Development and evaluation of a psychometric instrument to assess problems related to illness acceptance in diabetes: the Diabetes Acceptance Scale (DAS)

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BACKGROUND & AIMS

Insufficient diabetes acceptance has been associated with reduced diabetes self-care and suboptimal glycaemic control. However, satisfactory tools to measure diabetes acceptance are lacking. Therefore, the *Diabetes Acceptance Scale (DAS)* was developed. This report presents its development and preliminary evaluation.

MATERIALS & METHODS

56 items were generated and revised based on patient feedback and expert reviews (27 directed towards acceptance/integration, e. g. 'I accept diabetes as a part of my life', 29 towards non-acceptance/denial/avoidance, e. g. 'I often push diabetes to the back of my mind'). A four-point Likert scale (3 – 'applies to me very much' to 0 – 'does not apply to me') was used for responses. Negatively keyed items were reverse-scored; hence, higher total scores indicated higher acceptance. The items were tested in a pilot study with 222 patients (see Table 1) to exclude unsatisfactory items and define the final scale. A subsequent validation study is currently recruiting; at the time of this report, 105 patients (see Table 2) were included, providing questionnaire data on diabetes non-acceptance (AADQ, German 6-item version), self-care behaviour (DSMQ), treatment satisfaction (DTSQ), diabetes-related distress (PAID) and depressive symptoms (PHQ-9); HbA_{1c} was assessed in a central laboratory. Analyses comprised item and scale properties, exploratory factor analysis (EFA), correlation/regression analysis and *t*-test.

RESULTS

Item selection:

- The item selection was performed based on the pilot study data (*n* = 222): Initially, 5 items were excluded for psychometric problems. Through repeated EFA, 8 items were excluded for loadings on non-interpretable factors, finally yielding an interpretable four-factor structure. Based on this structure, 11 items were excluded for suboptimal statistical or semantic fit and 4 for redundancy, leading to the final 28-item scale.

Scales/reliability:

- EFA of the selected items (pilot data, *n* = 222) yielded four factors (71% explained variance), interpreted as 'acceptance/integration' (7 items, Cronbach's α = 0.93), 'treatment motivation' (7 items, α = 0.93), 'denial/defence' (7 items, α = 0.91) and 'emotional suffering' (7 items, α = 0.92); see Table 3.
- The derived subscales were highly correlated, providing summing of all items to a reliable total score (28 items, α = 0.97); see Figure 1.
- Reliability was reassessed on the validation data (*n* = 105), yielding the following coefficients α (scales in above order): 0.91, 0.89, 0.90, 0.91 and 0.98; see Figure 1.

Validity:

- All validity data are based on the validation study (*n* = 105): The correlation between the DAS total score and the AADQ, a measure of diabetes non-acceptance, was −0.72; the correlation with HbA_{1c} was −0.40; all *P* < 0.01; see Figure 2.
- In a multiple regression model, higher DAS total scores (indicating higher overall diabetes acceptance) were significantly related to longer diabetes duration (β = 0.26, *P* < 0.05) and not having

retinopathy (β = −0.33, *P* < 0.01) but not to age, gender, BMI, diabetes type, insulin treatment or other complications (all *P* > 0.22); see Figure 3.

- Patients with higher DAS total scores (indicating higher overall diabetes acceptance; *n* = 55) compared to those with lower ones (*n* = 50; median split) reported significantly better self-care in terms of diet (6.0 ± 1.9 vs. 4.0 ± 1.9, Δ = 1.05), medication adherence (9.5 ± 1.1 vs. 8.0 ± 2.3, Δ = 0.83), blood glucose monitoring (8.1 ± 2.5 vs. 6.0 ± 2.6, Δ = 0.82), physical activity (6.3 ± 2.3 vs. 5.2 ± 2.6, Δ = 0.43) and appointment adherence (9.3 ± 1.3 vs. 7.4 ± 2.8, Δ = 0.87); all *P* < 0.05; see Figure 4; they also showed significantly better glycaemic control (HbA_{1c}: 7.6 ± 1.0 vs. 8.4 ± 1.3%, Δ = 0.69); *P* < 0.01; see Figure 5.
- Patients with higher DAS total scores moreover showed significantly higher treatment satisfaction (30 ± 5 vs. 22 ± 6, Δ = 1.45), lower diabetes-related distress (21 ± 14 vs. 41 ± 16, Δ = 1.33) and fewer depressive symptoms (5.5 ± 3.9 vs. 8.9 ± 4.9, Δ = 0.77); all *P* < 0.01; see Figure 5.

CONCLUSION

The DAS appears reliable and valid in assessing problems related to illness acceptance in both major types of diabetes. It may help detect patients at high risk of poor diabetes outcomes and explain suboptimal self-care practices as well as poor glycaemic control. Further data to expand these initial findings are being collected.

Table 1: Patient characteristics of the pilot study sample

Variable	Total sample (*n* = 222)	T1DM (64%)	T2DM (36%)
Age (years)	49 ± 16	44 ± 16	58 ± 12
Gender (female)	49%	56%	38%
BMI (kg/m²)	30 ± 7	27 ± 5	35 ± 8
Diabetes duration (years)	17 ± 11	18 ± 12	15 ± 10
Insulin therapy	94%	100%	84%
With long-term complications	41%	27%	65%
HbA_{1c} value (%)	8.5 ± 1.7	8.2 ± 1.7	8.9 ± 1.6

Table 2: Characteristics of the up to now included patients of the validation study

Variable	Total sample (*n* = 105)	T1DM (61%)	T2DM (39%)
Age (years)	48 ± 13	42 ± 12	59 ± 8
Gender (female)	57%	64%	46%
BMI (kg/m²)	29 ± 6	26 ± 4	33 ± 6
Diabetes duration (years)	16 ± 10	17 ± 12	13 ± 6
Insulin therapy	92%	100%	81%
With long-term complications	39%	25%	62%
HbA_{1c} value (%)	8.0 ± 1.2	7.8 ± 1.1	8.2 ± 1.3

Table 3: Items und factorial structure of the DAS

Item#	Item	Acceptance/ integration	Treatment motivation	Denial/ defence	Emotional suffering
1	I can handle having to live with diabetes.	0.71			
2	I have accepted having diabetes.	0.76			
3	Diabetes is a normal part of my life.	0.77			
5	I live a content life with diabetes.	0.60			−0.27
6	Living with diabetes is part of me.	0.81			
8	I accept diabetes as part of my life.	0.65			
13	I fully accept living with diabetes.	0.62			
3	I give diabetes as much space in my life as needed.	0.36	0.59		
7	I ensure that my diabetes treatment works well in daily life.		0.91		
9	I am motivated to treat my diabetes properly.		0.82		
11	I integrate diabetes into my daily routines as good as possible.	0.30	0.65		
14	I take good care of my diabetes.		0.79		
17	I often ignore diabetes.		−0.56		
26	I have difficulties to motivate myself to perform good diabetes self-care.		−0.75		
18	I refuse to accept diabetes as part of my life.	−0.34		0.44	0.25
19	I neglect my diabetes self-care because it reminds me of having diabetes.			0.59	
21	I avoid dealing with topics related to diabetes.		−0.28	0.44	
22	I am reluctant to perform diabetes self-care.			0.77	
24	I avoid things which remind me of diabetes.			0.48	0.29
27	I am reluctant to accept recommendations from physicians/ diabetes team.			0.87	
28	I neglect diabetes self-care because I want to avoid topics related to diabetes.			0.65	
10	Living with diabetes does not bother me.	0.26			−0.49
12	I see myself as a valuable person with diabetes.		0.32		−0.62
15	I suffer from having diabetes.				0.78
16	When I think about having to live with diabetes, I feel low/ depressed.				0.67
20	Diabetes contributes to being dissatisfied with my life.				0.80
23	I hate having to live with diabetes.				0.69
25	Living with diabetes makes me sad/ depressed.				0.83

Results from an exploratory factor analysis with direct oblimin rotation; factor loadings < 0.25 are not displayed for ease of presentation.
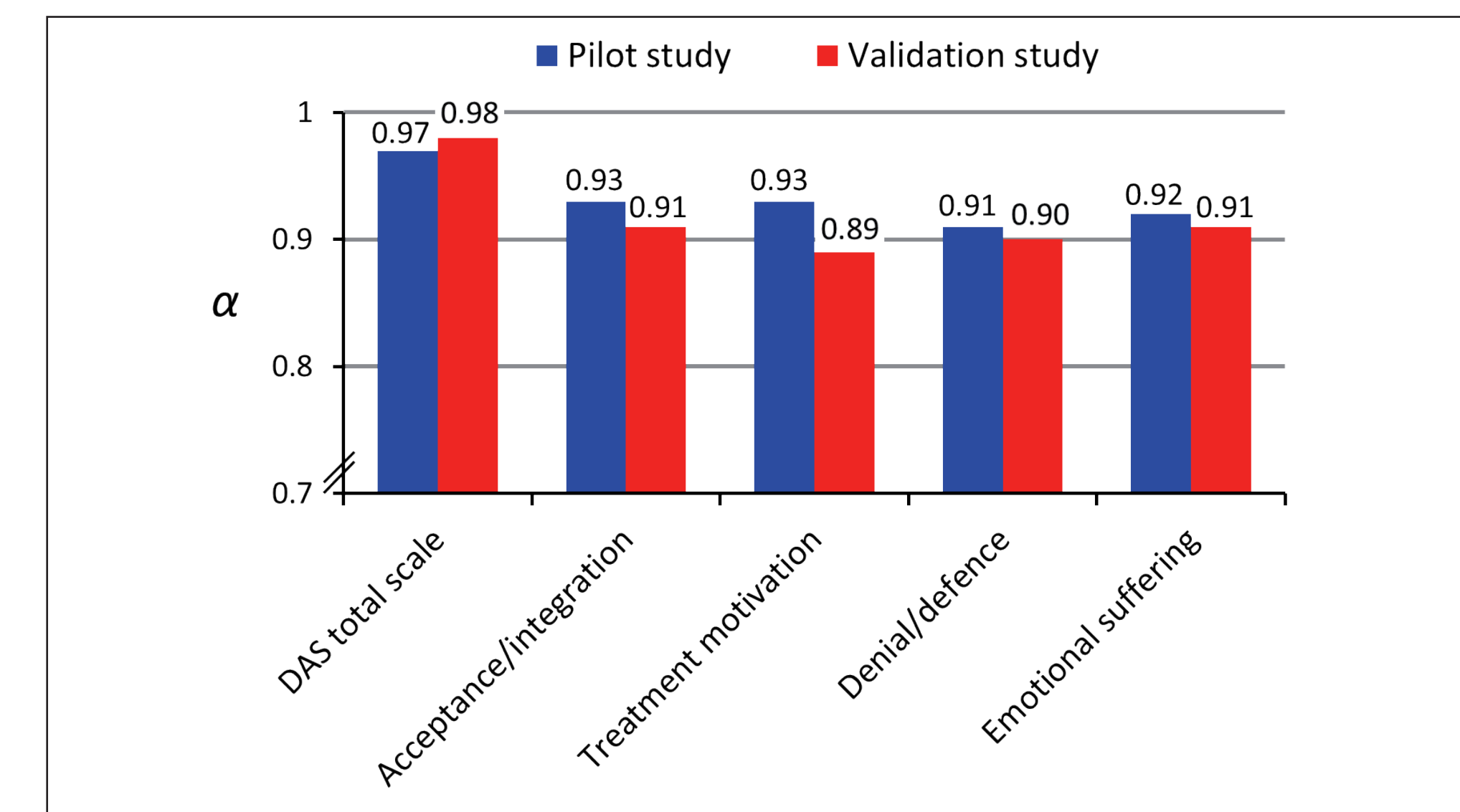

Figure 1: Reliability coefficients (Cronbach's α) of the DAS total scale and factorially derived subscales
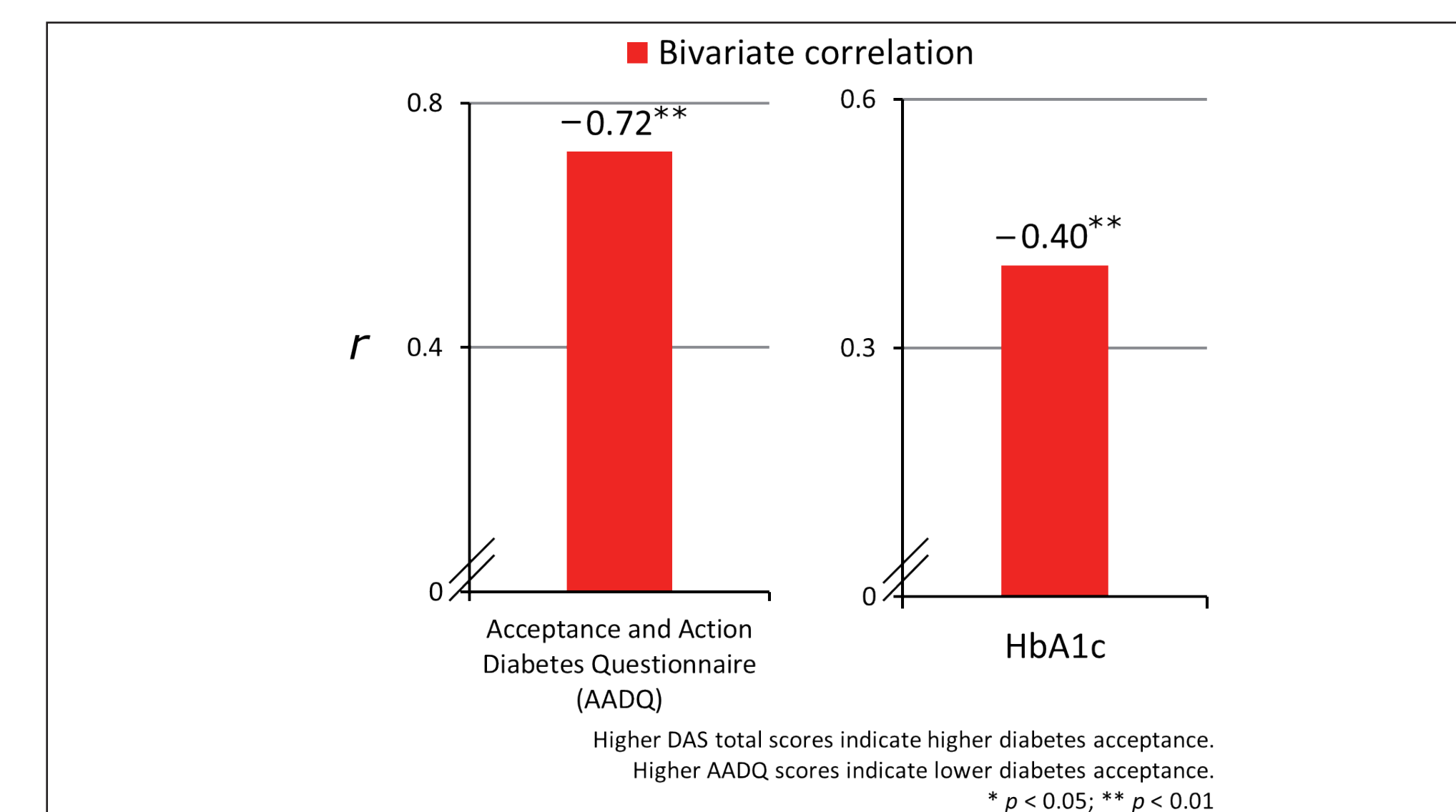

Figure 2: Associations between the DAS total score and convergent criteria of interest
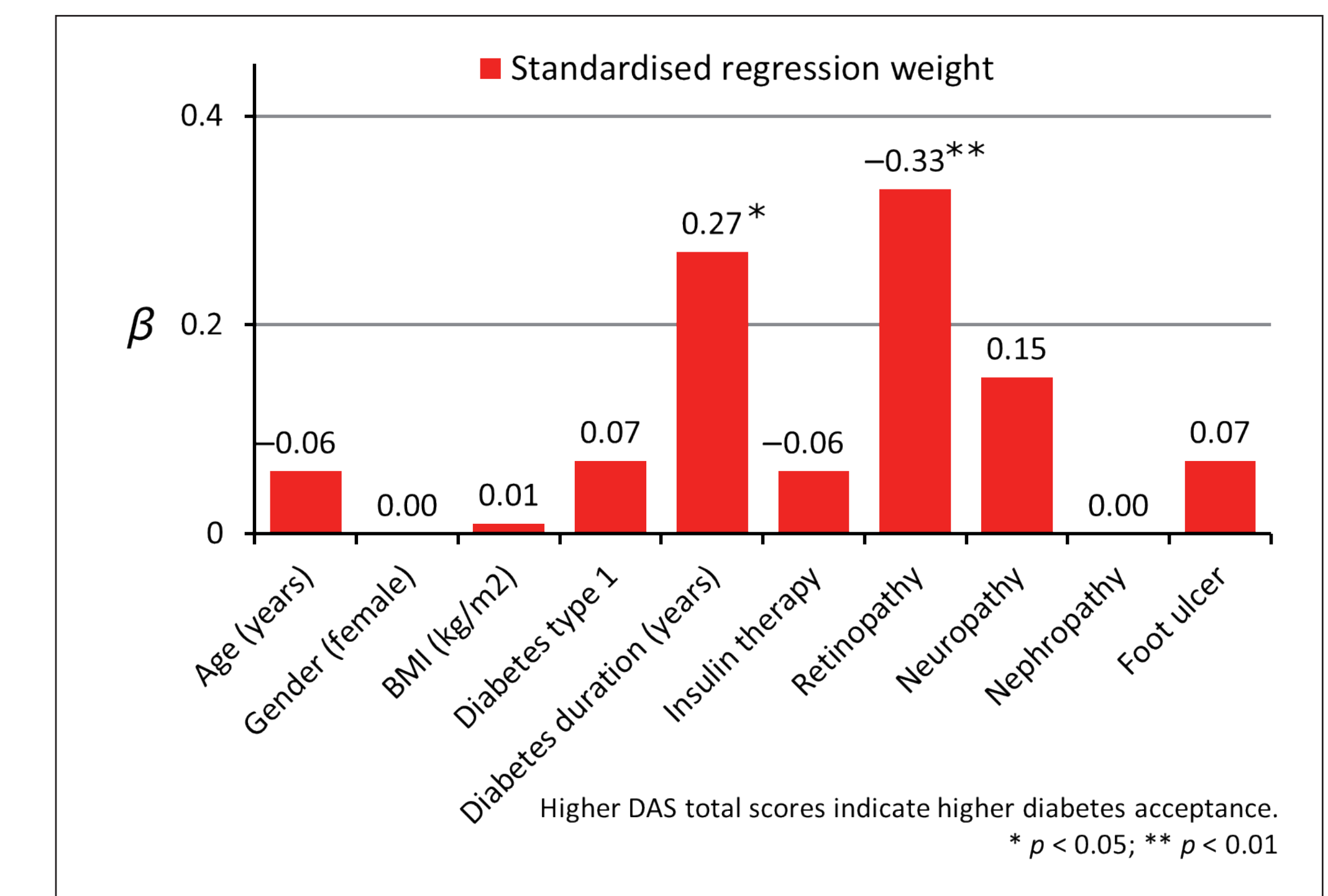

Figure 3: Regression of the DAS total score on demografic and clinical characteristics
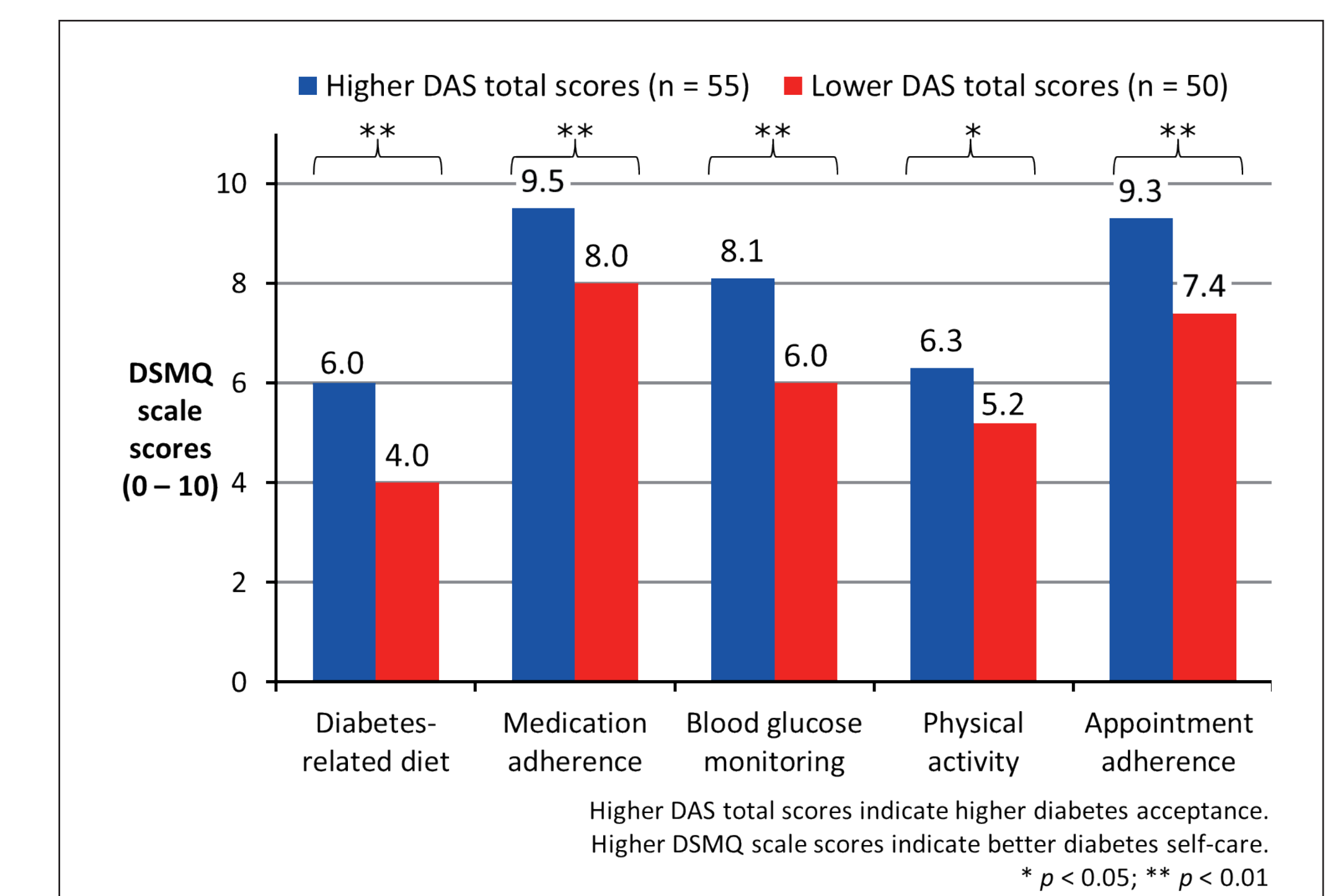

Figure 4: Comparison of self-care activities between patients with higher versus lower DAS total scores (median split)
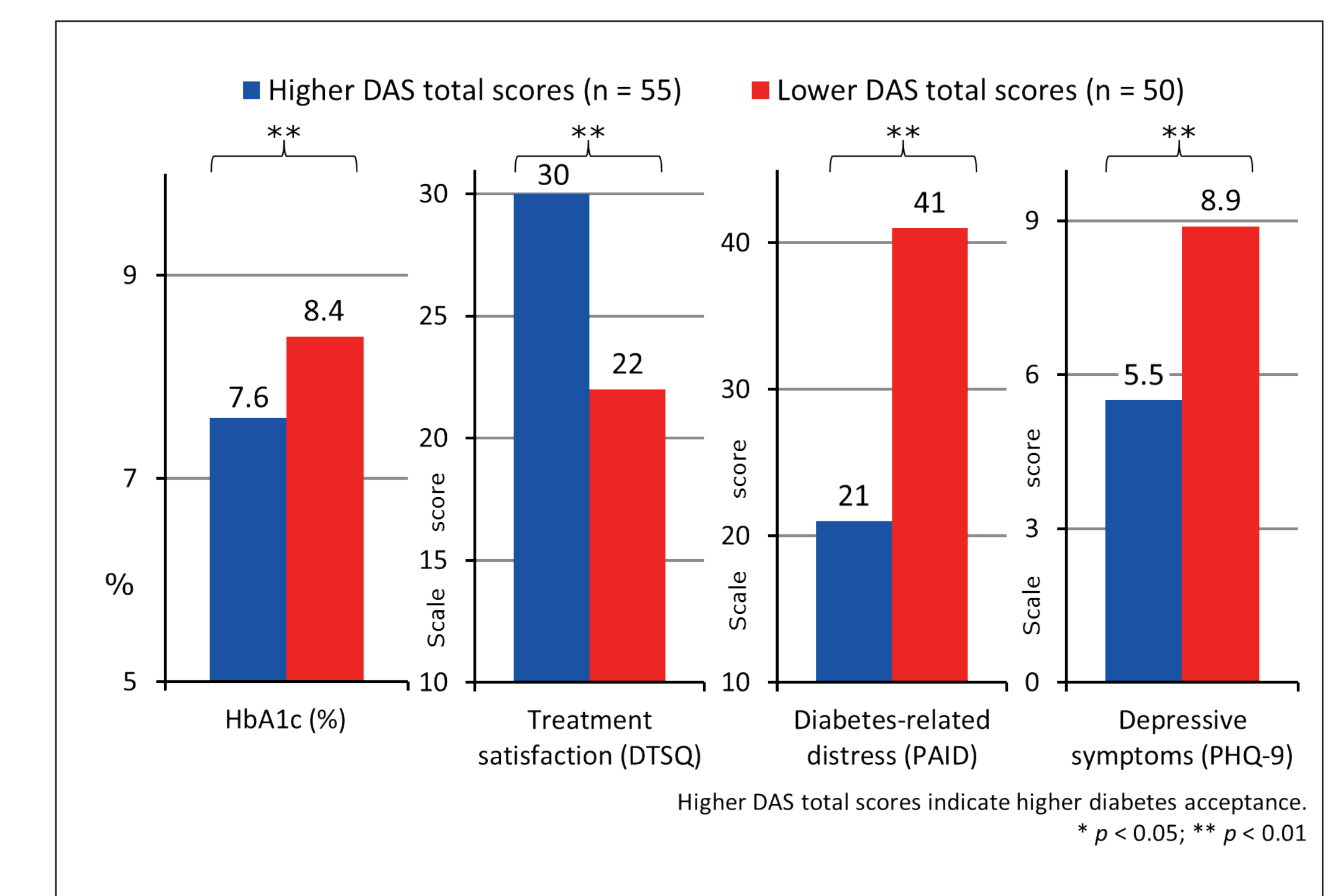

Figure 5: Comparison of clinical outcomes between patients with higher versus lower DAS total scores (median split)