Effects of a group-based counselling programme on diabetes-related stress, coping, psychological well-being and metabolic control in adults with type 1 or type 2 diabetes

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Abstract

This study was designed to determine whether participation in a group-based counselling programme would result in reduced diabetes-related stress, improved coping and psychological well-being as well as achieving glycaemic control closer to an acceptable level. Effects of the programme were evaluated implementing an experimental design with a sample comprising 63 Norwegian adults with both types of diabetes aged between 25 and 70. At the 6-month follow-up, results indicate that the group-based counselling programme tested in the present study has the potential to reduce diabetes-related stress and self-blame as well as to improve coping in adults with diabetes. Moreover, results suggest that the programme can help participants to achieve more acceptable HbA1c levels as well. The present study indicates that this group-based counselling programme is feasible in the sense of suggesting that cognitive restructuring and problem-solving approaches in groups may be useful in helping people adjust to diabetes.

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Keywords: Diabetes; Group-based counselling programme; Stress; Coping; Psychological well-being; HbA1c

1. Introduction

Considering the importance of psychosocial factors in the management of diabetes and the rapidly increasing number of adult patients with diabetes (mostly type 2), the development and clinical implementation of effective psychosocial interventions are important [1]. Such interventions could help patients improve their coping and psychological well-being as well as achieving glycaemic control closer to an acceptable level, thus reducing the risk of diabetes-related complications.

Research indicates that many patients perceive both type 1 and type 2 diabetes as problematic; particularly the demands of the daily treatment regimen and worries about the risk of developing long-term complications [2]. The literature also suggests that in chronic diseases such as diabetes, the resultant disruption in health is a continual source of stress, which, in addition to everyday stressors, must be managed if people with diabetes are to adjust properly to the disease [3]. Diabetes-related stress may in turn affect the patient’s ability for self-care, impacting on metabolic control and psychological well-being and thus leading the individual with diabetes into a vicious circle [4,5]. Previous research also demonstrates that impaired well-being with symptoms of depression and anxiety is a common and often debilitating reaction to diabetes [6–8].

Consequently, people with diabetes are continuously challenged to cope with multifaceted problems, and they may use different ways to cope with the stressing demands of the disease. Although people usually resort to a combination of problem- and emotion-focused coping in almost every stressful encounter [9], problem-focused coping may be particularly important for people with diabetes in order to achieve good metabolic control, and thus prevent diabetes-related problems such as hypoglycaemic episodes and long-term complications [10]. Results from a recent Norwegian study, however, demonstrate that many adults with diabetes do not take active steps in trying to cope with the demands of the disease [11].

Reviews so far indicate that psychosocial interventions in diabetes overall are moderately effective in improving both psychological well-being and metabolic outcomes [12–18]. However, the number of studies reviewed is limited, and they
often lack systematic, quantitative evaluation [12–18]. The interventions employed have primarily been designed to improve coping abilities of children and adolescents [15]. Yet, some studies have demonstrated beneficial effects in adults. These have primarily been described as coping-oriented group interventions with cognitive-behavioural elements aimed at helping patients to cope more effectively with diabetes [14]. Results have suggested improvements in self-efficacy, coping abilities, psychological well-being as well as glycaemic control. Controlled studies have demonstrated lasting improvements in the quality of life as well as glycaemic control [4]. These benefits can also be accomplished with minority and older type 2 patients.

Although it is suggested that the application of psychological approaches in chronic diseases such as diabetes shows promising results, there is still more work to be done in providing solid evidence that the application of psychological techniques to diabetes care improves coping skills, psychological well-being, and metabolic control [17,18]. More research is therefore needed to examine the contributions of such approaches in the care of adults with both types of diabetes.

Our approach in the present study was to develop a group-based counselling programme that would be responsive to the behavioural, cognitive and psychosocial needs of adults with both types of diabetes aged between 25 and 70 to deal with the significant demands of the disease. Since implementing diabetes management lies largely with the patient and the patient’s active role and responsibility. The purpose of this study is therefore to examine short-term (after 6 months) as well as long-term effects (after 12 months) of a group-based counselling programme. The main hypothesis states that participation in the programme will result in reduced diabetes-related stress, improved coping and psychological well-being as well as metabolic control (HbA1c) closer to an acceptable level in adults with type 1 or type 2 diabetes.

2. Methods

2.1. Subjects and recruitment

The subjects were recruited from a sample of 534 respondents included in a Norwegian survey on coping with diabetes [11]. Due to practical reasons, the intervention was carried out within a limited geographical area, and 227 of the 534 subjects lived in this area. This sub-sample was therefore restricted to subjects who reported having ample potential for improving active coping and for increasing their sense of control over diabetes self-management in the previous study. On the basis of the scores on the sub-scales assessing active coping and perceived control over diabetes self-management, these respondents reported that they seldom or never used more than two active coping styles, and that they experienced difficulties in controlling diabetes self-management. Based on these criteria, 131 adults with type 1 and type 2 diabetes aged between 25 and 70 were selected for the present study.

Of the 131 people who were invited by letter to participate, 92 (71%) volunteered to take part in the study by giving their written consent. The participants were distributed in one experimental/intervention group (n = 47) and one control group (n = 45) by a procedure of stratified randomisation. Of the 92 subjects, 76 (39 in the intervention group and 37 in the control group, respectively) actually entered the project and were pre-tested. Finally, 83% of those who were pre-tested completed the first phase of the study and were post-tested after 6 months: the intervention group receiving the group-based counselling programme (n = 31) and the control group (n = 32) defined as a waiting list group. This resulted in a total response rate of 48.1% of eligible patients who were asked to participate. In addition, those assigned to the intervention group completed a follow-up post-test after another 6 months. One person dropped out due to serious illness at the second post-test. Besides participating in the present study, the subjects in both groups continued with their routine consultations with healthcare professionals.

The majority of those who were not able to accomplish the intervention programme left at the very beginning of the programme, mainly of practical reasons such as being too busy, going through other life stresses at the present time as well as moving to another place. Those assigned to the control group dropped out immediately after the pre-test mainly of the same reasons as those leaving the intervention group.

2.2. Design

Table 1 illustrates the profile of the design used in the present study. The short-term effects of the group-based counselling programme were evaluated in an experimental design over a period of 6 months (post-test 1). The control group was kept on a “waiting list” arrangement; i.e. these subjects were promised participation in the intervention procedure at a later time. Due to ethical and practical considerations the subjects in the control group were offered the same programme as the original experimental group. This took place immediately after post-test 1. After 6 months the control group was thus changed into a new condition, becoming an intervention group, to receive a full 12-month study.

<table>
<thead>
<tr>
<th>Study design</th>
<th>Months</th>
<th>0</th>
<th>6</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intervention group</td>
<td>Pre-test</td>
<td>X1</td>
<td>Post-test1</td>
</tr>
<tr>
<td>Control group</td>
<td>Pre-test</td>
<td>Post-test1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

R: randomization; X1: six sessions between pre-test and post-test1 over a period of 6 months; X2: three additional sessions for the intervention group between post-test1 and post-test2 over another 6 months.
programme on the same footing as the original intervention group. Follow-up testing of the control group receiving the total group-based counselling programme is not reported in this paper. In order, to evaluate longer-term effects of the programme in the original intervention group, those assigned to this group also received a 12-month follow-up assessment (post-test2) after attending three additional group sessions.

A detailed description of the intervention programme as well as information regarding randomisation into two groups was presented to the subjects assigned to the intervention group at a meeting. The intervention group was pre-tested at the beginning of the first session in the group-based counselling programme, whereas those assigned to the control group were pre-tested at a separate orientation meeting. The participants in both groups were initially given the offer to test a new glucose meter. This was done to reduce possible errors due to effects of attention in the comparison between the intervention group and the control group.

The total programme consisted of nine sessions of one and a half hours each over a period of 12 months. Six group sessions were conducted within the first 6 months: the first four with a two-week interval, then after a 2-month break, another two successive sessions. This was followed by three additional group sessions, the seventh and eighth with a 2-month interval, and then after a 4-month break, the final session. The 6-month follow-up assessment (post-test1) took place at the beginning of the seventh session, whereas the 12-month follow-up assessment (post-test2) was held at the ninth session. Missing more than two sessions resulted in exclusion from the study. The Norwegian Medical Ethical Committee approved the study procedures.

2.3. The intervention

2.3.1. Objectives and content of the programme

The intervention programme based on the cognitive-behavioural therapy (CBT) approach incorporated effective components of cognitive therapy, social support enhancement and patient education supplemented with supportive counselling into a composite intervention package [19]. It was developed for this particular study through discussions with an expert panel consisting of healthcare personnel and people with diabetes (a total of 10 people). The cognitive-based approach, which had the assumption that behaviour and emotions are in constant interaction with cognitions, was central to the programme. These cognitions may be inaccurate, leading to excessive emotional reactions and a failure to cope effectively [14]. A central aspect of the programme was therefore to help the participants alter dysfunctional cognitions and behaviour by stimulating conscious reflection of how they think and behave in relation to their diabetes. This may in turn diminish diabetes-related stress and enhance active coping and psychological well-being as well as metabolic control. In order to meet these aspects we applied a group-based counselling process involving the problem-solving approach, which is cognitive. The advantages of adapting this approach to a group setting are the motivating effects of group discussion, the sharing of ideas and experiences, moulding, social support and social reinforcement [20].

Initial group sessions emphasized the introduction to the programme, to the counselling process and to each other. Specialist nurses in diabetes care provided a short informational presentation on every topic in the beginning of each session. In addition, results from the previous Norwegian national study on coping with diabetes were used as input to some of the sessions [7,11,21]. The most practical and easy topics to be discussed were placed early in the programme, followed by more difficult and personal topics later on.

As a main goal was to help the participants to cope more actively with diabetes, the content of the programme focused on stress and coping—various sources of diabetes-related stress and ways to cope with this stress. Table 2 summarizes the objectives and content of the group-based counselling programme.

<table>
<thead>
<tr>
<th>Table 2</th>
<th>The group-based counselling programme for adults with diabetes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives</strong></td>
<td>The counselling process focuses on the patient’s active role and responsibility and aims at stimulating</td>
</tr>
<tr>
<td></td>
<td>Conscious reflection</td>
</tr>
<tr>
<td></td>
<td>Cognitive restructuring</td>
</tr>
<tr>
<td></td>
<td>Problem-solving skills</td>
</tr>
<tr>
<td></td>
<td>Skills in decision making</td>
</tr>
<tr>
<td><strong>Content</strong></td>
<td>Through group discussions and demonstrations focusing on</td>
</tr>
<tr>
<td></td>
<td>Reduced stress</td>
</tr>
<tr>
<td></td>
<td>More active coping</td>
</tr>
<tr>
<td></td>
<td>Enhanced psychological well-being</td>
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<tr>
<td></td>
<td>More optimal metabolic control</td>
</tr>
<tr>
<td><strong>Session</strong></td>
<td>Main topics covered in each programme session</td>
</tr>
<tr>
<td>1</td>
<td>Introduction</td>
</tr>
<tr>
<td>2</td>
<td>Self-monitoring of blood glucose</td>
</tr>
<tr>
<td>3</td>
<td>Stress, coping and self-care behaviour</td>
</tr>
<tr>
<td>4</td>
<td>Focus on coping profiles and strategies for being more active in seeking diabetes-related knowledge</td>
</tr>
<tr>
<td>5</td>
<td>Relationships with health care professionals (2 months break)</td>
</tr>
<tr>
<td>6</td>
<td>Relationships with family, friends and colleagues</td>
</tr>
<tr>
<td>7</td>
<td>Stress management techniques</td>
</tr>
<tr>
<td>8</td>
<td>Formulating goals</td>
</tr>
<tr>
<td>9</td>
<td>Dietary and exercise self-care behaviour (2 months break)</td>
</tr>
<tr>
<td>10</td>
<td>Goal attainment—relapse prevention (4 months break)</td>
</tr>
<tr>
<td>11</td>
<td>Worrying about future complications</td>
</tr>
<tr>
<td>12</td>
<td>Conclusions (summing up) focusing on where to go now</td>
</tr>
</tbody>
</table>

The participants in the intervention group were allocated to five separate subgroups; three with type 1 and two with type 2 participants. The subgroups met at different days of the week. The intervention programme was offered free of charge, and all sessions were given in the evenings.

The social setting of the counselling process, in which a nurse and an experienced person with diabetes as well as the other group participants with diabetes served as facilitators, was arranged to enhance reflection and thereby change the interpretation of living with diabetes. It emphasized questions and group discussions that encouraged the group members to think for themselves, formulate deductions and elaborations and suggest solutions. It relied heavily upon the participants’ ability to identify their own diabetes-related problems and to actively seek out ways of solving the problems through group discussions.

Except for the first and the last sessions, all the sessions had two participants who presented a perceived diabetes-related problem or challenge each had prepared at home for discussion. The consultant (the person seeking guidance) was the active part, and as much as possible in control of the counselling process. The problems were mainly related to the different issues in the intervention programme. The main task and responsibility of the group leaders were to help the consultant to reflect upon thoughts, feelings and actions about the problem and further, to make sure that the person himself/herself made decisions about goals and changes in behaviour. They were not there to criticize or give any “right” answer. This was done in close cooperation with the co-leaders as well as the other group members by using techniques such as asking questions, modelling, supporting and giving positive feedback. Meetings were always followed by a short sequence of discussing and sharing the progress made by the consultant from the previous session.

### 2.4 Instruments

In order to examine intervention effectiveness, diabetes-related stress, coping styles and psychological well-being as well as metabolic control were measured three times at the intervention site with a pre-test, post-test and post-test 2. As well as metabolic control were measured three times at the intervention site with a pre-test, post-test and post-test 2.

#### 2.4.1 Perceived diabetes-related stress

In the present study, diabetes-related stress refers to a person–environment relationship in which perceived diabetes-related demands tax or exceed perceived coping resources [9]. Such stress was assessed by eight items based on the 20-item Problem Areas in Diabetes Survey (PAID) developed by Polonsky et al. [23]. The PAID assesses a wide range of feelings related to living with diabetes and its regimen. The scale has proved to be a useful measure to assess diabetes-related stress in IDDM as well as in NIDDM patients and to detect differences in stress between the two types. In addition, the PAID has shown satisfactory reliability and validity [23,24]. Recent research has provided strong support for the sensitivity of the PAID to change as well [25]. Results from a pilot study conducted in connection with our previous research on coping using the current scale showed high internal consistency (Cronbach’s alpha of 0.92). The dimensionality of responses to items in the PAID was explored by explorative factor analysis, yielding a one-factor solution. The seven items yielding the highest factor loadings were then selected from the PAID. The following items were included: (1) feeling guilty or anxious when you get off track with your diabetes regimen; (2) feeling scared when you think about living with diabetes; (3) feeling depressed when you think about living with diabetes; (4) feeling constantly concerned about food; (5) feeling constantly burned-out by the constant effort to manage diabetes; (6) feeling overwhelmed by your diabetes regimen; and (7) feeling alone with my diabetes. Two additional items “dissatisfied or worried because of blood glucose level” and “feeling that your diabetes is making daily practical problems” were developed for this particular study. These items are considered relevant when assessing diabetes-related stress. On a four-point Likert scale ranging (slightly modified from the original PAID) from “never” to “all the time”, the respondents rate to which degree each of the items may have distressed them during the past month. The higher the scores, the greater the emotional distress. The nine items yielded a one-factor solution in a factor analysis conducted at baseline, implementing principal axis factor, oblique rotation and an eigenvalue of 1.0. At baseline, the scale had a Cronbach’s alpha of 0.90 in the present study.

#### 2.4.2 Diabetes-related coping styles

In the present study, coping styles refer to habitual coping when dealing with diabetes-related strains and will, therefore, be understood as diabetes-related coping styles [11]. Such coping styles were assessed by a scale developed by Karlsen and Bru [11] on the basis of subscales from the Diabetes Coping Measure [24,26], the COPE scale [27], and the Ways of Coping Questionnaire [28] as well as a subscale developed for our project assessing knowledge-seeking. The new scale was developed to cover different coping styles relevant for the management of diabetes and includes seven subscales. However, confirmatory factor analyses presented by Karlsen et al. [21] indicated that the original subscales could be combined into three: (1) problem-focused coping (including seeking social support, seeking knowledge and planning); (2) emotion-focused coping (including...
integration, denial/mental disengagement and resignation); and (3) self-blame. The latter three subscales will be used in the present study. Cronbach’s alphas for the three subscales assessing diabetes-related coping were in the present study 0.91, 0.77 and 0.81, respectively. Higher scores on problem-focused coping indicate frequent use of such coping (e.g. more seeking support, more seeking knowledge and planning), whereas higher scores on emotion-focused coping indicate frequent use of this type of coping (e.g. little integration, more disengagement and resignation).

2.4.3. Psychological well-being

Psychological well-being defined in the present study as general mood or affect, including both negative (depressive moods and symptoms of anxiety) and positive well-being [7], was assessed by the combination of three different scales, and the items implement the original response alternatives for these scales. (A) Symptoms of depression were measured by using the 10-question Short Zung Symptoms of Depression Rating Scale (Short Zung) [29]. This scale has proved to be a useful brief screening test for depression [29]. (B) Symptoms of anxiety were assessed by four items from the symptoms of the anxiety subscale of the Hopkins Symptom Checklist (HSCL) [30]: (1) feeling tense or keyed up; (2) suddenly scared for no reason; (3) feeling fearful; and (4) nervousness or shakiness inside. (C) The WHO (Ten) Well-Being Index (WHO-Ten) adapted by Beck et al. [31] was used to assess general well-being. Previous research has reported some evidence that the WHO-Ten constitutes a valid index of general well-being with respect to internal and external validity [31,32]. Further documentation of these three scales is given in Karlsen et al. [7]. Note that the negatively worded scores of symptoms of depression and symptoms of anxiety were reversed before inclusion in the psychological well-being index. The overall measure of psychological well-being had a scoring range from 1 to 4 and yielded a Cronbach’s alpha of 0.94. The higher the scores, the better the psychological well-being.

2.4.4. Metabolic control

Metabolic control was measured using HbA1c values. One trained nurse at the intervention site performed the analyses of HbA1c using the Bayer DCA 2000 (Bayer Corporation, Tarrytown, USA) (normal range = 4.0–6.3%). HbA1c reflects the glycosylation of the haemoglobin molecule, and in patients with diabetes it is used to assess overall metabolic control over the preceding 4–8 weeks [33]. From a medical point of view, it is agreed that HbA1c < 7% is to be regarded as optimal, 7–8% acceptable, and >8% as sub-optimal to poor. In the present study, the focus was to achieve a good metabolic control to reach as close as possible an acceptable level of 7.5 and 8%.

2.4.5. Retrospective evaluation

The group-based counselling programme was evaluated by means of evaluation forms at the end of the eighth session. A scale including nine items was implemented to assess this evaluation. The scale was developed for this particular study and focuses on the perceived effect of participation in the group-based programme. The respondents rate the degree to which they agree to items, such as “the programme has made me more motivated”, “the programme has made me more optimistic”, and “the programme has given me more faith in living well with diabetes” on a four-point format ranging from “agree strongly” to “disagree strongly”.

2.4.6. Demographic and clinical variables

In addition to collecting information about gender, age, diabetes type, treatment regimen, level of education and complications, the respondents were asked to indicate other diseases affecting health unrelated to diabetes (co-morbidity) as well as whether they lived alone.

2.5. Statistical analysis

The analyses were conducted using the SPSS programme [34]. Statistical analyses included descriptive analyses, reliability testing, and a mixed design ANOVA (repeated measures analysis) conducted by the GLM-procedure in SPSS. This procedure allows a mixture of between-group and repeated measures variables, and thereby tests the significance of within- and between-group differences simultaneously, providing both multivariate as well as univariate tests. This mixed design ANOVA technique was employed to examine the effectiveness of the group-based counselling programme, covarying the effects of the pre-test score for HbA1c to adjust results for the significant pre-test difference for this measure. Bonferroni adjustments for multiple tests are carried out.

Pre-test scores for psychological well-being showed marked deviation from the normal distribution (skewness = −0.87, kurtosis = 1.65). All scores for psychological well-being were therefore transformed by log 10-function. After transformations, skewness and kurtosis for the variables assessing psychological well-being in the three time points ranged from −0.49 to −0.16 and −0.38 to −0.09, respectively.

3. Results

Table 3 summarizes the demographic and clinical characteristics of the participants in the experimental group and the control group. No significant differences between conditions in these variables were detected. A multivariate GLM gave no overall significance for differences in pre-test, indicating that the outcome of the randomisation was successful. Yet, the univariate tests showed a significant difference between the two groups on the HbA1c measure (P = 0.045). The effects of the pre-test score for HbA1c were thereby covaried to adjust the results. In addition, scores for type of diabetes
were included as covariate in the repeated measures GLM presented below.

3.1. Evaluation of the intervention programme

According to the results of the nine-item questionnaire on the retrospective evaluation of the effects of the intervention programme, the majority of the participants claimed that the programme had positive effects.

Table 4 shows that 84% of the participants agreed strongly or a little to being more motivated to regulate diabetes. The same tendency was found for the items on having more faith in self-control (77%) as well as in living well with diabetes (91%) and in being generally more optimistic (77%). Furthermore, the majority claimed that they have got more knowledge (84%), more understanding of how to seek support (80%), and finally, 65% reported that they agreed strongly or a little to being more active after participating in the intervention programme. On the other hand, very few reported that they have become more pessimistic or worried (6 and 13%, respectively).

3.2. Changes after 6 months

Table 5 presents the mean and standard deviations for the dependent variables in the intervention group and the control group.

Table 6 portrays multivariate and univariate tests for the dependent variables included in the GLM-repeated measures analyses. As seen in this table, there is no significant multivariate change from pre-test to post-test1 for the group as a whole (F = 1.246, d.f. = 7/53, P = 0.295). However, there is a pre-post1 change that is significantly different for the intervention group and the control group (F = 4.158, d.f. = 7/53, P = 0.001). These analyses justify inspecting the univariate tests for the dependent variables causing the significant change.

Analyses with the pre-test score for HbA1c as covariate yielded significant differences between the intervention and the control group for pre–post1 changes in scores on “diabetes-related stress” (F = 5.296, d.f. = 1/59, P = 0.025), and “self-blame” (F = 5.401, d.f. = 1/59, P = 0.024), revealing effects in these variables in favour of the intervention group. Moreover the analysis indicated a marginal significant effect in favour of the intervention group for the deviation from the acceptable level of HbA1c of 7.5 (F = 3.284, d.f. = 1/59, P = 0.075). When the acceptable level of HbA1c was set to 8, effects in favour of the intervention group became significant (F = 5.575, d.f. = 1/59, P = 0.022).

The level of coping efforts is likely to be related to the level of perceived stress in the way that coping efforts will...
Table 5
Mean scores with standard deviations (S.D.) for variables assessing diabetes-related stress, coping, psychological well-being as well as HbA1c values in the intervention group (pre–post1 \( n = 31 \); post1–post2 \( n = 30 \)) and the control group (pre–post1 \( n = 32 \)).

<table>
<thead>
<tr>
<th></th>
<th>Intervention group: mean (S.D.)</th>
<th>Control group: mean (S.D.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-test</td>
<td>Post-test1</td>
</tr>
<tr>
<td>Diabetes-related stress (^a)</td>
<td>2.22 (0.64)</td>
<td>2.01 (0.54)</td>
</tr>
<tr>
<td>Problem-focused coping (^a)</td>
<td>2.51 (0.50)</td>
<td>2.69 (0.51)</td>
</tr>
<tr>
<td>Emotion-focused coping (^a)</td>
<td>3.11 (0.46)</td>
<td>3.11 (0.45)</td>
</tr>
<tr>
<td>Self-blame (^a)</td>
<td>2.34 (0.90)</td>
<td>2.11 (0.74)</td>
</tr>
<tr>
<td>Psychological well-being (^a)</td>
<td>3.05 (0.40)</td>
<td>3.19 (0.50)</td>
</tr>
<tr>
<td>HbA1c</td>
<td>7.88 (1.16)</td>
<td>7.99 (1.04)</td>
</tr>
<tr>
<td>Mean deviation from HbA1c levels of 7.5%</td>
<td>0.77 (0.95)</td>
<td>0.80 (0.82)</td>
</tr>
</tbody>
</table>

\(^a\) Scoring range 1–4.

Table 6
Results from the repeated measures GLM: changes from pre-test to post-test1.

<table>
<thead>
<tr>
<th></th>
<th>Time (pre-test to post-test1)</th>
<th>Time (pre-test to post-test2) × condition (treatment vs. control)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( F )-value</td>
<td>( P )-value</td>
</tr>
<tr>
<td>Multivariate tests</td>
<td>7/53</td>
<td>1.246</td>
</tr>
<tr>
<td>Univariate tests</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes-related stress</td>
<td>1/59</td>
<td>0.347</td>
</tr>
<tr>
<td>Problem-focused coping</td>
<td>1/59</td>
<td>0.032</td>
</tr>
<tr>
<td>Emotion-focused coping</td>
<td>1/59</td>
<td>0.016</td>
</tr>
<tr>
<td>Self-blame</td>
<td>1/59</td>
<td>2.272</td>
</tr>
<tr>
<td>Psychological well-being</td>
<td>1/59</td>
<td>0.238</td>
</tr>
<tr>
<td>HbA1c</td>
<td>1/59</td>
<td>3.753</td>
</tr>
<tr>
<td>Mean deviation from HbA1c levels of 7.5%</td>
<td>1/59</td>
<td>6.430</td>
</tr>
</tbody>
</table>

Note that pre-test scores for HbA1c and scores for type of diabetes were included as covariates in the repeated measures analyses.

4. Discussion and conclusion

The main purpose of the present study was to evaluate effects of the programme on diabetes-related stress, coping, and psychological well-being as well as on metabolic control. Multivariate analyses showed overall beneficial effects of the intervention study. These effects are due to significant univariate changes for some of the variables as well as a general positive effect for the intervention group compared with the control group. The following, details of the results from the univariate analyses and the retrospective evaluation of the intervention programme will be discussed.

4.1. Diabetes-related stress and coping

The participants’ retrospective evaluation of the counselling programme indicates that the majority of the participants think that the counselling programme has made them more optimistic in general and given them more faith in their ability to respond adequately to the demands of living with diabetes. These results were in accordance with the pre–post1 comparison for diabetes-related stress, indicating a significant reduction in perceived stress for the intervention group. This finding is consistent with previous research. Anderson et al. [35] demonstrated in their randomised controlled study significant improvements in stress management after a six-session empowerment programme. Moreover, the improvements on diabetes-related stress detected within the intervention group were maintained at the 12-month follow-up.

Furthermore, the retrospective evaluation suggests that a majority of the participants have become more active and motivated in relation to regulating their diabetes. This
received stress were entered as covariates, pre–post1 comparisons when changes in perceived diabetes-related stress was not controlled for. However, the level of coping efforts is likely to be related to the level of perceived stress in the way that coping efforts will be reduced when the level of stress is reduced. It is therefore relevant to control for changes in the level of perceived stress when analysing changes in coping efforts. When scores for changes in perceived stress were entered as covariates, pre–post1 comparisons showed significant differences for problem-focused and emotion-focused coping in favour of the intervention group. This may indicate that the participants in the counselling programme had adopted a more active and systematic approach to diabetes-related challenges.

4.2. Psychological well-being

Pre–post comparisons suggest that the counselling programme has resulted in participants being less self-blaming regarding their management of diabetes. This decrease in self-blame was maintained at the 12-month follow-up as well. The tendency to self-blame may be a problem for people with diabetes when taking the responsibility for the management of their disease. To our knowledge, few studies have focused on self-blaming, and the present results are therefore encouraging.

Moreover, results from the retrospective evaluation indicate that a clear majority of the participants have become more optimistic in relation to their diabetes. Although self-blaming is regarded to predict poor psychological well-being [36] and optimism is found to be closely related to psychological well-being [37], the pre–post1 comparisons for the indicator of psychological well-being in the present study suggest no improvements as a result of the intervention programme. The findings concerning the effects of the programme on psychological well-being are therefore not conclusive, and the possible effects of the programme upon psychological well-being should be investigated in further research.

4.3. Metabolic control

Pre–post comparisons for HbA1c levels showed no reduction in the mean HbA1c levels for the intervention group. However, with an average HbA1c of 7.88% in the intervention group at the pre-test, there is likely to be little room for improvement. Moreover, bringing HbA1c levels to the lowest possible ones was not the objective for the intervention programme. Low levels of HbA1c may imply demanding management regimens that may restrict the possibility of people with diabetes to live a normal life. In addition, low HbA1c levels increase the risk of hypoglycaemia that may have serious negative consequences. Very low levels of HbA1c may therefore be incompatible with a good quality of life [38]. Furthermore, reductions in HbA1c from levels below 8% are likely to give fewer gains in terms of a decrease in the risk of developing diabetes-related complications than reductions from higher levels of HbA1c [39]. The aim of the intervention was therefore to help the participants to achieve a more acceptable level of HbA1c. In this project, HbA1c levels between 7.5 and 8% have been regarded as acceptable levels.

Results indicate that the intervention may be effective in helping people with diabetes to achieve more acceptable HbA1c levels. Comparison with the control group indicates that the participants in the intervention group have been more able to maintain acceptable HbA1c levels. The period between the pre-test and the post-test1 was from early September to February/March. During this period the climate in Norway becomes considerably harsher and less inviting to outdoor activities. For some people this may lead to reduction in physical activity and thus cause higher HbA1c levels. Moreover, diets may also change from light diets on warm summer days to more enriched diets for cold winter days and for Christmas celebrations. Such seasonal changes in diets and conditions for physical activities in the wintertime may affect HbA1c levels negatively among people who are not persistent enough in their diabetes management or do not know how to compensate for less physical activity and higher carbohydrate intake by adjusting their insulin doses. Such mechanisms could explain the increase in deviations from acceptable HbA1c levels seen in the control group. On the other hand, the absence of such increase in the intervention group may imply that subjects who are vulnerable to seasonal changes in HbA1c could have developed skills and motivation to manage the demands of the diabetes regimen better, when external conditions easily lead to inactivity and unhealthy diets. However, further research is needed to more thoroughly study the effects on metabolic control.

4.4. Methodological issues

Particularly with the indicator of psychological well-being, there was a tendency for the retrospective indicators to imply stronger effects of the intervention programme than the pre–post1 comparisons. The participants may have established a kind of relationship with the project leaders during the intervention period, which in turn may have influenced them to respond too positively during the retrospective evaluation. On the other hand, the instruments used for the pre–post1 comparisons may not have been sensitive enough to catch change. This is an issue that requires further research.

Some potential threats to the internal validity of our study have to be mentioned. We cannot rule out the possibility that effects may be due to participants being exposed to increased attention ("Hawthorne" effect). However, it should be noted that the control group were also given attention in an orientation meeting by the distribution of a new blood glucose meter as well as by diabetes-related conversations with a nurse when measuring HbA1c levels.
These procedures may have reduced possible errors due to effects of attention in the comparisons between the intervention group and the control group [40].

A relatively large percentage of those who were invited to participate in the intervention project chose not to do this. Results should therefore only be generalized to people with diabetes who are motivated to participate in this type of counselling programmes. Moreover, there was some deflection after randomising the subjects to the intervention group and the control group. This may have affected the internal validity of the study. However, the comparison of the intervention group and the control group at the pre-test indicated that the two groups were relatively similar on the variables included in the study except for a significant difference in HbA1c values. The pre-test score for HbA1c was therefore included as covariate in the GLM to control for possible differences between groups at the pre-test. Defection after randomisation was mainly related to practical reasons such as being too busy, going through other life stresses at the present time and moving to another place. It is therefore not likely that differences between the intervention group and the control group are due to differences in (self) selection into the two groups.

In the present study we intended to recruit subjects who had ample potential for improving active coping. However, when comparing the mean values of pre-test data with the mean values of data from our previous survey on indicators of psychological well-being and coping [7,11], the present sample only had more negative scores than the survey sample to a certain degree. This may reflect the fact that the present sample only comprises subjects with moderate potential for improvement and not those with an ample potential. Relatively low HbA1c levels also suggest this moderate potential for improvement. This fact may have reduced the possibility to achieve and document strong effects from the present intervention.

The present sample size and the relatively wide time span between the different programme sessions might influence the possibility of a full examination of the effects of the programme. Also, a larger sample size might be conducive to an extensive exploration of the extent to which type of diabetes the intervention is most effective.

4.5. Practice implications

The results indicate that the group-based counselling programme tested in the present study has a potential for reducing diabetes-related stress and self-blame as well as improving coping in adults with diabetes. In addition, the results suggest that the programme can help participants to achieve metabolic control closer to the acceptable level. Based on these results we can conclude that the group-based counselling programme is feasible in the sense of suggesting modifications of the intervention programme that may make the approach even more effective and helpful for people with diabetes. Such modification could include a greater focus on behavioural components, which may be especially effective in altering coping behaviour for people with diabetes [14].

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