

Treatment of Subclinical Depression with a CBT - Program (DIAMOS): Results of a Prospective Randomized Controlled Study



Kulzer B., Schmitt A., Reimer A., Ehrmann D., Haak T., Hermanns N.

FIDAM Research Institute Diabetes Academy, Diabetes Center Mergentheim, Bad Mergentheim, Germany



ABSTRACT

Nearly 20% of the diabetic population suffers from a sub-threshold depression without meeting the criteria of a major depression. However, elevated depressive symptoms are associated with a reduced quality of life, lower self-care activities, and a higher mortality. To target this large group of people, a diabetes-specific treatment program (DIAMOS) was developed and evaluated in a randomized controlled trial with a 12-month follow-up.

DIAMOS is a group program based on cognitive-behavioral-therapy (CBT). It consists of 5 group sessions which lasts for 90 minutes each. 214 inpatients with subclinical depression were randomized either to DIAMOS or to a control group receiving diabetes education. Depression, diabetes-related distress, and quality of life were assessed via questionnaires (CES-D, PAID, WHO-5 respectively). HbA1c was analyzed in a central laboratory.

181 patients (age: 43±14 yrs.; 57% female; 63% Type 1 DM; diabetes duration 15±14 yrs.; 95% with insulin; 51% with late complications; HbA1c 8.8±1.7%; CES-D 23.3±8.1; PAID 39.5±18.4; WHO-5 8.9±4.5) were available at the 12-month follow-up (drop-out rate: 15%). Compared to the control group, patients treated with DIAMOS showed a significantly greater reduction of depressive symptoms (- 7.4 ± 11.4 vs. - 2.7 ± 11.7; $p < .01$), and diabetes-related distress (- 13.0 ± 18.9 vs. - 4.2 ± 16.9; $p < .01$). Improvement of quality of life (+ 4.5 ± 6.1 vs. + 2.5 ± 6.3; $p > .05$) as well as HbA1c improvement was comparable in both groups.

The results demonstrate that DIAMOS is an effective tool for the treatment of subclinical depression in people with diabetes. In addition, DIAMOS positively affects diabetes-related distress and quality of life. Interestingly, the reduction of depressive symptoms and distress was not associated with an improvement of glycemic control. DIAMOS proves to be an innovative tool for routine care to improve the situation of people with diabetes and subclinical depression.

INTRODUCTION

Patients with diabetes are almost twice as likely affected by depressive disorders. Recent meta-analyses demonstrated that nearly 12% of patients with diabetes are affected by major depression and an additional 20% are suffering from sub-threshold depression. Sub-threshold depression is defined as having elevated depressive symptoms without meeting diagnostic criteria for major depression. Serious adverse effects of depression in people with diabetes are reported throughout the literature, but strikingly also sub-threshold depression is linked with a poorer quality of life, higher diabetes-related distress, reduced diabetes self-care, and higher risks of micro- or macrovascular diabetes complications, disability, and early mortality. The epidemiological findings regarding the high frequency of sub-threshold depression and the evidence of its negative impact on the prognosis of diabetes support the need for adequately addressing sub-threshold depression in clinical care. To target this large group of people, a diabetes-specific treatment program (DIAMOS) was developed and evaluated in a randomized controlled trial with a 12-month follow-up.

METHODS

People with diabetes and sub-threshold depression were randomly assigned to either the newly developed intervention program DIAMOS or to the control group (CG). Patients in the CG participated in a standard group based diabetes education program of 5 lessons (90 minutes each) including topics such as healthy diet in diabetes, diabetes and exercise, and diabetes and legal issues. The program was conducted by diabetes educators. DIAMOS is based on a self-management/empowerment approach focusing on the coping with diabetes-related distress. It is conducted as a group program comprising 5 lessons of 90 minutes each, led by a certified psychologist. Primary outcome was the reduction in depressive symptoms assessed via the CES-D questionnaire. Secondary outcomes were incidence of depressive disorders assessed via the PHQ-9

questionnaire, diabetes-related distress (PAID questionnaire), quality of life (WHO-5 questionnaire), and glycemic control (HbA1c was analyzed in a central laboratory).

RESULTS

- A total of 3,156 patients with diabetes were screened for depressive symptoms, 1,261 of those were screened positive. 214 of those positively screened met the inclusion criteria and gave informed consent. 108 patients were randomized to the CG and 106 to DIAMOS. A total of 33 patients (15.4%) were lost to follow-up (see figure 1).
- Patients in both groups were 43 years old with mean diabetes duration of 14 years (no differences between groups). Sex distribution in both groups was similar. People with type 1 diabetes were rather frequent in both groups with a significantly higher proportion in the CG. Moderate overweight was present in both groups, but in CG BMI was significantly lower than in DIAMOS. Glycemic control was comparably poor in both groups. The prevalence of microvascular complications did not differ significantly between groups, whereas the prevalence of macrovascular complications was significantly higher in DIAMOS (see table 1).
- Participants of DIAMOS reported significantly more depressive symptoms but well-being and diabetes-related distress did not differ at baseline between both groups (see table 2).

Primary Outcome:

- Depressive symptoms as measured by the CES-D could be reduced in both groups (-7.4 ± 11.4 vs. -2.7 ± 11.7; both $p_{\text{within}} < .05$) (see figure 2). However, the reduction of depressive symptoms in DIAMOS was significantly greater than the reduction in the CG (adjusted- Δ 3.7 ± 1.6, 95% CI 0.6 to 6.8) even when adjusting for baseline scores, BMI, and diabetes type (see figure 2).
- An intention-to-treat analysis also showed a significant difference between CG and DIAMOS in favor of DIAMOS ($p=0.049$) (see figure 3).

Secondary Outcomes:

- Patients in DIAMOS also showed a significantly greater reduction of the PHQ-9 depression score (-3.3 ± 5.1 vs. -1.2 ± 5.7; both $p_{\text{within}} < .05$; adjusted- Δ 1.5 ± 0.7, 95% CI 0.1 to 2.9) (see figure 4), corroborating the finding of a significant reduction of depressive symptoms measured by the CES-D.
- Diabetes-related distress was significantly reduced in both groups (-13.0 ± 18.9 vs. -4.2 ± 16.9; both $p_{\text{within}} < .05$), but DIAMOS led to a significantly greater reduction of diabetes-related distress (adjusted- Δ 8.0 ± 2.4, 95% CI 3.3 to 12.7) as measured by the PAID (see figure 5).
- Improved well-being was reported in DIAMOS as well as in the CG (+4.5 ± 6.1 vs. +2.5 ± 6.3; both $p_{\text{within}} < .05$). However, the difference of improvement in well-being between both groups did not reach significance (adjusted- Δ -1.1 ± 0.8, 95% CI 0.5 to -2.8) (see figure 6).
- Interestingly, there was a significant improvement in glycemic control in both groups (-0.5 ± 2.0 vs. -0.7 ± 1.7; both $p_{\text{within}} < .05$), but no significant difference between DIAMOS and the CG (adjusted- Δ -0.3 ± 0.2, 95% CI 0.2 to -0.7) (see figure 7).
- Furthermore, categorical assessment of major depression according to DSM-IV criteria was carried out using the PHQ-9. Based on this analysis, 10 participants of DIAMOS (10.8%) versus 20 participants of the CG (22.7%) fulfilled criteria for major depression at follow-up ($p < .05$). Therefore, participating in DIAMOS led to a risk reduction of 37% regarding the incidence of major depression (adjusted odds ratio 0.63, 95% CI 0.42 to 0.96, $p < .05$).

CONCLUSION

In contrast to routine care, the newly developed program DIAMOS led to significant improvements of depressive symptoms, diabetes-related distress and incident depression one year after participation. Furthermore, subsequent analyses showed that DIAMOS has the effect of preventing a deterioration of sub-threshold depression into major

depression. In summary, the DIAMOS program has proven its efficacy in treating sub-threshold depression and elevated diabetes distress more efficiently than diabetes education alone. Given the negative sequelae of sub-threshold depression on the prognosis of diabetes, this new program has the potential to close an important gap in the management of sub-threshold depression in clinical care.

Contact Information:

FIDAM - Research Institute Diabetes Academy Mergentheim

Bernhard Kulzer

97980 Bad Mergentheim, Germany

Phone: +49 7931 594-151

kulzer@diabetes-zentrum.de

Table 1: Sample Characteristics

Mean ± SD / %	DIAMOS (N = 106)	Control Group (N = 108)	P
Age – years	43.2 ± 14.9	43.4 ± 13.8	.911
Female gender – n (%)	60 (56.6%)	61 (56.5%)	.986
Years of education – years	11.3 ± 3.0	10.8 ± 2.7	.232
Type 1 diabetes – n (%)	63 (59.4%)	78 (72.2%)	.049
Diabetes duration – years	14.2 ± 10.3	14.2 ± 10.7	.992
HbA1c – % – mmol/mol	8.9 ± 1.8 64.5 ± 10.2	8.9 ± 1.8 67.4 ± 12.4	.722
BMI – kg/m ²	29.8 ± 7.7	27.7 ± 6.3	.029
# with microvascular complications – n (%)	57 (53.8%)	49 (45.4%)	.219
# with macrovascular complications – n (%)	18 (17.0%)	7 (6.5%)	.017

Table 2: Psychological variables - baseline characteristics

Mean ± SD / %	DIAMOS (N = 106)	Control Group (N = 108)	P
CES-D (depression score)	24.7 ± 7.6	22.1 ± 8.6	.049
PHQ-9 (depressive symptoms)	10.8 ± 4.4	9.6 ± 3.9	.043
WHO-5 (emotional well-being)	8.5 ± 4.3	9.6 ± 4.8	.091
PAID (diabetes-related distress)	39.7 ± 19.6	37.5 ± 17.0	.385

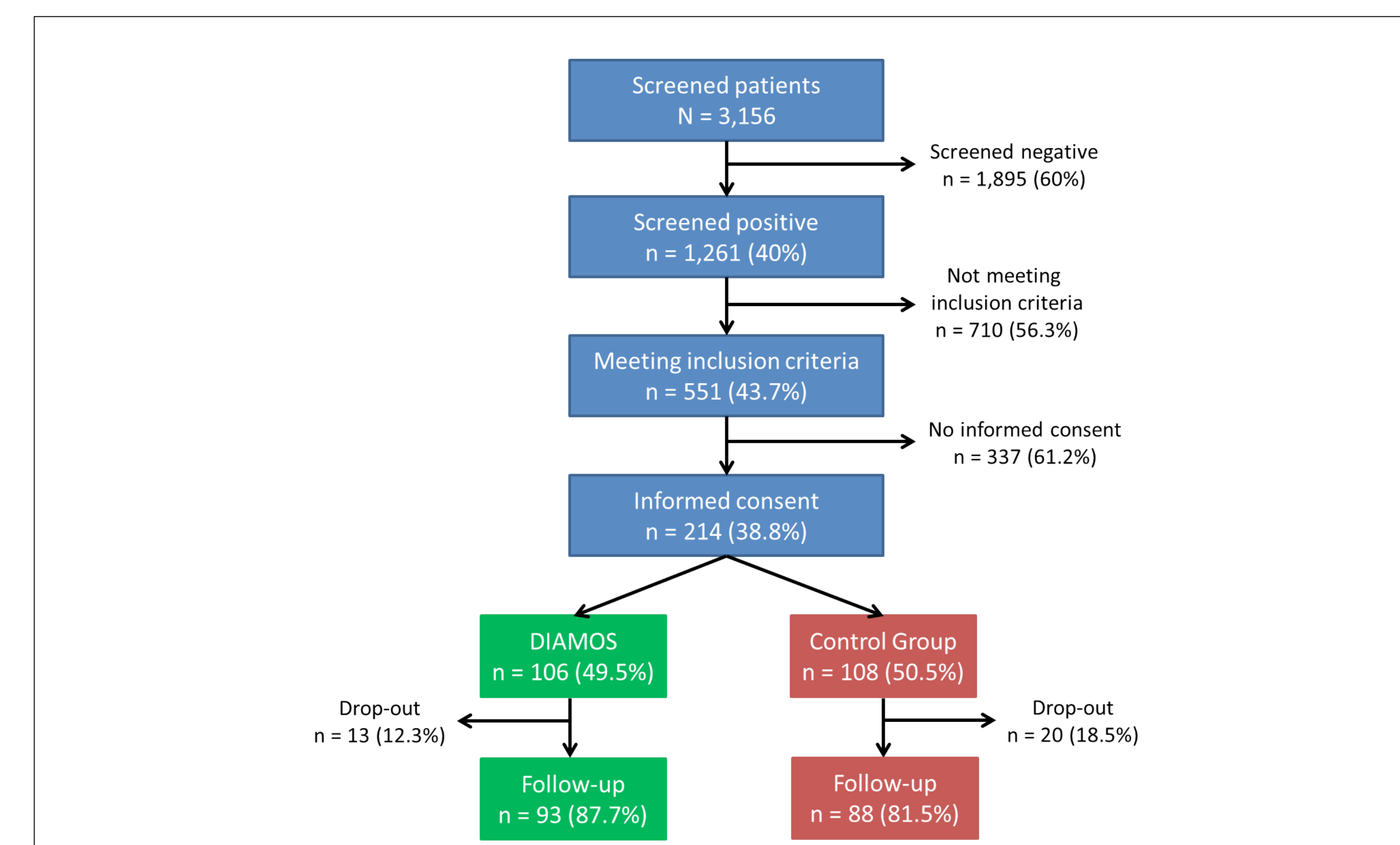


Fig. 1: Study flow chart

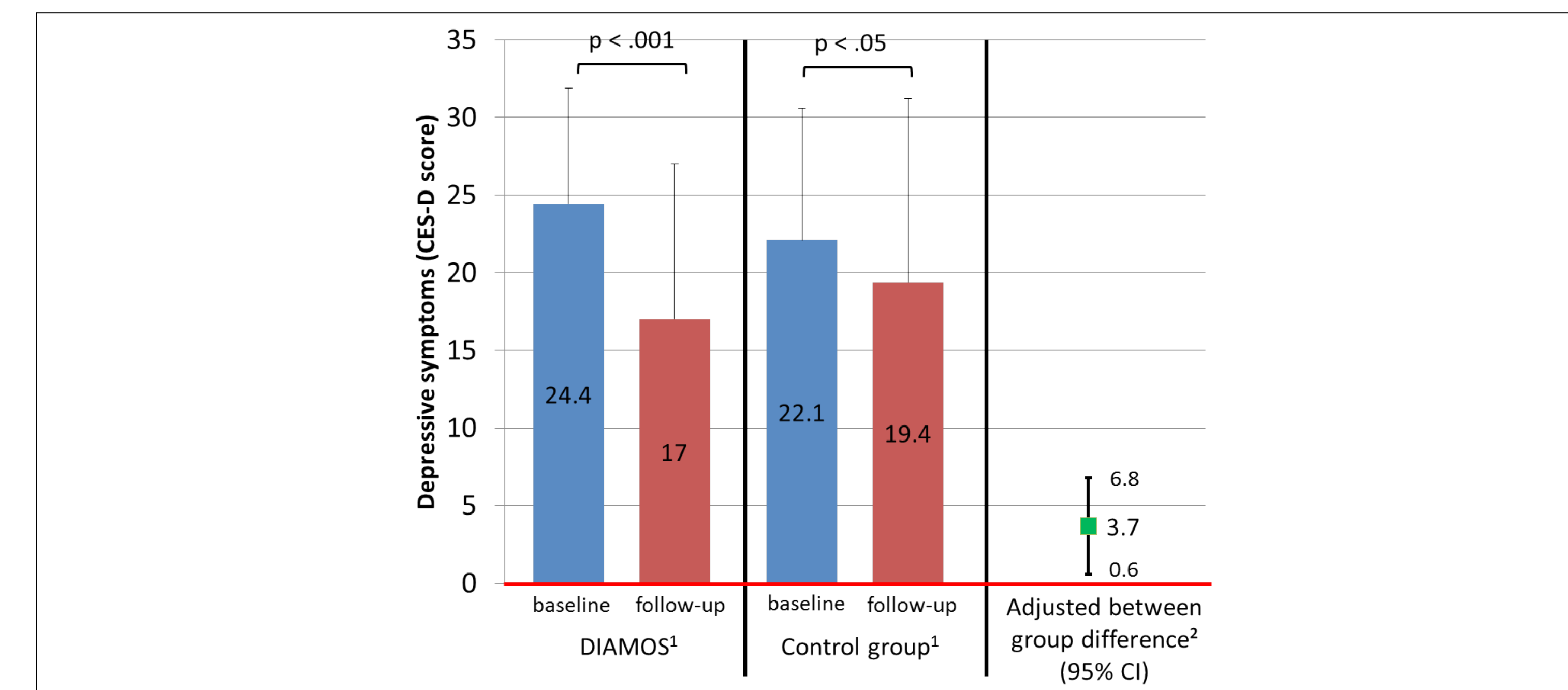


Fig. 2: Reduction of depressive symptoms (CES-D)

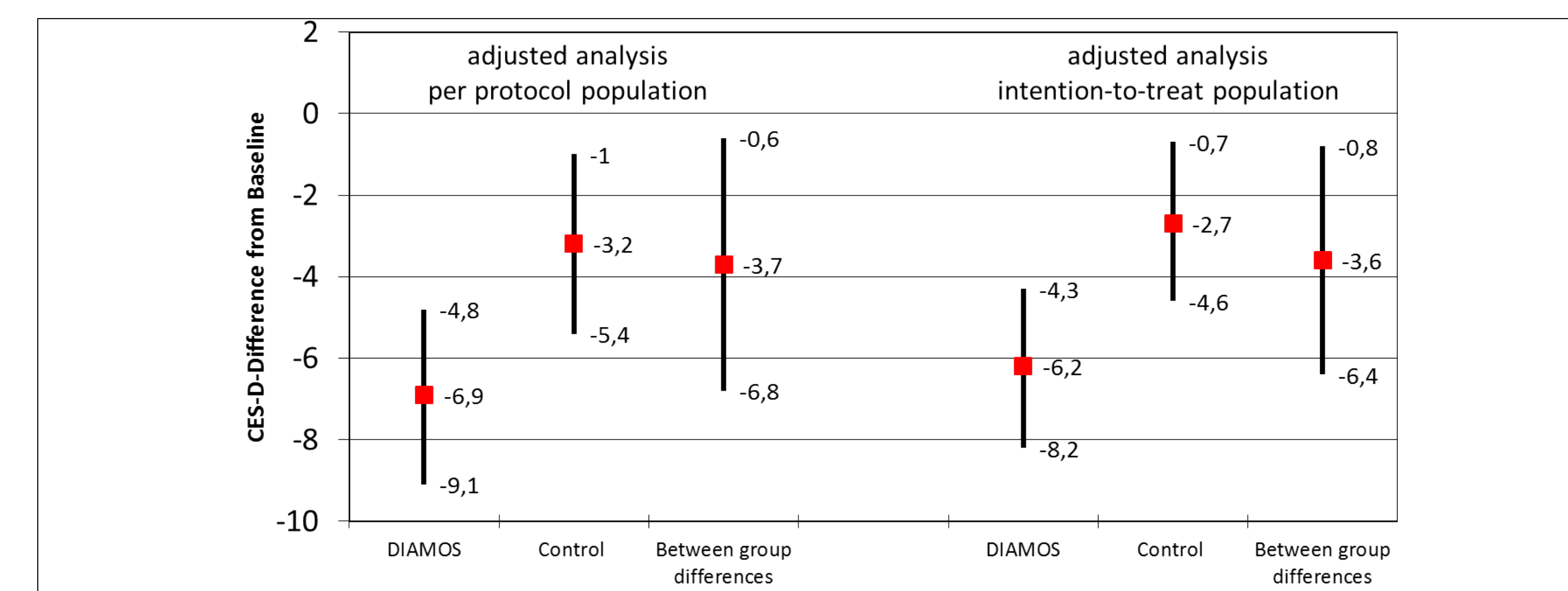


Fig. 3: Reduction of depressive symptoms (CES-D) in per-protocol and intention-to-treat analyses (adjusted mean differences and 95% confidence intervals)

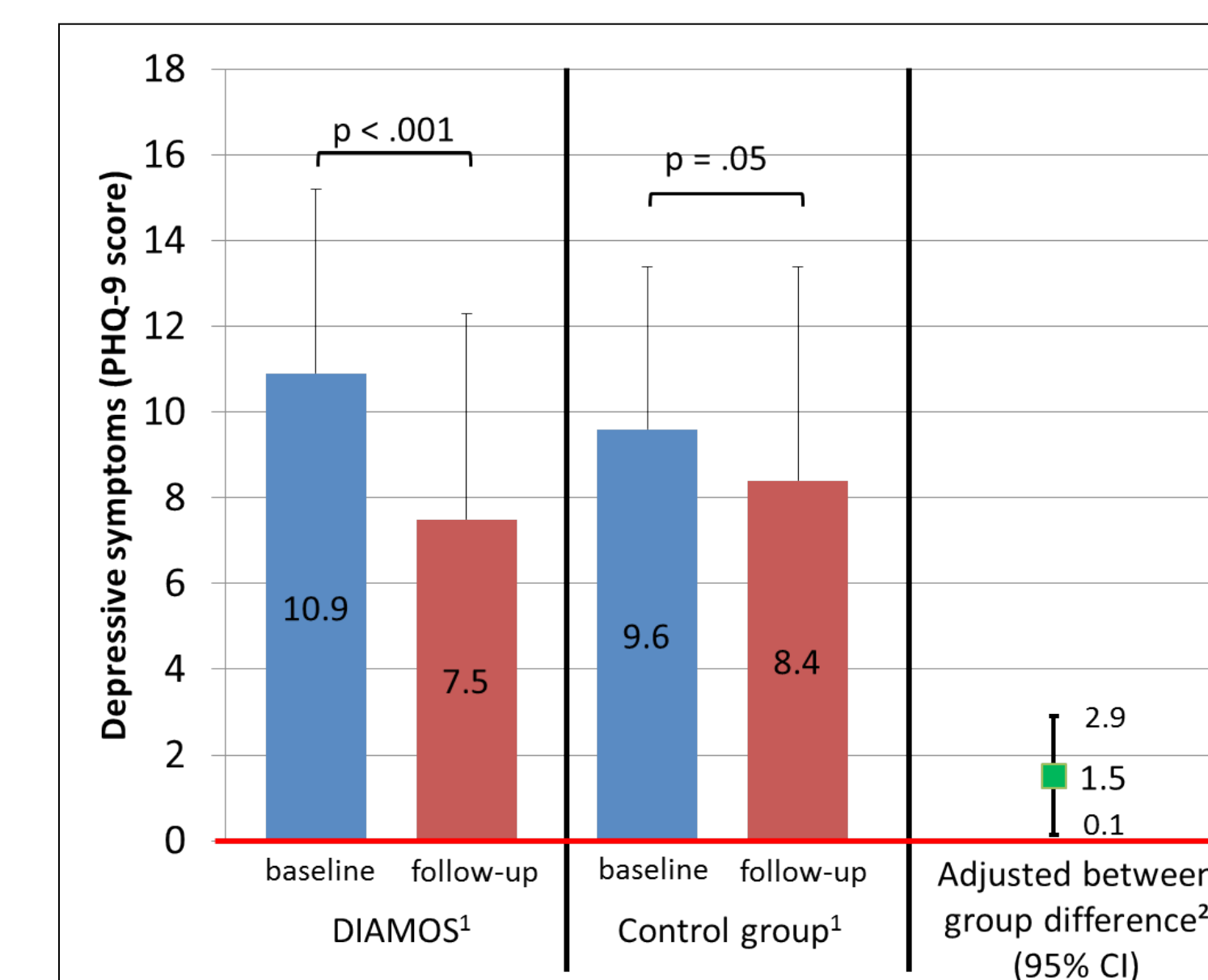


Fig. 4: Reduction of depressive symptoms (PHQ-9)

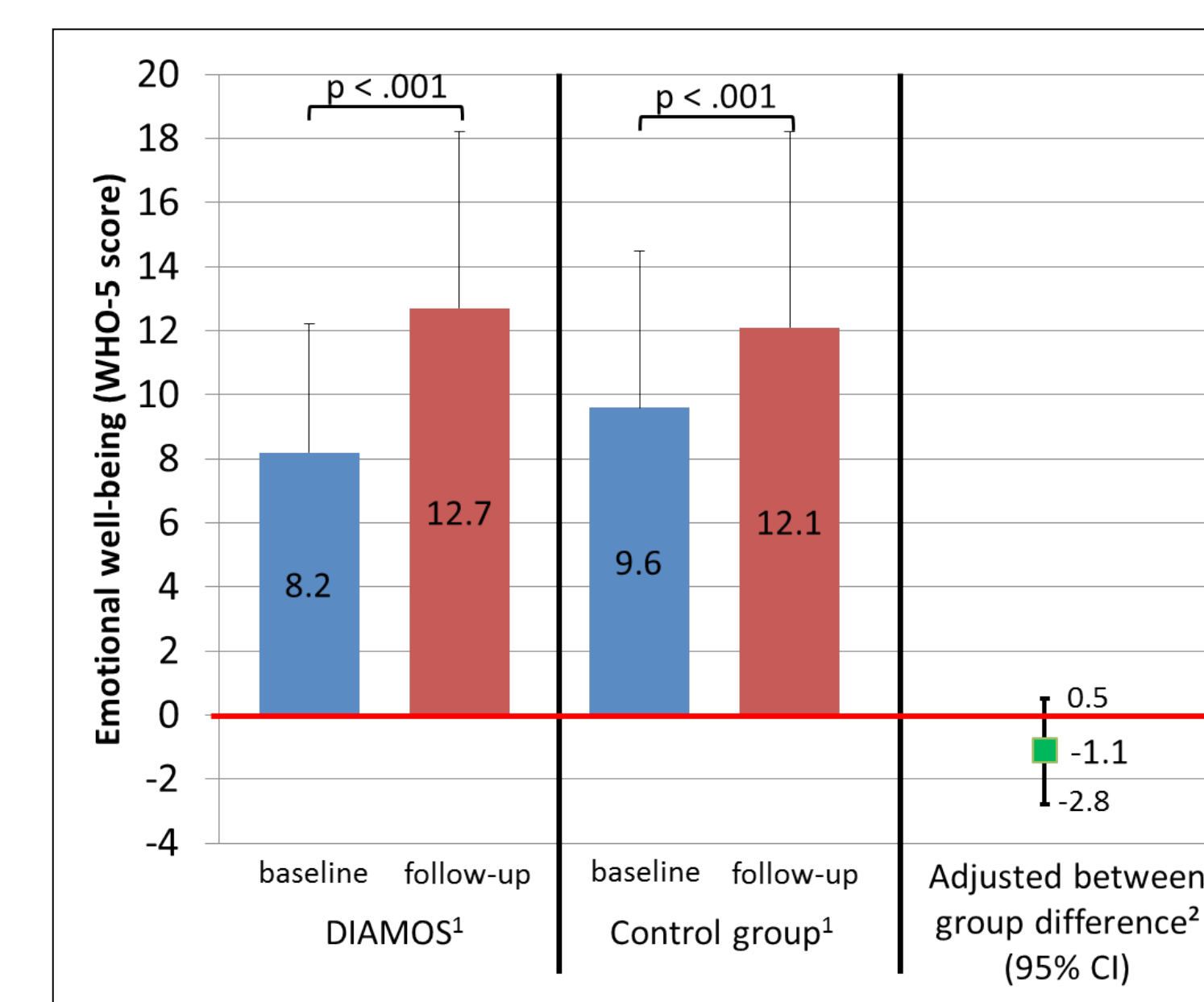


Fig. 6: Improvement of emotional well-being (WHO-5)

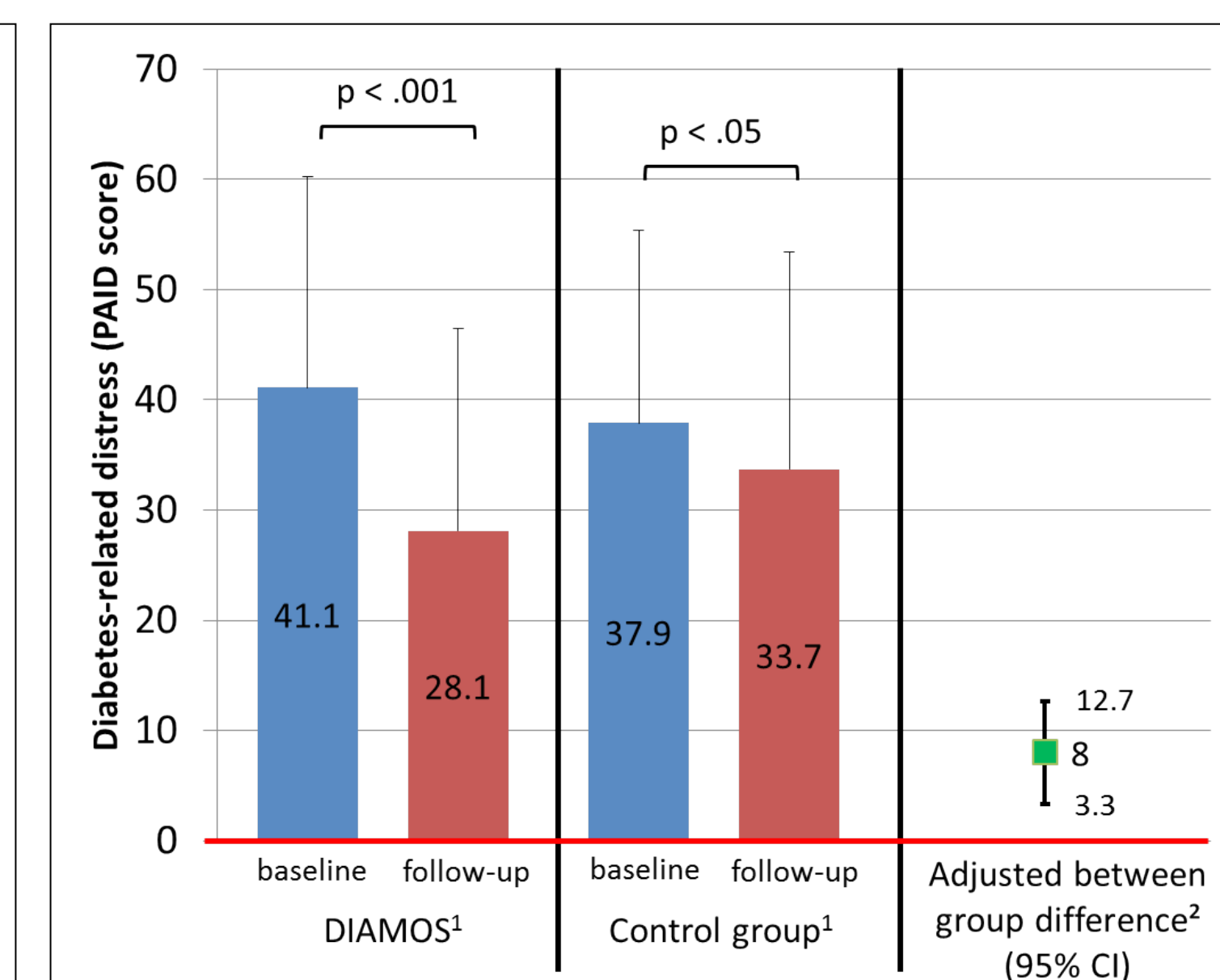


Fig. 5: Reduction of diabetes-related distress (PAID)

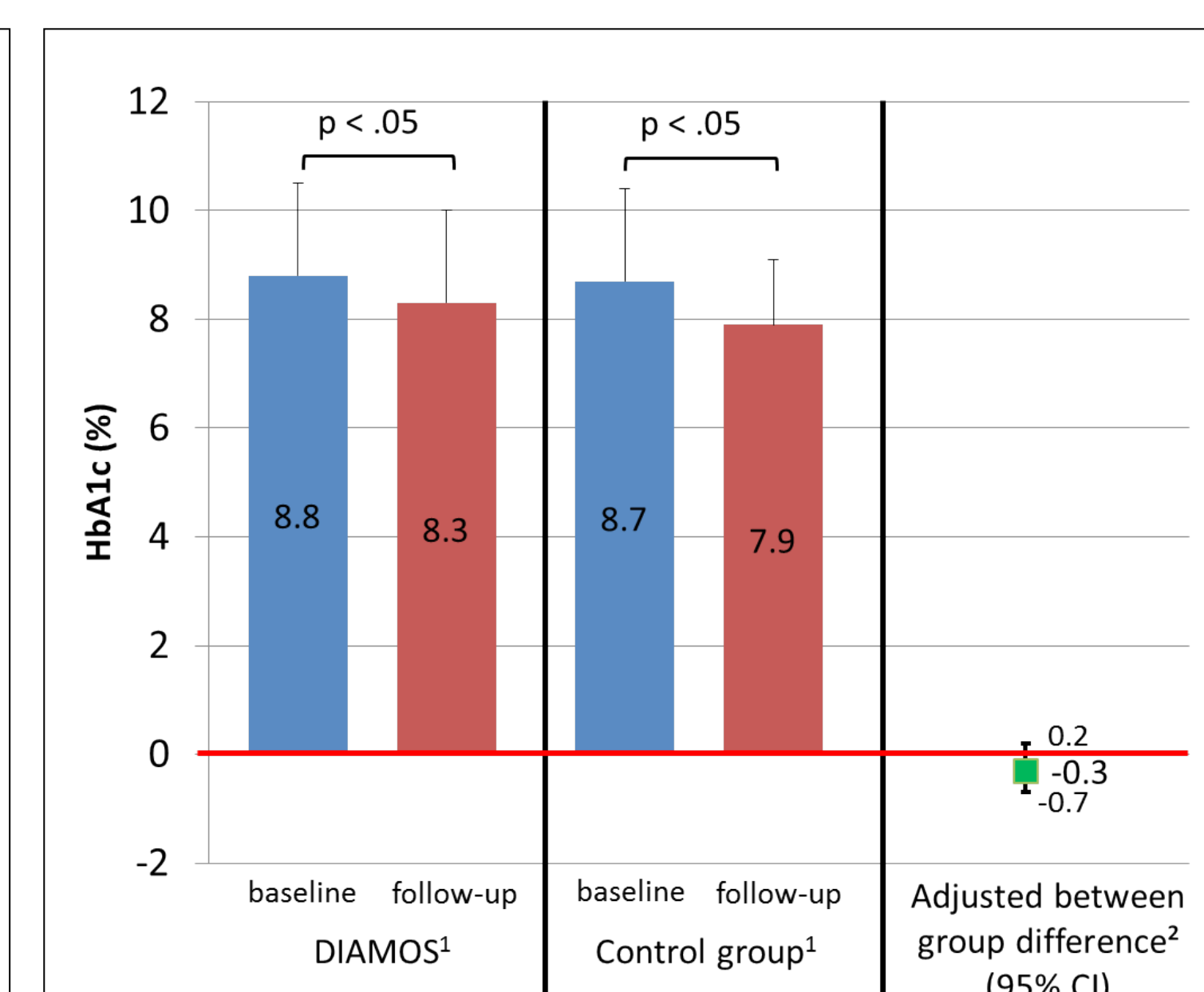


Fig. 7: Reduction of depressive symptoms (PHQ-9)

¹ mean ± standard deviation; ² Mean adjusted between group baseline-endpoint-change adjusted for BMI, diabetes type, and baseline values