

The Third Version of the Diabetes Attitude Scale

ROBERT M. ANDERSON, EDD
JAMES T. FITZGERALD, PHD

MARTHA M. FUNNELL, MS, RN, CDE
LARRY D. GRUPPEN, PHD

OBJECTIVE— The objective of this study was to develop a third version of the Diabetes Attitude Scale (DAS-3) that is congruent with current scientific knowledge about diabetes, has improved subscale internal reliability scores, and is shorter than the earlier versions of this instrument.

RESEARCH DESIGN AND METHODS— The second DAS was revised and rewritten by a panel of diabetes experts, including patients, associated with the University of Michigan Diabetes Research and Training Center. The revised version of the instrument was sent to physicians, nurses, dietitians, and patients with diabetes. Completed and usable questionnaires were obtained from 384 patients with diabetes, 321 physicians, 540 nurses, and 569 dietitians. The total number of surveys used for these analyses was 1,814.

RESULTS— The study resulted in a revised DAS with 33 items and five discrete subscales. The subscales were attitudes toward the following: 1) need for special training to provide diabetes care, 2) seriousness of type 2 diabetes, 3) value of tight glucose control, 4) psychosocial impact of diabetes, and 5) attitude toward patient autonomy. Overall, the subscale reliabilities of the DAS-3 were superior to the earlier versions of the scale.

CONCLUSIONS— The DAS-3 is a valid and reliable general measure of diabetes-related attitudes and is most suitable for comparisons across different groups of health care professionals and/or patients. The DAS-3 is also suitable for the evaluation of patient and/or professional education programs if those programs focus on the specific topic areas measured by the five DAS-3 subscales.

Diabetes Care 21:1403–1407, 1998

In the report to the U.S. Congress in 1975, the National Diabetes Commission suggested that the diabetes-related attitudes of health care professionals were often inappropriate and could lead to negative outcomes for patients (1). The Commission did not present scientific evidence to support its claims, which appeared to be based on personal experience and anecdotal evidence. To determine if the assertions of the Commission would be supported by research, the Diabetes Attitude Scale (DAS)

for health care professionals was developed (2). The content of the original DAS was developed through the efforts of a national panel of diabetes experts (3).

In reviewing the responses to the DAS by physicians, nurses, and dietitians, it became clear that it would be useful to know how persons with diabetes viewed these same issues. Additionally, a DAS completed by both patients and health care professionals would allow for direct comparisons of the diabetes-related attitudes

of both groups. We decided that the wording of the original DAS was too technical for patients and needed to be changed. We rewrote most of the items to make them less technical while trying to retain the original meaning. However, a study using two random samples of health care professionals, one of which completed the original DAS and the other completed the revised DAS, indicated that the revisions had changed the psychometric properties of the attitude scale (4). On the basis of these results, we determined that the revised DAS would have to be viewed as a new attitude measure, and its psychometric properties would be established through the administration of the scale to both patients and health care professionals (5,6).

The revised DAS has been used 1) to measure the attitudes of patients toward diabetes and its treatment (7), 2) to demonstrate that controversial beliefs about diabetes could be attributed in part to membership in a professional group (e.g., physicians versus nurses, number of years since graduation from professional training schools, and whether or not one specialized in the treatment of diabetes [8]), 3) to demonstrate that a special diabetes training program for medical students could have an impact on the attitudes toward diabetes (9), and 4) to show that there was a consistent relationship between the diabetes-related attitudes of patients and their self-reported regimen adherence (10). The revised DAS has also been used to measure sex differences in diabetes attitudes (11) and to compare and contrast the attitudes of health care professionals and patients (12).

The Diabetes Control and Complications Trial (DCCT) (13) prompted us to revise the DAS again. The DCCT firmly established the role of blood glucose control in limiting the microvascular complications of diabetes. The findings of the DCCT, in effect, converted some attitude items in the current version of the DAS (e.g., people with diabetes who have poor blood sugar control are more likely to have diabetes complications than people who have good blood sugar control [13]) to knowledge items.

We also wished to shorten the instrument. We felt that having 50 items in the questionnaire was a barrier to its wider use

From the Department of Medical Education (R.M.A., J.T.F., L.D.G.), University of Michigan Medical School, Ann Arbor; and the Clinical Implementation Core (M.M.F.), Michigan Diabetes Research and Training Center, University of Michigan, Ann Arbor, Michigan.

Address correspondence and reprint requests to Robert M. Anderson, EdD, Department of Medical Education, The University of Michigan, G1116 Towsley Center, Box 0201, Ann Arbor, MI 48109-0201. E-mail: boba@umich.edu.

Received for publication 7 October 1997 and accepted in revised form 14 May 1998.

Abbreviations: DAS, Diabetes Attitude Scale; DAS-3, third version of the Diabetes Attitude Scale; DCCT, Diabetes Control and Complications Trial; MDRTC, University of Michigan Diabetes Research and Training Center.

A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

Table 1—Guidelines for writing new items for inclusion in DAS-3

Significance—Write items that measure an important belief. An important belief is one that is likely to predict the behavior of the person holding that belief. For example, an important belief about tight glucose control would predict a patient's or health care professional's willingness to strive to achieve tight glucose control.

Clarity—Write items that are easy to understand.

Ambiguity—Do not write items that can have more than one interpretation. If an attitude item is worded ambiguously, it is impossible to interpret a respondent's agreement or disagreement with that item.

Negative items—Please write some items that you think should be responded to with "strongly disagree." For example, if you think that tight glucose control is in the patient's best interest, you might write an item that reads "tight glucose control is not worth the effort required to achieve it" and indicate your strong disagreement with this item. In order for the measure to be effective, it must have some items for which disagreement is the desired response.

Controversial—An item that almost everyone will agree or disagree with is not useful. Write items that you believe will elicit agreement from some people and disagreement from others. The value of the attitude scale depends on its ability to identify areas of disagreement among various groups of respondents (e.g., patients and professionals, specialists and generalists, older and younger persons, etc.).

Strong items—Write items that you would respond to by either "strongly agree" or "strongly disagree."

in research studies and program evaluation. Finally, we wished to improve the internal reliability of the DAS subscales. These changes would make the DAS more user-friendly, valid, and reliable.

RESEARCH DESIGN AND METHODS

— The first step in the revision process involved a review of the existing studies that had used the DAS to identify items and subscales that we judged appropriate for the third version of the scale. We eliminated items and subscales that were no longer relevant. For example, items comparing the complications rates for patients in good and poor control were eliminated. The items that were retained for the subscale about tight glucose control focused on the long-term inevitability of complications or the overall cost-benefit value of striving for tight blood glucose control. We also eliminated items that did not contribute significantly to subscale reliability and/or items that had very low item-to-subscale correlations.

Content validity of the third version of the Diabetes Attitude Scale (DAS-3) was assured by having new items for the DAS-3 generated by a panel of 22 diabetes experts affiliated with the University of Michigan Diabetes Research and Training Center (MDRTC). The MDRTC panel included physicians, nurses, dietitians, social workers, and patients.

The expert panel interacted by mail using a modified Delphi (14) technique to develop and prioritize new items for inclusion in the DAS-3. In live panel discus-

sions, an overly verbal panel member can have influence out of proportion to his or her content expertise. The Delphi technique is a method developed to facilitate the interaction of a panel of experts about a particular topic so that each expert's input is given equal consideration. The Delphi technique relies on collecting written input from a panel of experts, collating that input, and returning it to the entire panel anonymously for revisions or further input. The MDRTC panel was provided with a list of the items and subscales from the previous DAS that were to be retained. The panel was then asked to write new items for each of the five DAS-3 subscales. They also were provided with guidelines for writing diabetes attitude items (Table 1). After panel members returned their items, redundant items were eliminated or combined. The remaining 210 new items were returned to the panel for a second Delphi round. During this second Delphi round, the panel nominated items for inclusion in the DAS-3. Panel members were asked to nominate five new items for inclusion in each of the five subscales for the DAS-3. The panel was also asked to prioritize each of the five items they selected for each subscale. Five points were given to the highest priority item

Table 2—DAS-3 subscales

The need for special training in education—Assesses the respondent's attitude about the need for health care professionals who care for patients with diabetes to have special training in teaching, counseling, and behavior change techniques.

Example:

"In general, I believe that health care professionals who treat people with diabetes should be trained to communicate well with their patients."

Seriousness of type 2 diabetes—Assesses the respondent's attitude about the seriousness of type 2 diabetes.

Example:

"In general, I believe that people who do not need to take insulin to treat their diabetes have a pretty mild disease."

The overall value of tight glucose control in diabetes care—Assesses the respondent's attitude about whether the potential benefit of tight glucose control is justified in terms of the cost to the patients.

Example:

"In general, I believe that most people can enjoy life and still keep tight blood sugar control."

Psychosocial impact of diabetes on patients—Assesses the respondent's attitude toward the psychosocial impact of diabetes on the lives of people with the disease.

Example:

"In general, I believe that diabetes is hard because you never get a break from it."

Attitude toward patient autonomy—Assesses the respondent's attitudes about whether patients should be the primary decision makers regarding the daily self-care of their diabetes.

Example:

"In general, I believe that people with diabetes have a right to decide how hard they will work to control their blood sugar."

Table 3—Health care professionals demographic information

n	1,430
Age in years	43.51 ± 9.73
Women	82
Profession	
Physician	22
Nurse	38
Dietitian	40
Effort devoted to diabetes	
0–24%	30
25–49%	18
50–74%	17
75–100%	35
Ethnicity	
African-American	2
Arabic	<1
Caucasian	89
Hispanic-American	2
Native-American	1
Other	6

Data are means ± SD or %.

selected by each panel member for each subscale, four points for the next highest priority item, and so on, giving the fifth priority item one point. The panel was also

Table 4—Patient demographic information

n	384
Age in years	61.2 ± 12.9
Women	59
Type of diabetes	
Type 1	5
Type 2 using insulin	39
Type 2 not using insulin	57
Years since diagnosis of diabetes	10.9 ± 9.6
Had diabetes patient education	60
Years of school completed	
8 or less	4
9–12	14
12	39
13–15	28
16 or more	15
Percent of ideal weight	
Women	155.1 ± 37.4
Men	121.4 ± 25.9
Ethnicity	
African-American	7
Arabic	0
Caucasian	83
Hispanic-American	2
Native American	4
Other	4

Data are means ± SD or %.

Table 5—Descriptive statistics for DAS-3 subscales

Scale name	Number of items	Mean ± SD	Range	Standardized item α	SE
Need for special training	5	4.6 ± 0.40	2.6–5.0	0.67	0.01
Seriousness of type 2 diabetes	7	4.4 ± 0.53	1.7–5.0	0.80	0.01
Value of tight control	7	4.3 ± 0.47	1.0–5.0	0.72	0.01
Psychosocial impact of diabetes	6	4.2 ± 0.50	2.0–5.0	0.65	0.01
Patient autonomy	8	4.1 ± 0.53	1.9–5.0	0.76	0.01

n = 1,843.

asked to indicate whether they thought the desired response for each item they selected was “agree” or “disagree”.

Three criteria were used to choose among all of the items nominated for inclusion in the DAS-3. First, all panel members had to agree on whether the desired direction of the response to the item was “agree” or “disagree.” Second, at least four of the panel members had to have chosen the item as one of their top five priorities for a particular subscale. Third, the item had to receive one of five highest scores for items nominated for that particular subscale. Scores were calculated by adding the number of points assigned to each item by each panel member. This Delphi process resulted in a DAS-3 with five subscales (Table 2) with 35 items. Of the items, 17 were new, and 18 items were from the previous DAS.

Sampling

The next step in the revision process was to have the DAS-3 completed by an adequate number of health care professionals and patients to determine its psychometric characteristics. Our sampling strategy was designed to ensure completion of at least 300 questionnaires from each of the major populations of interest (i.e., physicians, nurses, dietitians, and patients). Different sampling methods were used for different populations. To obtain at least 300 completed questionnaires from nurses and dietitians, the DAS-3 was sent to 1,000 nurse

and 1,000 dietitian members of the American Association of Diabetes Educators. Because, as we and others have learned (6,15), it is very difficult to obtain an adequate number of returns with surveys mailed to physicians, we used a different strategy for this group of health professionals. The DAS-3 was distributed to approximately 1,000 physician participants at a variety of continuing medical education programs held at the University of Michigan in 1995 and 1996. Programs that were likely to attract physicians who provided care to patients with diabetes such as family practice updates, internal medicine programs, and endocrinology and diabetes symposia were used.

To obtain completed surveys from patients, convenience samples drawn from a number of MDRTC outreach programs were used. Approximately 700 patients received questionnaires in the mail and were asked to complete and return them in stamped, addressed envelopes. This sampling strategy yielded completed questionnaires from 384 patients with diabetes, 321 physicians, 540 nurses, and 569 dietitians. The total number of usable surveys used for these analyses was 1,814.

Statistical methods

The reliability of each of the five DAS subscales was determined by Cronbach's coefficient α calculated on standardized scores. Differences among α 's for each scale across

Table 6—Pearson's product-moment correlations between DAS-3 subscales

	Special training	Seriousness of type 2 diabetes	Tight control	Psychosocial impact
Special training	—	—	—	—
Seriousness of type 2 diabetes	0.52	—	—	—
Value of tight control	0.42	0.63	—	—
Psychosocial impact of diabetes	0.46	0.41	0.27	—
Patient autonomy	0.52	0.50	0.37	0.45

n = 1,837. *All correlations are significant at $P < 0.0001$.

Table 7—Mean DAS-3 subscale scores by health care profession

Scale name	Dietitian	Nurse	Physician	P value
Need for special training	4.72 ± 0.31 (567)	4.67 ± 0.34 (531)	4.43 ± 0.36 (320)	<0.01*
Seriousness of type 2 diabetes	4.54 ± 0.46 (567)	4.58 ± 0.43 (531)	4.13 ± 0.47 (320)	<0.01†
Value of tight control	4.42 ± 0.41 (567)	4.43 ± 0.41 (531)	4.23 ± 0.45 (320)	<0.01†
Psychosocial impact of diabetes	4.32 ± 0.40 (567)	4.39 ± 0.41 (531)	4.15 ± 0.43 (320)	<0.01*
Patient autonomy	4.33 ± 0.40 (567)	4.33 ± 0.42 (531)	3.93 ± 0.46 (320)	<0.01†

Data are means ± SD (n). *All scale scores were different. †Dietitians and nurses differed from physicians.

earlier versions of the DAS were evaluated with the Feldt test. Correlations among the DAS subscales were examined by Pearson's correlations. The questionnaires of the health professionals and the patients were combined for these analyses. Differences among dietitians, nurses, and physicians in subscale means were evaluated using analysis of variance (F ratio, $P < 0.05$) and Tukey's honestly significant difference (global $\alpha = 0.05$).

RESULTS — Demographic information for health professionals is presented in Table 3. Of the respondents, 78% were either dietitians or nurses, and 82% were women. Most of the health professionals were Caucasian (89%) and had a substantial portion of their practice devoted to patients with diabetes (52% reported that at least half of their time was spent in treating diabetes).

Demographic information for patients with diabetes is presented in Table 4. The majority of the patients were women (59%) and most were Caucasian (83%). More than half (57%) of the respondents were patients with type 2 diabetes not using insulin. Of the patients, 60% had attended diabetes patient education classes.

Subscale statistics

Descriptive statistics for the five DAS subscales are presented in Table 5 (two items were dropped). The score mean ranged from 4.1 (patient autonomy) to 4.6 (need for special training). The reliabilities of the subscales ranged from 0.65 (psychosocial

impact of diabetes) to 0.80 (seriousness of type 2 diabetes). Subscale correlations are presented in Table 6. The correlations ranged from a high of 0.63 (seriousness of type 2 diabetes and value of tight control) to a low of 0.27 (value of tight control and psychosocial impact of diabetes). Most subscales (7 of 10) were moderately correlated (between 0.40 and 0.60).

Attitude scores for health care professionals

Differences in attitude scores between health professionals were indicated for all five subscales (Table 7). On two subscales (need for special training and psychosocial impact of diabetes), all three professionals differed. For the need for special training subscale, dietitians scored the highest, followed by nurses, with physicians scoring the lowest (high scores indicate agreement with the items). For the psychosocial impact of diabetes subscale, nurses scored the highest, followed by dietitians and physicians. For the three remaining subscales (seriousness of type 2 diabetes, value of tight control, and patient autonomy), the differences between scores of the dietitians and the nurses were not statistically significant. However, dietitians and nurses differed with physicians, whose subscale scores were lower for all three subscales.

The amount of time devoted to caring for patients with diabetes was a predictor of the respondents' attitudes for all three health care professional groups. Nurses,

dietitians, and physicians had more positive attitudes toward diabetes than their colleagues who spent less time treating the disease. This relationship held for all health care professional groups across all five DAS-3 subscales (Table 8).

Patients using insulin differed from patients not using insulin on the subscales of seriousness of type 2 diabetes (4.0 vs. 4.1, $P \leq 0.03$) and psychosocial impact of diabetes (4.0 vs. 3.8, $P \leq 0.01$).

CONCLUSIONS — The previous versions of the DAS have been shown to be valid and reliable general measures of diabetes-related attitudes. The second version of the DAS has been used in a number of evaluative and group comparison studies. The second version of the DAS has also been used to measure the attitudes of nurses in Australia (16). The third version of the DAS is an appropriate instrument for similar studies conducted in the future. It has 17 fewer items than the original DAS and, overall, it has superior subscale reliability scores. Also, the Delphi review and revision of DAS items assures the content validity of this version of the scale. These changes should make the DAS-3 more useful than the previous versions.

The DAS-3, like its predecessors, is a general measure of diabetes-related attitudes. This fact makes it more suitable for some applications than others. For example, because it is a general measure of attitudes, it is an appropriate choice for comparisons

Table 8—DAS-3 subscale scores by percent of effort devoted to diabetes

DAS-3 subscale	0–24%	25–49%	50–74%	75–100%	P value
Need for special training	4.5 ± 0.37 (399)	4.62 ± 0.35 (255)	4.7 ± 0.35 (253)	4.7 ± 0.30 (509)	<0.01
Seriousness of type 2 diabetes	4.3 ± 0.50 (399)	4.38 ± 0.53 (255)	4.5 ± 0.50 (253)	4.7 ± 0.35 (509)	<0.01
Value of tight control	4.3 ± 0.45 (399)	4.32 ± 0.45 (255)	4.4 ± 0.45 (253)	4.5 ± 0.36 (509)	<0.01
Psychosocial impact of diabetes	4.2 ± 0.46 (399)	4.31 ± 0.40 (255)	4.3 ± 0.41 (253)	4.4 ± 0.38 (509)	<0.01
Patient autonomy	4.1 ± 0.47 (399)	4.20 ± 0.47 (255)	4.3 ± 0.45 (253)	4.4 ± 0.38 (509)	<0.01

Data are means ± SD (n).

across patient and/or professional groups. However, this strength is also a limitation of the DAS-3. Because it is a general measure of attitudes, it is not likely to be as sensitive to changes in a particular population as an attitude measure designed specifically for a particular population of patients or health care professionals. The sampling procedures in this study were chosen to help determine the psychometric properties of the instrument rather than generalize about the attitudes of any particular group. For example, obtaining completed questionnaires from physicians attending continuing medical education courses was done to obtain adequate numbers of completed surveys from this difficult-to-survey group rather than generalize about their attitudes.

The validity of this version of the DAS is supported by the fact that findings of this study are consistent with earlier DAS surveys. For example, health care professionals who spend more time treating diabetes are likely to have a more favorable attitude toward the disease than those who spend less time. This finding is striking in its consistency across professional groups and percentage effort categories. Also, as with earlier DAS studies, the attitudes of nurses and dietitians tend to be more positive than those of physicians. Most physicians practice in settings where they are expected to provide care during short-term symptom-driven visits and may find diabetes a less satisfying condition to treat than nurses or dietitians who are more likely to be able to interact with patients for longer periods of time. Finally, as with earlier studies, patients using insulin report more psychosocial impact than patients who do not take insulin.

This study suggests that the DAS-3 is a valid and reliable general measure of diabetes-related attitudes. It is most suitable for comparisons across different groups of health care professionals and/or patients. It

is also suitable for the evaluation of patient and/or professional education programs if those programs focus on the specific topic areas measured by the five DAS-3 subscales.

Acknowledgments— This study was supported by grant 5P60-DK-20572 from the National Institute of Diabetes and Digestive and Kidney Diseases.

We wish to acknowledge the following individuals who helped in the development of the third version of the Diabetes Attitude Scale: Marilyn Arnold, Anne Jackson, Evelyn Piehl, Patricia Barr, Tracy Klenk, Linda Ridley, David Buck, Ralph Knopf, Marsha Samus, Patricia Butler, Andrea Lasichak, Priscilla Smith, Margaret Christiansen, Catherine Martin, Judy Tomer, Margaret Fox, Mary McElgunn, Deborah Wierzbinski, Jeffrey Halter, Jennifer Merritt, Roland Hiss, and Karen Nairn. We also wish to acknowledge Scarlett Bennett and Jules Lounsbury for help with manuscript preparation.

This study was presented at the 1997 Annual Meeting of the American Diabetes Association in Boston, Massachusetts. A copy of the DAS-3 and written permission to use it can be obtained from R.M.A.

References

1. Department of Health, Education, and Welfare: *Report of the National Commission on Diabetes to the Congress of the United States*. Vol. 3, part 5. Washington, D.C., U.S. Govt. Printing Office, 1975, p. 5–13 (NIH publ. no. 76–1024)
2. Anderson RM, Gressard C: Developing a measure of the attitudes of health care providers toward diabetes and its treatment (Abstract). *Diabetes* 36:A120, 1987
3. Anderson RM, Donnelly MB, Gressard CP, Dedrick RF: The development of a diabetes attitude scale for health care professionals. *Diabetes Care* 12:120–127, 1989
4. Anderson RM, Donnelly MB: Words and meaning: a cautionary tale for diabetes educators. *Diabetes Educ* 16:117–122, 1990
5. Anderson RM, Donnelly MB, Dedrick RF: Measuring the attitudes of patients towards diabetes and its treatment. *Patient Educ Couns* 16:231–245, 1990
6. Anderson RM, Donnelly MB, Dedrick RF, Gressard CP: The attitudes of nurses, dietitians, and physicians toward diabetes. *Diabetes Educ* 17:261–268, 1991
7. Donnelly MB, Anderson RM: The role related attitudes of physicians, nurses, and dietitians in the treatment of diabetes. *Med Care* 28:175–179, 1990
8. Anderson RM, Donnelly MB, Davis WK: Controversial beliefs about diabetes and its care. *Diabetes Care* 15:859–863, 1992
9. Anderson RM, Donnelly MB, Gorenflo DW, Funnell MM, Sheets KJ: Influencing the attitudes of medical students towards diabetes: results of a controlled study. *Diabetes Care* 16:503–505, 1993
10. Anderson RM, Fitzgerald JT, Oh MS: The relationship of diabetes-related attitudes and patients' self-reported adherence. *Diabetes Educ* 19:287–292, 1993
11. Fitzgerald JT, Anderson RM, Davis WK: Gender differences in diabetes attitudes and health. *Diabetes Educ* 21:523–529, 1995
12. Anderson RM, Fitzgerald JT, Gorenflo DW, Oh MS: A comparison of the diabetes-related attitudes of health care professionals and patients. *Patient Educ Couns* 21:41–50, 1993
13. Diabetes Control and Complications Research Group: The effect of intensive treatment on the development and progression of long-term complications in insulin-dependent diabetes mellitus. *N Engl J Med* 329:977–986, 1993
14. Udinsky BF, Ostorlind SJ, Lynch S: *Delphi Technique in Evaluation Resource Handbook: Gathering, Analyzing, and Reporting Data*, vol. 79. San Diego, CA, EDITS Pubs, 1981
15. Maheux B, Legault C, Lambert J: Increasing response rates in physicians' mail surveys: an experimental study. *Am J Public Health* 79:638–639, 1989
16. Williamson P, Shute R, King M, Lehman J: Measuring diabetes-related attitudes: the use of a USA-developed instrument with Australian nurses. *Patient Educ Couns* 29:41–47, 1996