

DISCRIMINANT ANALYSIS OF TREATMENT ADHERENCE IN INSULIN-DEPENDENT DIABETES MELLITUS

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In this study we present the outcome of a study carried out on 63 insulin-dependent diabetic patients from the Endocrinology Department of a hospital in Madrid. Our goal was to assess the relationship between psychosocial variables and treatment adherence and to obtain a discriminant function with which it was possible to classify the patients on the basis of assessed adherence level. Results show a positive relationship between self-reported adherence to therapy and metabolic control. We also found that physical exercise and relations with medical personnel were the main variables determining treatment adherence.

En este trabajo se presentan los resultados de una investigación realizada con 63 pacientes diabéticos insulino-dependientes del servicio de Endocrinología de un hospital madrileño. Nuestro objetivo era evaluar la relación de variables psicosociales con la adhesión al tratamiento y establecer una función discriminante que pudiese clasificar a los pacientes según el nivel de adhesión evaluado. Los resultados de nuestro estudio muestran que la adhesión terapéutica autoevaluada está relacionada positivamente con el control metabólico y que las variables fundamentales que determinan la adhesión terapéutica son las relativas a la práctica de ejercicio físico y la relación establecida con el personal sanitario.

Diabetes is an endocrinal and metabolic illness characterized by a partial or absolute deficit in the secretion of insulin, a hormone secreted by the beta cells of the pancreas. This deficit has multiple and diverse consequences in the organism, notable among which is the tendency to maintain inappropriately high levels of glucose in the blood (hyperglycemia). In order to avoid this occurring, diabetic patients have to inject themselves subcutaneously with insulin at regular intervals, in addition to exercising strict control over their diet and following the requirements of a complex program of treatment. For this reason, diabetes is a clear example of a metabolic disorder whose control depends on patients' behaviour, so that, to a large extent, the course of their illness will be a function of their adherence to treatment.

Adherence to therapy is a difficult construct to define; in the present work we shall use the proposal of Beléndez and Méndez (1995, p. 66), who define adherence as "carrying out self-care behaviours involved in the components of diabetes treatment: insulin, hypoglycemics, diet and exercise, depending on the levels required by

each individual at each given time, in accordance with the results of assessment of their glycemetic condition, with the aim of optimizing the treatment resources provided". The techniques normally employed for assessing adherence to therapy have been self-report (including self-register), report by those close to the patient (usually family members) and biochemical measures, in which a biochemical parameter is used as an indicator of correspondence with the prescriptions (normally the level of glycated haemoglobin or glucose in blood).

Diabetes is a paradigmatic illness as regards the number of factors that can constitute obstacles to patients following their treatment program (Amigo, Fernández & Pérez, 1998; Meléndez & Méndez, 1995; Gil, 1990; Goodall & Halford, 1991; Kavanagh, Gooley & Wilson, 1993; Shillitoe, 1988; Wing, Epstein, Nowalk & Lamparski, 1986; Wysocki, Hough, Ward & Green, 1992). It is a disorder that can remain asymptomatic for long periods, and is a chronic illness for which sufferers need treatment throughout their lives. Treatment, moreover, that is especially complicated, causes substantial changes in everyday life, requires the collaboration of the family, and demands the acquisition of specific skills and knowledge, as well as potentially giving rise to undesirable side-effects. Furthermore, the complications of the disease occur in the long term, making it difficult to establish a direct contingency between the patient's current behaviour and subsequent health problems, or

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between treatment adherence and the benefits associated with it (except in the case of serious situations). There may even be occasions on which following the treatment may be more aversive for the patient than the possibility of developing complications in the future.

According to different authors (Beléndez & Méndez, 1995; Wing et al., 1986), the most serious obstacles to treatment adherence in diabetic patients are complexity of the regime, substantial changes in their everyday activities and lack of knowledge and skills for managing the illness. But there are other factors that can have a negative effect on adherence, notable among which are those related to interaction with medical personnel (Glasgow, McCaul & Schafer, 1987; Johnson, Tomer, Cunningham & Henreta, 1990; Orme & Binik, 1989).

The objective of the present study is to assess the relationship between different psychosocial variables, relevant to the course of diabetes, and adherence to therapy in insulin-dependent diabetic patients, and to establish a discriminant function from which we can classify patients according to the level of adherence measured.

METHOD

Sample

Participants in this study were 63 insulin-dependent diabetic patients from the specialist service for diabetes of the Endocrinology Department at the Ramón y Cajal Hospital (Madrid), with an age range of 17 to 49 years (mean= 31; mode= 31), of which 36 (57%) were men and 27 (43%) women.

Instruments and variables

For the assessment we used a questionnaire designed by the authors of the present work for recording the patient's sociodemographic data, as well as data related to the variables assessed, details of which are provided below. The metabolic analysis data come from the analyses carried out every time patients attend the hospital's diabetes service.

Criterion variables

Self-assessment of adherence to therapy: measured by means of self-report. We used a Likert-type scale with 5 points, in reverse order: 1 totally (or similar) to 5 not at all (or similar).

The variables considered were as follows (in brackets, the acronyms used for denoting them in the tables):

- Perception of compliance with recommended diet (Pdieta).

- Perception of compliance with recommended physical exercise (Pexercise).
- Perception of compliance with glycemia analysis program (Pglycemia).

Predictor variables

We considered 9 variables, assessed by means of patients' self-report using a Likert-type scale. Following other authors (Mira, Vitaller, Buil, Aranaz & Rodríguez-Marín, 1994), we calculated the total score for each variable from the mean of the scores of the items making it up.

Table 1 provides a list of the variables and the items through which they were assessed. The number preceding each variable and the acronym in brackets are the keys to identifying the variables in subsequent tables.

Control variables

Metabolic analysis

Carried out through measurement of the levels of glycated haemoglobin (HbA_{1c}). The method of analysis used is HPLC, from the Mennarini laboratory. This method gives mean glycated haemoglobin levels for non-diabetic population of 4.04% (range 3.34 – 4.74; standard deviation, 0.35).

Sociobiographical data

Measured by means of self-report, using a 5-point Likert-type scale (except for the age and sex variables):

- Sex (sex).
- Age (age).
- Educational level (educ).
- Socio-economic level (socioeco).
- Employment status (work).

Procedure

The questionnaire was administered to 102 patients at the specialist diabetes service of the Ramón y Cajal Hospital in Madrid who voluntarily agreed to participate in the study. They were interviewed by one of the psychologists in the research team, who explained the aims of the research and gave them the questionnaire. The completed questionnaire was returned either by post (in a pre-paid envelope provided) or personally, on the same day as the interview, if the participant had time to fill it in during waiting time. Interviews and requests for participation ceased when those attending the service had already been interviewed and had filled out the questionnaire.

Inclusion criteria for the study were as follows:

- Suffering from insulin-dependent diabetes.
- Having been diagnosed with the illness at least one year ago.

Of the 102 participants who received the questionnaire, the data from 5 was discarded, as they failed to fulfil the inclusion criteria. Of the remaining 97 interviewees, 63 returned the questionnaire, giving a response rate of 64.9%.

Initially, and with the aim of determining if the decision whether or not to take part in the study was due to the results of the patient's metabolic analysis (HbA1c level), we made a comparison of means in this variable between patients who returned the questionnaire and those who did not. The results of this analysis are shown in Table 2.

No significant differences were found for the mean of

glycated haemoglobin between patients who participated in the study and those who were interviewed but did not return the questionnaire (ANOVA: $F_{1,77} = 0.010$; $p = 0.920$). Therefore, we can consider the sample as representative of the diabetic patients seen by the hospital service in relation to the metabolic analysis: there was no bias towards more favourable analyses among eventual participants in the study with respect to those who were not included.

	Mean HbA1c	Standard deviation
Total interviewees with HbA1c data	6.41	1.48
Participants	6.40	1.40
Non-participants	6.45	1.79

Table 1
Predictor variables considered in the study

<p>Health habits:</p> <ol style="list-style-type: none"> 1. Smoking (1-smoker) 2. Drinking (2-alcohol) 3. Physical exercise (3-frequex) <p>Influence of social and family context:</p> <ol style="list-style-type: none"> 4. Family support in general (4-gensupp) 5. Family support in relation to diabetes (5-suppdia) 6. Knowledge about the treatment on the part of family members (6-knowfam) 7. Change in family habits due to diabetes (7-famhab) 8. Accompaniment at check-ups by family members (8-acomchk) 9. Diabetes as a problem for the family (9-probfam) 10. Family characteristics (10-famcarac) 11. Family's coping with the illness (11-famcop) 12. Knowledge of patient's diabetes at work/college (12-knowrk) 13. Work/academic problems because of diabetes (13-wrkprob) 14. Colleagues' action in situation of diabetic crisis (14-actwrk) 15. Relations with work/study colleagues (15-relatcoll) <p>Judgements about diabetes:</p> <ol style="list-style-type: none"> 16. Seriousness of diabetes (16-seriousn) 17. Fear of complications (17-fearcom) 18. Changes in life if diabetes were cured (18-changlif) 19. Solution for diabetes (19-solutdia) <p>Everyday problems associated with diabetes:</p> <ol style="list-style-type: none"> 20. Life changes due to diabetes (20-changes) 21. Effects of changes caused by diabetes (21-effchang) 22. Results would change with better compliance (22-compres) 23. Worry or frustration at not achieving results (23-noresult) <p>Skills/Abilities for managing diabetes:</p> <ol style="list-style-type: none"> 24. Need for help with self-injection (24-helpinj) 25. Need for help with glycemia analysis (25-helpglyan) 26. Need for help with diet alternation (26-helpdiet) 27. Need for help to do exercise (27-helpexc) 28. Use of strategies for remembering injections (28-stratinjc) 29. Use of strategies for remembering to make glycemia analyses (29-stratgly) 	<ol style="list-style-type: none"> 30. Use of strategies for remembering diet alternation (30-stratdiet) 31. Use of strategies for remembering to do exercise (31-stratex) 32. Patient's satisfaction with his/her knowledge about diabetes (32-satiskno) <p>Barriers to treatment compliance:</p> <ol style="list-style-type: none"> 33. Problems for obtaining material (33-probmatr) 34. Problems for doing injections (34-probinjc) 35. Problems for carrying out glycemia analysis (35-probgly) 36. Problems for doing exercise (36-probexc) 37. Problems for following diet (37-probdiet) <p>Self-assessment of treatment:</p> <ol style="list-style-type: none"> 38. Suitability of treatment (38-suitreat) 39. Treatment facilitates everyday life (39-faclife) 40. Satisfaction with treatment (40-sattreat) <p>Participation of patient in consultation:</p> <ol style="list-style-type: none"> 41. Request for changes in treatment (41-changtrat) 42. Thoughts about what s/he would do in doctor's place (42-docplace) 43. Agreement on objectives (43-agreeobj) 44. Written treatment indications (44-writindic) 45. Detailed explanation of treatment (45-detexpl) 46. Amount of information that can be repeated (46-infrep) <p>Therapeutic relationship:</p> <ol style="list-style-type: none"> 47. Perception of doctor's interest in patient's opinion about his/her illness (47-docopint) 48. Perception of consideration of patient's personal situation on prescribing treatment (48-personsit) 49. Perception of interest shown by doctor toward patient (49-docint) 50. Perception of interest shown by nurse toward patient (50-nursint) 51. Consideration of relationship with doctor (51-relacdoc) 52. Consideration of relationship with nurse (52-relacnurs) 53. Perception of doctor's satisfaction with treatment compliance (53-docsatisf) 54. Perception of nurse's satisfaction with treatment compliance (54-satisfnurs) 55. Perception of doctor's opinion on patient's future achievement of objectives (55-docopobj)
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RESULTS

Once the data had been collected, we carried out an analysis of frequencies with respect to the criterion variable *self-assessment of adherence to therapy*; we continued by making a correlational analysis between the predictor variables and the criterion variable and then carrying out a discriminant analysis with those items that had previously displayed a significant correlation with the criterion variable and which, subjected to an analysis of variance, showed significant differences for the different levels of adherence. The purpose of the discriminant analysis was to establish a discriminant function from which it would be possible to classify patients in relation to the criterion variable considered in the study.

Analysis of frequencies for self-assessment of adherence to therapy

Table 3 shows the descriptive results for the criterion variable. Differences were found with regard to compliance with therapeutic prescription according to area of treatment (diet, exercise and glycemia analysis program).

As it can be seen, compliance with the recommendations on regular glycemia self-analysis is the self-assessed adherence behaviour with the highest frequency score (35% made analyses daily, 25% made them 4-6 days a week, and 35% did so 1-3 days a week). The recommendation showing poorest compliance was that of regular physical exercise: 17% of participants did not comply with the guidelines at all, while 31% did so only poorly. Diet

Table 3
Contingencies of the therapeutic adherence variables

Frequency of GS analysis		Compliance with physical exercise						
		Totally	Very well	Reasonably well	Little	Not at all	Total	
Daily	Compliance with diet	Totally	1	2			1	4
		Very well			4	1	1	6
		Reasonably well	1	1	6			9
		Little	1		1			
		Not at all						
	Total	3	3	11	1	3	21	
6-4 days per week	Compliance with diet	Totally		1	1	3		5
		Very well		1	3	1	3	8
		Reasonably well						
		Little						
		Not at all						
	Total		2	4	4	3	13	
3-1 days per week	Compliance with diet	Totally				1		1
		Very well					1	1
		Reasonably well			6	6	2	14
		Little				3		3
		Not at all						
	Total			6	10	3	19	
Less than 1 day/week	Compliance with diet	Totally				1		1
		Very well						
		Reasonably well						
		Little				1		1
		Not at all						
	Total				2		2	
Never	Compliance with diet	Totally						
		Very well						
		Reasonably well						
		Little						
		Not at all						
	Total							

recommendations were followed to an intermediate extent by comparison with the two other adherence behaviours, with 10% complying fully, 22% largely, 54% moderately and 14% poorly. None of the participants reported total non-compliance with diet recommendations. Nevertheless, adherence in one of the treatment areas does not imply similar compliance in the others. Table 3 shows the distribution of participants in each of the adherence self-assessment items. As it can be seen, there are patients who carry out the glycemia analysis and take physical exercise daily, but report non-compliance with the diet prescriptions. Likewise, other participants report making daily glycemia analyses and following the diet recommendations precisely but doing no physical exercise.

Graph 1 shows the distribution of the sample with

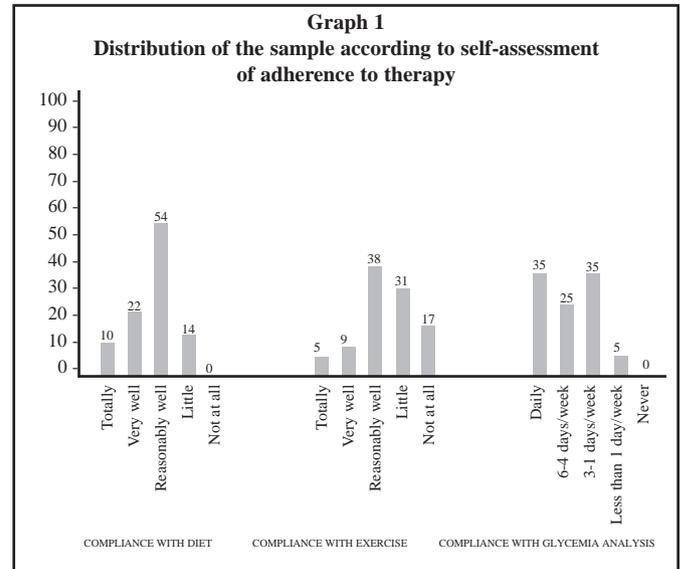


Table 4
Correlations between therapeutic adherence and predictor variables

Adherence self-assessment	Adherence self-assessment
Adherence self-assessment	
Pdiet	
Pexercise	
Pglycemia	
Health habits	.442**
1. Smoker	.149
2. Alcohol	.210
3. Frequent	.562**
Family and social support	.048
04. Family support in general (4-gensupp)	.016
10. Family characteristics (10-famcarac)	.096
06. Knowledge about the treatment on the part of family members (6-knowfam)	.188
05. Family support in relation to diabetes (5-suppdia)	.072
07. Change in family habits due to diabetes (7-famhab)	-.104
08. Accompaniment at check-ups by family members (8-acomchk)	.177
09. Diabetes as a problem for the family (9-probfam)	-.133
11. Family's coping with the illness (11-famcop)	.033
13. Work/academic problems because of diabetes (13-wrkprob)	-.037
15. Relations with work/study colleagues (15-relatcoll)	.126
12. Knowledge of patient's diabetes at work/college (12-knowrk)	.078
14. Colleagues' action in situation of diabetic crisis (14-actwrk)	-.004
Judgements about diabetes	-.279*
17. Fear of complications (17-fearcom)	-.117
16. Seriousness of diabetes (16-seriousn)	-.244
19. Solution for diabetes (19-solutdia)	-.199
18. Changes in life if diabetes were cured (18-changlif)	-.202
Everyday problems - .247	
20. Life changes due to diabetes (20-changes)	-.149
21. Effects of changes caused by diabetes (21-effchang)	-.155
22. Results would change with better compliance (22-compres)	-.123
23. Worry or frustration at not achieving results (23-noresult)	-.176
Skills/Abilities for managing diabetes	-.118
32. Patient's satisfaction with his/her knowledge about diabetes (32-satiskno)	.096
24. Need for help with self-injection (24-helpinjc)	.225
25. Need for help with glycemia analysis (25-helpglyan)	-.062
26. Need for help with diet alternation (26-helpdiet)	.082
27. Need for help to do exercise (27-helpex)	.018
28. Use of strategies for remembering injections (28-stratinjc)	-.245
29. Use of strategies for remembering to make glycemia analyses (29-stratgly)	-.275*
30. Use of strategies for remembering diet alternation (30-stratdiet)	-.088
31. Use of strategies for remembering to do exercise (31-stratex)	-.138
Barriers to treatment compliance	-.288*
34. Problems for doing injections (34-probinjc)	-.209
35. Problems for carrying out glycemia analysis (35-probgly)	-.115
36. Problems for doing exercise (36-probex)	-.280*
37. Problems for following diet (37-probdiet)	-.098
33. Problems for obtaining material (33-probmatr)	-.149
Self-assessment of treatment	.312*
38. Suitability of treatment (38-suitreat)	.391**
39. Treatment facilitates everyday life (39-faclife)	.145
40. Satisfaction with treatment (40-sattreat)	.274*
Participation in consultation	-.025
41. Request for changes in treatment (41-changtreat)	.014
43. Agreement on objectives (43-agreeobj)	.045
42. Thoughts about what s/he would do in doctor's place (42-docplace)	.088
44. Written treatment indications (44-writindic)	-.112
45. Detailed explanation of treatment (45-detexpl)	.050
46. Amount of information that can be repeated (46-infrept)	.041
Therapeutic relationship	.151
49. Perception of interest shown by doctor toward patient (49-docint)	-.314*
50. Perception of interest shown by nurse toward patient (50-nursint)	-.063
51. Consideration of relationship with doctor (51-relacdoc)	-.385**
52. Consideration of relationship with nurse (52-relacnurs)	-.178
48. Perception of consideration of patient's personal situation on prescribing treatment (48-personsit)	.042
47. Perception of doctor's interest in patient's opinion about his/her illness (47-docopint)	-.014
53. Perception of doctor's satisfaction with treatment compliance (53-docsatisf)	.409**
54. Perception of nurse's satisfaction with treatment compliance (54-satisfnurs)	.407**
55. Perception of doctor's opinion on patient's future achievement of objectives (55-docopobj)	.380**

** Correlation is significant at the 0.01 level (bilateral).

* Correlation is significant at the 0.05 level (bilateral).

regard to self-assessment of adherence to the therapy.

Determination of relationships between predictor variables and self-assessed adherence to therapy

Table 4 shows the results for the analysis of correlation between the criterion variable (self-assessed level of adherence to therapy) and the predictor variables considered in the study. As it can be appreciated, the strongest correlations are obtained with the items of physical exercise, suitability of the treatment and relationship with medical personnel.

Establishing the model of classification of adherence to therapy from the variables assessed

In the determination of the discriminant function of adherence to therapy we carried out an ANOVA, whose results appear in Table 5. The items analyzed were those presenting a significant correlation with perception of therapeutic adherence (see Table 4). The discriminant analysis was carried out with the items displaying significant and marginally significant differences in the ANOVA.

Thus, the items considered in the calculation of the discriminant analysis were “frequency of physical exercise”; “suitability of the treatment”; “relationship with doctor”; “perception of doctor’s satisfaction with patient’s treatment compliance”; “perception of nurse’s satisfaction with patient’s treatment compliance”; and “perception of doctor’s opinion on the results the patient will obtain”, which displayed significant differences in relation to self-assessment of adherence, and the items “perception of interest shown by doctor” and “problems for doing exercise in situations other than the normal

ones”, which displayed marginally significant differences.

The sample was then divided into two subgroups, above and below the median of the total sample. Before carrying out the discriminant analysis it was checked that this grouping distinguished the two groups in relation to perception about adherence to therapy ($F_{(1,56)}=104.82$; $MS_e=0.169$; $p=0.000$).

In carrying out the analysis we were able to use valid data from 48 participants. Table 6 shows the descriptive results corresponding to the classification variables for each item for each level of the criterion variable.

From the results of the analysis we obtained a discriminant function with an eigenvalue of 1.767. The *Wilks’*

Items	F	G1	g2	MS _e	P
Frequency of physical exercise	7,95	4	49	0,29	0,000
Use of strategies for remembering glycemia analysis	1,46	4	48	0,44	0,229
Problems for doing exercise in non-everyday situations	2,48	4	49	0,39	0,056
Suitability of treatment	4,38	3	50	0,37	0,008
Satisfaction with treatment	1,83	4	49	0,42	0,139
Perception of doctor’s interest	3,18	2	52	0,41	0,050
Relationship with doctor	5,23	2	52	0,38	0,008
Perception of doctor’s satisfaction with patient’s treatment compliance	4,62	4	49	0,35	0,003
Perception of nurse’s satisfaction with patient’s treatment compliance	4,17	4	44	0,36	0,006
Perception of doctor’s opinion on patient’s future achievement of objectives	3,49	4	49	0,38	0,014

Adherence self-assessment	Above the median (n= 29)		Below the median (n= 19)		Total (n=48)	
	M	Sx	M	Sx	M	Sx
3. Physical exercise (3-frequex)	2,37	1,26	3,55	1,18	3,08	1,33
36. Problems for doing exercise (36-probex)	3,89	0,74	3,07	1,39	3,40	1,23
38. Suitability of treatment (38-suittreat)	1,95	0,78	2,45	0,91	2,25	0,89
53. Perception of doctor’s satisfaction with treatment compliance (53-docsatisf)	1,63	0,60	1,59	0,57	1,60	0,57
54. Perception of nurse’s satisfaction with treatment compliance (54-satisfnurs)	1,68	0,48	1,41	0,57	1,52	0,55
55. Perception of doctor’s opinion on patient’s future achievement of objectives (55-docopobj)	2,42	0,90	2,97	0,78	2,75	0,86
49. Perception of interest shown by doctor toward patient (49-docint)	2,42	0,90	2,97	0,78	2,75	0,86
51. Consideration of relationship with doctor (51-relacdoc)	1,79	0,54	2,34	0,81	2,13	0,76

lambda value was significant: 0.566; $\chi^2_{(8)} = 23.89$; $p = 0.002$). The *canonical correlation* was 0.659. Table 7 shows the centroids of the groups.

Considering the structure matrix (see Table 8), we can classify patients with regard to their perception of adherence to therapy on the basis of the frequency with which they do physical exercise and the difficulties they encounter for doing it, and on the basis of their perception of their relations with medical personnel (“patient’s consideration of doctor’s opinion”, “perception of doctor’s/nurse’s satisfaction with patient’s treatment compliance”).

As it can be seen in the classification matrix (see Table 9), on the basis of the function, 85% of cases were classified correctly.

DISCUSSION AND CONCLUSIONS

The results of the present study concur with those obtained in previous research in relation to the differential difficulty of following therapeutic prescriptions depending on the area of treatment (Beléndez and Méndez, 1995; Wing et al., 1986). It is found that compliance with the recommendations is far from easy for diabetic patients; rather, it involves substantial changes in diverse aspects of their life, and the difficulties each patient encounters in adapting to these changes are different and personal.

However, as we remarked in the introduction to this work, and as pointed out also by authors such as Johnson et al. (1990) and Orme and Binik (1989), there is no homogeneity with regard to adherence to the different parts of the therapeutic regime, so that a person may comply strictly with the prescriptions in one area, but not at all with the other recommendations (see Table 3). In our study, the glycemia analysis schedule is the prescription with the highest degree of compliance by participants. This may be due to the fact that the monitoring of glycemia levels involves the learning of a new technique associated with the control of diabetes, and does not involve a change in already-established habits, which, according to the data from Glasgow et al. (1989), is more difficult to accomplish. Furthermore, and in accordance once more with these authors, a tendency has been identified for patients to draw a distinction between two types of self-care: one biomedical (insulin and glycemia analysis), which is considered easier to follow or more important, or is simply complied with more strictly; and another lifestyle-related,

adherence to which is considerably more difficult, or is seen as secondary with respect to the treatment objectives.

A possible explanation for this distinction may lie in the emphasis placed by medical personnel on the clarification of biomedical aspects of the treatment, compared to the laxity with which elements related to changes in lifestyle are usually prescribed; indeed, even the style of the recommendations or instructions themselves is different: for example, “take regular exercise” or “you have to give up smoking”, as opposed to “make a glycemia analysis before and two hours after every meal three times a week on alternate days”, or “you must disinfect the injection zone with cotton wool soaked in alcohol before taking the insulin, each time you do so”. We can suppose that treatment adherence in the non-biomedical

Table 7
Discriminant scores for group centroids

Perception of adherence	Function
Above the median	-1.059
Below the median	0.694

Table 8
Structure matrix

Variables	Function
3. Physical exercise (3-freque)	0,557
55. Perception of doctor’s opinion on patient’s future achievement of objectives (55-docopobj)	0,441
36. Problems for doing exercise (36-probex)	-0,401
54. Perception of nurse’s satisfaction with treatment compliance (54-satisfnurs)	0,375
53. Perception of doctor’s satisfaction with treatment compliance (53 docsatisf)	0,375
38. Suitability of treatment (38-suittreat)	0,332
51. Consideration of relationship with doctor (51-relacdoc)	-0,289
49. Perception of interest shown by doctor toward patient (49-docint)	-0,045

Table 9
Results of classification according to therapeutic adherence self-assessment group

Original group	Predicted group		Total
	Above the median	Below the median	
Above the median	17 (89,5)	2 (10,5)	19
Below the median	6 (20,7)	23 (79,3)	29
85.1% of original grouped cases correctly classified.			

areas would increase considerably if the prescriptions were indicated so carefully and precisely as those related to the insulin injections or the glucose self-analyses, and if medical personnel themselves were to assume the two areas of therapy to be complementary (rather than one being secondary to the other).

A confirmation of this supposition emerges on considering the results of the discriminant analysis. It can be seen that the variables which best classify our participants with regard to self-assessed therapeutic adherence are frequency of physical exercise and problems for doing exercise, together with perception of their relationship with medical personnel. Doing physical exercise tends to be one of the most demanding tasks in any therapeutic regime, due to the time it requires, the high degree of effort involved (especially in people with sedentary habits), the scarce amount of immediate pleasure derived from it and the delay in perception of the benefits obtained from its continued practice. It may be the difficulty of the task that explains why the physical exercise items emerge as relevant in the discrimination of diabetic patients according to treatment adherence. Together with these, perception of the relationship with medical personnel also displays discriminant capacity. This result is to be expected if we bear in mind that diabetes is a chronic disorder requiring permanent and continuous contact with doctors and nursing professionals, and that the way in which they explain and control the treatment will influence the course of the illness.

In sum, in the light of the results obtained, we can conclude that in order to facilitate treatment adherence, medical personnel might place special emphasis on the modification of aspects of the patient's lifestyle and habits, particularly those directly related to the treatment of diabetes, such as physical exercise and eating habits, in addition to habits considered as healthy (avoidance of smoking and alcohol) that have been associated with metabolic control. Another possible source of influence by medical personnel on adherence to therapy may lie in the assessment of patients' beliefs and opinions about their treatment. In this regard, Kavanagh et al. (1993) conclude that perceived self-efficacy is the most powerful simple predictor of compliance with diet and physical exercise programs. Knowledge of the patient's opinions may help the therapist to make prescriptions as appropriate as possible to the needs of the patient, and thus to increase the probability of compliance with them.

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