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Received 3 December 2011; received in revised form 11 March 2012; accepted 12 March 2012

Abstract

Background. – Stages of change in exercise behaviour have been shown to be associated with health-related quality of life (HRQoL) in overweight/obese adults. However, studies examining this relationship have not used questionnaires specifically designed for such a population. The present study assessed the impact of stages of change (SOC) for exercise, using the transtheoretical model, on the HRQoL, using the Quality of Life, Obesity and Dietetics (QOLOD) scale, an obesity-specific QoL questionnaire. Our hypothesis was that the more people are in the advanced stages of behavioural change, the better their HRQoL.

Methods. – A total of 214 consecutive obese individuals (148 women/66 men, mean age 47.4 ± 14.0 years, BMI 37.2 ± 8.4 kg/m²) were included in the cross-sectional study, and all completed SOC and QOLOD questionnaires.

Results. – Multivariate analysis of covariance (MANCOVA) established significant effects on the overall composite of the five dimensions of the QOLOD (P < 0.001). Analysis of covariance (ANCOVA) further determined the significant effect of SOC in terms of physical impact (P < 0.001) and psychosocial impact (P < 0.01), with marginally significant effects on sex life (P = 0.07), but no impact on comfort with food (P = 0.13) or on the dieting experience (P = 0.13), two dimensions evaluating attitudes toward food.

Conclusion. – In obese/overweight individuals, the HRQoL varies with the SOC, with those in the more advanced behavioural stages reporting better HRQoL. However, dimensions related to food showed no differences according to SOC, confirming the complexity of the relationship between exercise and nutrition, and the need for further studies to acquire a more complete understanding of their underlying mechanisms.

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Keywords: Stage of change; Obesity; Quality of life; Physical activity; Behavioural change

Résumé

Relations entre qualité de vie liée à la santé et stades de changement de comportement vis-à-vis de l’activité physique dans une population en surpoids/obèse.

Objectifs. – Des études ont montré une relation entre les stades de changement (SDC) et la qualité de vie liée à la santé (QVLS) dans des populations obèses. Ces études n’ont cependant pas utilisé de questionnaires de qualité de vie spécifiques à la population obèse, ce qui constitue l’objet de notre étude. Nous avons testé l’hypothèse selon laquelle les sujets à des stades de changement avancés avaient une meilleure QVLS.

Méthodes. – Un total de 214 sujets obèses (148 femmes/66 hommes, âge moyen : 47,7 ± 14,0 ans, IMC moyen : 37,2 ± 8,4 kg/m²) ont été inclus dans une étude transversale et ont rempli les questionnaires de SDC et l’échelle de qualité de vie obésité diététique (EQVOD).

Résultats. – Une MANCOVA a montré une différence significative entre les cinq dimensions de l’EQVOD (P < 0.001). Une ANCOVA a montré un effet des SDC sur l’impact physique (P < 0.001), psychosocial (P < 0.01), la vie sexuelle (P = 0.07) mais ni sur le bien-être alimentaire (P = 0.13), ni sur le vécu des régimes (P = 0.13).

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doi:10.1016/j.diabet.2012.03.003
1. Introduction

Obesity is a growing crisis worldwide, but mostly in the developed countries [1]. In Europe over the past decade, the number of obese individuals has increased by a staggering 30%. Across European countries, from 4.0% to 28% of men and 6.2% to 37% of women are obese [2]. The prevalence of obesity in France is approximately 15% in both men and women [3]. Obesity is associated, on the one hand, with a number of comorbidities, including diabetes and cardiovascular disease [4] and, on the other hand, with poor Health-Related Quality of Life (HRQoL) [5], thus leading to increased health costs directly and indirectly [6,7]. Obesity results from an energy imbalance wherein caloric intake outweighs energy expenditure through physical activity (PA). In Europe as in most countries, most people are below the recommendations for PA [8], which include: 30 min of moderate-intensity PA 5 on days a week to maintain a healthy state [9]; 45–60 min/day of PA to prevent transition to overweight or obesity; and 60–90 min/day of moderate-intensity activity to prevent regaining weight [10]. It is widely acknowledged that regularly engaging in an exercise programme has positive outcomes for a number of chronic disorders [11], including metabolic diseases. Numerous studies have reported on the beneficial effects of PA on weight management [12], fat mass [13], health costs [14], cognitive function [15] and HRQoL [16]. When dietary control is combined with an exercise regimen, it produces better long-term effects of weight loss than either one on its own [12].

Exercise with dieting and cognitive-behavioural therapy is central to the management of obesity. Although an exercise programme may not necessarily result in weight loss over time, it nevertheless confers various health benefits to overweight and obese individuals [17]. Therefore, increasing weekly bouts of exercise is a major goal of excess body weight management. However, even though the beneficial effects of PA and diet are well documented, the real challenge is to ensure that people engage in an exercise programme and adhere to a healthy diet on a regular basis. The transtheoretical model (TTM) of behavioural change [18] provides a theoretical basis for understanding why people engage, or not, in healthy behaviours. As such, the TTM has demonstrated both its relevance and efficacy in obesity management [19–21]. The model includes several components, including processes of change, decisional balance, self-efficacy and stages of change (SOC). The SOC are the best-described components of the model, and assume that people move through five different stages, from precontemplation (not intending to change) to maintenance (sustained regular exercise or PA over time), while passing through contemplation (intending to change within the next 6 months), preparation (intending to change within the next 30 days) and action (being engaged in the behaviour for < 6 months) according to their readiness to change. However, evolution through each stage is not a linear process, as individuals can regress to an earlier stage.

Previous research with the TTM showed that tailoring an educational programme to the SOC is effective for increasing PA participation [22,23]. Also, as modifying the self-perception of the benefits of regular exercise is an important motivational strategy in many exercise-promotion interventions, it is important to study whether, and to what degree, the self-perception of HRQoL varies across the SOC. Three studies have examined the effects of SOC on HRQoL [24–26]. Of these studies, two were conducted in the general population [24,26], and one involved overweight and obese adults [25]. They concluded that people who reported exercising on a regular basis also had better HRQoL, with a peak that occurred in the action stage. The study in overweight and obese individuals [25] used the Medical Outcomes Short-Form (MOS SF-36) [27], a generic HRQoL questionnaire comprising eight dimensions, and revealed significant differences mostly in the dimensions associated with the physical component scale. However, to our knowledge, no studies have so far used the SOC with an obesity-specific HRQoL questionnaire. Thus, the present study aimed to expand the literature on exercise behaviour and HRQoL by examining the relationship between readiness to exercise behavioural changes and the self-perceived HRQoL in an obese population, using an obesity-specific HRQoL questionnaire. Psychometric properties of the questionnaire were also examined, followed by analysis of their correlation to covariates. As predicted by the TTM, it was hypothesized that the more individuals are in the higher SOC, the better their HRQoL.

2. Methods

2.1. Inclusion criteria

The study population consisted of consecutive patients, who were either overweight or obese, evaluated at our centre between February 2010 and January 2011. The included patients had no contraindications for PA or co-morbidities related to major psychiatric disorders. Also, none of the patients had participated in a weight-control programme for more than 6 months prior to inclusion in the study. The entire protocol was administered under routine care in the nutrition and diabetes department of the University Hospital of Montpellier (France).
2.2. Sociodemographic information

Participants were asked for their gender, date of birth, tobacco status (smoker, non-smoker, former smoker) and socioprofessional status, according to the five categories defined by the National Institute of Statistics and Economic Studies (1: manual labourers; 2: intellectual professionals; 3: employees; 4: retirees; and 5: unemployed).

2.3. Stages of change in exercise behaviour

The SOC for exercise were assessed using a French translation of the PA staging questionnaire described by Nigg et al. [28]. The algorithm used was a single item followed by four questions. The SOC classify people according to either their intentions to be physically fit or their actual participation in PA. In the present study, PA was defined as regular when performed for at least 30 min on 4 days a week (as defined by the original version of the questionnaire) [28], and the four questions were used to determine the SOC for exercise. Participants had to answer either ‘yes’ or ‘no’ to each of the following questions:

1. Do you currently engage in regular PA?
2. Do you intend to engage in regular PA in the next 6 months?
3. Do you intend to engage in regular PA in the next 30 days?
4. Have you been regularly physically active for the past 6 months?

If they answered ‘no’ to questions 1 and 2, they were classified as being in precontemplation. If they answered ‘no’ to questions 1 and 3, but ‘yes’ to question 2, they were considered to be in contemplation. If they answered ‘no’ to question 1, but ‘yes’ to question 3, they were classified as being in preparation. If they answered ‘yes’ to question 1, but ‘no’ to question 4, they were considered in action and, if they answered ‘yes’ to questions 1 and 4, they were considered to be in maintenance.

2.4. Health-Related Quality of Life (HRQoL)

HRQoL was assessed using the Quality of Life, Obesity and Dietetics (QOLOD) rating scale [29], a French obesity-specific questionnaire adapted from the Impact of Weight on Quality of Life (IWQOL) questionnaire [30]. The QOLOD is a 36-items questionnaire with five dimensions, including physical impact, psychosocial impact, sex life, comfort with food and diet experience. The scores for these dimensions range from 1 to 5 and the results are expressed as percentages, with higher scores indicating a better HRQoL.

2.5. Data analysis

All data were analyzed using STATISTICA version 7.1 software (StatSoft, Inc., France). Descriptive statistics were used to analyze demographic data. The frequency table was used for dividing the sample population according to their SOC for exercise, and to calculate the ceiling and floor effects. Both ceiling and floor effects reflected the percentage of respondents scoring at the highest and lowest levels, respectively, of the scale and are considered adequate when less than 20%. Multivariate analysis of covariance (MANCOVA) was computed to analyze variations across the SOC for exercise in the overall dimensions of the QOLOD. A one-way analysis of covariance (ANCOVA) with the Least Significant Difference (LSD) as the post hoc test was used to analyze significant effects between the SOC for exercise and QOLOD dimensions. Also rated was the size of the effect of SOC for exercise on QOLOD dimensions. As a measure of effect size, Cohen’s $f^2$ [31] was used and, by convention, the values of 0.02, 0.15 and 0.35 of $f^2$ were considered small, medium and large effect sizes, respectively. A 2 × 4 (gender × SOC) ANCOVA was processed to examine the potential main and interaction effects involving gender and SOC on HRQoL.

All analyses were conducted with statistical adjustments for age and body mass index (BMI) as, in the clinical validation of the QOLOD, these variables were related to HRQoL [29].

3. Results

3.1. Population characteristics

A total of 228 overweight or obese adults seeking help for weight loss were considered for inclusion in our present study. However, as 14 of them were excluded for failing to meet the inclusion criteria ($n = 11$) or because they refused to complete the questionnaires ($n = 3$), 214 participants were ultimately included in the study (66 men/148 women, mean age 47.4 ± 14.0 years, mean BMI 37.6 ± 7.9 kg/m²) up to completion. The main characteristics of the study population are shown in Table 1. Of the 214 included patients, 133 (62.3%) were non-smokers and 73 (34.1%) were unemployed.

The distribution of the population across the different SOC for exercise was: precontemplation, 6/214 (2.8%); contemplation, 25/214 (11.7%); preparation, 102/214 (47.6%); action, 26/214 (12.1%); and maintenance, 55/214 (25.7%). Thus, 62.1% of the population did not exercise regularly (precontemplation, contemplation and preparation were coded as inactive), and there were no significant differences between men and women compared with those who reported exercising (action and maintenance coded as active) on a regular basis ($\chi^2 = 0.51, df = 1, P = 0.47$). However, because of the small number of patients in the precontemplation stage, the results of this group were merged with those in the contemplation stage for the subsequent analyses.

3.2. Health-Related Quality of Life (HRQoL)

Across the entire study population, the distribution of scores for the different dimensions of the HRQoL appeared to be satisfactory in that no ceiling or floor effect was found (< 20%) except for sex life, which had an intermediate ceiling effect of 27.7% (Table S1, see supplementary material associated with this article online). This result indicates that a large percentage of respondents scored at the higher end of the range. Cronbach’s
Study population characteristics.

Data are expressed as means ± SD unless otherwise stated; PC/C: precontemplation/contemplation stage; P: preparation stage; A: action stage; M: maintenance stage; WP: whole study population.

### Table 1

<table>
<thead>
<tr>
<th></th>
<th>PC/C</th>
<th>P</th>
<th>A</th>
<th>M</th>
<th>WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women [n (%)]</td>
<td>24 (16.2)</td>
<td>66 (44.6)</td>
<td>19 (12.8)</td>
<td>39 (26.3)</td>
<td>148</td>
</tr>
<tr>
<td>Men [n (%)]</td>
<td>7 (10.6)</td>
<td>36 (54.5)</td>
<td>7 (10.6)</td>
<td>16 (24.2)</td>
<td>66</td>
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<tr>
<td>Age (years)</td>
<td>52.1 ± 17.5</td>
<td>46.0 ± 13.5</td>
<td>43.3 ± 14.5</td>
<td>48.9 ± 13.3</td>
<td>47.4 ± 13.9</td>
</tr>
<tr>
<td>Body mass index (kg/m²)</td>
<td>39.1 ± 6.0</td>
<td>39.4 ± 8.4</td>
<td>32.5 ± 9.1</td>
<td>35.0 ± 8.9</td>
<td>37.6 ± 7.9</td>
</tr>
<tr>
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<td></td>
<td></td>
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<tr>
<td>Smokers</td>
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<td>19.6</td>
<td>11.1</td>
<td>9.6</td>
<td>15.9</td>
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<tr>
<td>Non-smokers</td>
<td>57.1</td>
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<td>61.1</td>
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<td>62.3</td>
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<tr>
<td>Former smokers</td>
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<td>27.7</td>
<td>9.6</td>
<td>21.7</td>
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<td>7</td>
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<td>16</td>
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<td>Unemployed</td>
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<td>8</td>
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</tbody>
</table>

Data are expressed as means ± SD unless otherwise stated; PC/C: precontemplation/contemplation stage; P: preparation stage; A: action stage; M: maintenance stage; WP: whole study population.

α ranged from 0.72 to 0.95, thus showing good-to-excellent internal consistency and reliability (Table S1, see supplementary material associated with this article online). Age was negatively associated with physical impact (r = −0.22, P = 0.005) and diet experience (r = −0.18, P = 0.02). Also, no relationships were found between age and psychosocial impact, sex life and comfort with food. Physical impact also declined with increasing BMI (r = −0.19, P = 0.01), while BMI was not associated with any of the other four dimensions of the QOLOD. In addition, socioprofessional status was not associated with any dimensions of the QOLOD nor with BMI or age.

### 3.3. Stages of change and Health-Related Quality of Life

Overall, the MANCOVA results revealed significant effects with SOC for exercise in relation to the five dimensions of the QOLOD (Wilks Λ = 0.77, df = 15, P < 0.001). As for the interaction effects involving gender, the factorial ANCOVA failed to reach statistical significance for physical impact (P = 0.40), psychosocial impact (P = 0.77) and sex life (P = 0.72). Concerning the comfort with food dimension, the factorial ANCOVA showed a borderline significant interaction effect (F[3, 199] = 2.33, η²P = 0.03, P = 0.07), but no statistical significance for diet experience (P = 0.68).

ANCOVA further reported a significant effect of the SOC for physical impact (F[3, 204] = 11.946, η²P = 0.15, P < 0.001; Fig. S1, see supplementary material associated with this article online). The F² value for physical impact was 0.27, representing a medium-to-large effect size. As regards the psychosocial impact dimension, the ANCOVA demonstrated a significant effect of the SOC (F[3, 203] = 5.115, η²P = 0.07, P < 0.01; Fig. S2, see supplementary material associated with this article online). The F² value for psychosocial impact was 0.091, indicating a small-to-medium effect size and, for sex life, the ANCOVA revealed a marginally significant effect of the SOC (F[3, 188] = 2.3385, η²P = 0.035, P = 0.07).

However, the ANCOVA indicated no significant effect of the SOC for exercise regarding the two dimensions evaluating attitudes toward food (comfort with food and diet experience). Significant post hoc comparisons and P values for all ANCOVA results are shown in Table 2.

### 4. Discussion

Our present study examined differences in the HRQoL of overweight/obese subjects using a specific questionnaire that took into account aspects related to obesity in the function of SOC. The effects of SOC were found on the dimensions of physical impact, psychosocial impact and sex life. However, no effects of SOC were found on comfort with food and diet experience.

Various studies have shown a relationship between the SOC for exercise and HRQoL in different populations [24–26], thereby indicating that the HRQoL might constitute an important motivational factor, as suggested by Huberty et al. [32]. However, this topic has rarely been studied in populations of obese individuals with, to our knowledge, only one such study in the literature, and that using an HRQoL questionnaire not specific to obesity [25]. The results suggested differences between the SOC for exercise and HRQoL among overweight and obese adults seeking to lose weight. The QOLOD questionnaire was derived from the IWQOL and addresses QoL dimensions not covered by generic questionnaires such as the SF-36 used by Lee et al. [25]. Those essential lifestyle dimensions evaluate attitudes toward food, which appear to be particularly important when dealing with people who wish to lose weight. Indeed, neglecting these aspects could lead to the conclusion that engaging in regular PA is associated with an overall improvement in HRQoL that is based predominantly on physical functioning with no consideration of the vital role of eating behaviours, as shown in numerous studies [33,34]. Similarly, Laforge et al. [24], using the SF-36, found that an individual’s SOC for exercise was positively associated with self-perceived HRQoL, with a correlation between
the SOC for exercise and physical functioning in addition to general health and vitality. Also, the physical functioning of those in the precontemplation stage has been found to be significantly lower than that of those in the contemplation, preparation, action and maintenance stages [24]. The results confirmed that, while the impact of obesity on the level of physical functioning is considerable, it is also the most likely to change [35]. They also showed that the impact on attitudes toward food could be an even more important dimension as, in the study by Ziegler et al. [29], it received by far the lowest scores of all.

Nevertheless, attitudes toward food were not influenced by PA as might be expected, whereas other lifestyle dimensions were. No significant results were observed in both the comfort with food and diet experience dimensions, which reflect the complex interactions between exercise and diet. These results are supported by a study showing that exercise increase was associated with an increase, rather than decrease, in fat intake, with no change in fruit and vegetable consumption [36]. Moreover, in this study by Dutton et al. [36], exercise was not predictive of changes in dietary behaviours, be they healthy or unhealthy. Thus, it is possible that patients with the most participation in PA also have greater cognitive restraint, which might have an effect on comfort with food. Indeed, increases in physical impact, psychosocial impact and sex life dimensions were found across the SOC for exercise, with obese individuals in the precontemplation/contemplation stages exhibiting larger impacts of their body weight on their HRQoL in these dimensions compared with those in the maintenance stage. Furthermore, post hoc tests supported the notion that the more obese people are engaged in PA, the better their HRQoL, thus confirming the results of previous studies [24,25].

It is worthwhile noting that age is a factor determining physical impact, as shown by the negative correlation between these two parameters ($r = -0.22$). In fact, the impact of age on physical function in obese individuals is well recognized and has been investigated in many studies [37]. In addition to physical impact, age was also associated with diet experience. It may be speculated that older obese individuals have a longer history of dieting and food frustration that consequently influenced their responses.

In the present study, around 50% of our overweight and obese adults did not exercise regularly, and 15% did not exercise at all. A markedly high percentage of participants (almost 65%), therefore, were not in the habit of exercising regularly, which is slightly less than the 74.5% found by Lee et al. [25]. However, our smaller proportion of sedentary people was due to methodological considerations. Lee et al. [25] used a less stringent definition of regular exercise – specifically, exercising three times a week, with each exercise session lasting 20 min or more – compared with at least 30 min/session on at least 4 days/week in our present study. However, in comparison to other studies using similar measuring techniques and protocols, it appears that our present obese/overweight participants did not differ in terms of overall HRQoL determinants from normal-weight subjects [24,26]. It should also be borne in mind that approximately 62% of our overweight or obese individuals wishing to shed some pounds and therefore seeking assistance for that purpose did not exercise regularly. However, they had a fairly strong intention to exercise, with 47.6% of them in the Preparation stage (having the intention to start exercise within the next 30 days) and a further 13.2% in the contemplation stage (having the intention to start exercising within the next 6 months). This finding was again consistent with the data from Lee et al. [25] and, similar to those authors, we believe that it is essential to focus on how to provide appropriate guidance to overweight and obese adults who are motivated to exercise so that they can gain health benefits and lose weight through regular exercise. General practitioners certainly have a key role to play at this level, although their management procedures need to be improved in terms of treatment of obesity [38,39].

The present study also raised the question of which processes involved in PA behavioural change can be used to motivate patients to adopt a more active lifestyle. A study by Marcus et al. [40] conducted in a worksite health-promotion-project sample revealed that the earliest process of change in the TTM involved in behavioural change is raising awareness. This other theoretical aspect of the TTM suggests that either experimental or behavioural strategies can be implemented in interventions to increase PA level. Nevertheless, there is no French validated scale to measure processes of change in terms of intention to exercise.

Concerning sex life, our trend ($P = 0.07$) appeared to be in line with the literature on obesity showing the beneficial effects of PA and lifestyle on this dimension [41,42]. However, it must be remembered that, in the analysis of the ceiling effect, with a
result of 27.7%, the distribution of scores was above the threshold of 20%, which might have affected the discriminating power of the scale and might also explain the lack of significance in this dimension. The same effect was observed in the French validation of the QOLOD [29].

Our study has some limitations. The participants were obese individuals consulting in a hospital and seeking guidance for weight loss, so the results obtained in our study population may not apply to the majority of obese people who do not consult for weight loss or participate in commercial programmes. There was also the possibility of a desirability bias whereby subjects might have tended to report what they thought the healthcare provider wanted to hear. In this regard, it might have been useful to have an assessment of patient motivation by caregivers. Ultimately, our findings can only be generalized to people who visit medical care centres to lose weight.

In addition, the small percentage of people in pre-contemplation \((n=6)\) led us to merge them with those in contemplation, precluding any specific interpretation for each of these distinct stages. Furthermore, the small proportions of people in pre-contemplation and contemplation may have been related to a recruitment bias, with patients in these stages not consulting for weight loss. However, the distribution of our population was consistent with that established for the PA stage [28]. Moreover, as our study was cross-sectional, the presence of an association between PA and HRQoL does not allow a causal relationship to be proposed, as evidence of causality can only be obtained from an interventional study. Indeed, it is possible that a higher HRQoL had a positive influence on the motivation to exercise, and not vice versa.

Finally, because certain data, such as the number of years of being overweight and obese, were not obtained, there is no way to know how this information might affect individuals’ self-perceptions of HRQoL.

5. Conclusion

Although the majority of the overweight and obese adults in the present study were not in the habit of exercising regularly, they showed motivation to exercise. It is therefore necessary that health professionals be properly trained to give advice tailored to patients at varying SOC to enable patients to effectively incorporate PA into their daily routines. On a more practical note, assessment of the QOLOD can follow the effectiveness of an individual’s therapeutic decisions according to its future validation according to the Minimal Clinically Important Difference (MCID). Thus, our results suggest that, by starting regular PA, patients may expect an improvement in HRQoL, although no improvement is likely to be expected in terms of comfort with food and diet experience.

Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

Acknowledgments

The authors wish to thank all the participants who completed the study. They also thank Dr Ariane Sultan, Dr Catherine Boegner, and Dr Elodie Le Prieur for their help in recruiting patients.

Appendix A. Supplementary data

Supplementary material (Table S1, Figs. S1 and S2) associated with this article can be found at http://www.sciencedirect.com, at doi:10.1016/j.diabet.2012.03.003.

References


