The relationship between clinical indicators, coping styles, perceived support and diabetes-related distress among adults with type 2 diabetes

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Abstract

Aim: This article is a report of a cross-sectional study examining the degree to which clinical indicators, coping styles and perceived support from healthcare professionals and family are related to diabetes-related distress.

Background: Many people with type 2 diabetes experience high levels of distress stemming from concerns and worries associated with their disease. Diabetes-related distress has predominantly been studied in relation to diabetes management and metabolic control, and to some extent in relation to coping styles and perceived social support. To date, little is known about the relative contribution of clinical indicators, coping styles and perceptions of social support to perceived distress among people with type 2 diabetes.

Methods: A sample comprising 425 Norwegian adults, aged 30–70, with type 2 diabetes, completed questionnaires assessing coping styles, perceived social support from health professionals and family and diabetes-related distress assessed by the Problem Areas in Diabetes Scale. Demographical and clinical data were collected by self-report. Data were collected in October 2008.

Findings: Results from the regression analyses showed a greater variance in emotional distress accounted for by coping styles (21.3%) and perceived support (19.7%) than by clinical indicators (5.8%).

Conclusion: Findings may indicate that healthcare providers should pay more attention to non-clinical factors such as coping styles and social support, when addressing diabetes-related distress. They should also be aware that interventions based on psychosocial approaches may primarily influence distress, and not necessarily metabolic control.

Keywords: clinical indicators, diabetes-related distress, healthcare providers, social support, type 2 diabetes

Introduction

Living with type 2 diabetes has been described as a difficult process. Type 2 diabetes requires long-term adherence to a complex diet, physical activity, medication and blood glucose monitoring. To live well with the disease, people need to integrate the demanding self-care activities into their daily lifestyle and learn to cope with the potential for complications. In the face of this complex and often demanding set of self-care directives, many people with type 2 diabetes may become emotionally overwhelmed, frustrated and discouraged (Polonsky *et al.* 2005). In this study, diabetes-related distress is understood as this kind of emotional reaction when dealing with the demands of the disease. Diabetes-related distress is found to be closely linked to reduced well-being, and to mental health problems such as anxiety and depression among people with type 2 diabetes (Fisher *et al.* 2010, Papelbaum *et al.* 2010). Moreover, such problems are more prevalent among people with type 2 diabetes than in the general population (de Groot *et al.* 2010). It is therefore important to understand to what extent essential clinical indicators of diabetes regulation [glycosylated haemoglobin (HbA1c), diabetes treatment, diabetes-related complications, disease duration and body mass index (BMI)], coping styles and perceptions of social support contribute to perceived distress among people with type 2 diabetes.

Background

Poor glycemic control has been found to be modest, but significantly related to diabetes-related distress (Polonsky *et al.* 1995, Welch *et al.* 1997). Moreover, a previous study revealed that people with type 2 diabetes treated with insulin reported higher diabetes-related distress than oral or diet treated people (Delahanty *et al.* 2007). Poor glycemic control and more intensive treatment could signal to the person with diabetes that their condition is deteriorating. Earlier research has also demonstrated that many people with type 2 diabetes experience high levels of emotional distress stemming from concerns and worries associated with their diabetes, its management and the experience of more complications (Fisher *et al.* 2009, 2008, 2007). According to previous studies, living with type 2 diabetes over a long period may increase psychological distress (Yang *et al.* 2009). However, such relationships have also been found to be absent (Fisher *et al.* 2001). Moreover, it could be suggested that worries about increased BMI may be a source of higher levels of distress. Consequently, poor glycemic control, more intensive diabetes treatment, long disease duration, high number of diabetes-related complications and increased BMI are all important indicators of diabetes-related strains that may influence the level of distress among adults with type 2 diabetes. Accordingly, they are included in the present study. The research literature has extensively proposed that coping, based on stable personality factors or disposition, are involved directly in the production and maintenance of various kinds of adjustment and maladjustment (Hewitt & Flett 1996). Dispositions or coping styles characterize individuals' habitual interactions with their environment and the emotional, cognitive and behavioural coping responses or skills individuals employ to manage specific stressful encounters (Moos *et al.* 2003). A number of studies indicate that individuals do have consistent coping preferences or dispositions that are employed across a wide range of situations (Carver *et al.* 1989, Costa *et al.* 1996, Hewitt & Flett 1996). In our study, 'coping styles' refer to this kind of habitual coping when dealing with demands in general.

According to Lazarus and Folkman (1984), people usually resort to a combination of problem-focused and emotion-focused coping in stressful encounters. Problem-focused coping concentrates on dealing with the stressor itself, whereas emotion-focused coping tries to deal with the emotional response to a stressor (Bouchard *et al.* 2004). There is, however, no clear consensus as to which coping styles are most effective in terms of resolving problems or preventing future difficulties (Folkman & Moskowitz 2004). Lazarus (1991) asserts a close connection between the choice of coping strategies and the emotional experience. He suggests that self-blaming and avoidant strategies, such as behavioural disengagement, are related to negative emotions, whereas more approach oriented strategies and seeking social support are associated with positive emotions. Research has also shown that emotion-oriented and avoidant coping may, in the long run, be less adaptive than problem-focused coping, although the impact of these coping styles appears to depend on the specific constraints imposed by the stressful situation (de Ridder & Schreurs 2001). Research has suggested that problem-focused coping (such as problem-solving, planning and seeking social support) may be particularly important for adjusting positively to diabetes (Cox & Gonder-Frederick 1992). In contrast, as shown in an earlier study by Karlsen *et al.* (2004), emotion-focused styles, avoidant coping and self-blaming predict impaired well-being and increased emotional distress among people with type 1 and type 2 diabetes.

There is widespread consensus that social support is positively associated with health-related well-being (Kosciulek 2007). Social support refers to the nature of interactions occurring in social relationships and how the person evaluates these interactions in terms of their supportiveness (Lazarus & Folkman 1984). In the context of this article, social support will be understood to include perceived support. As type 2 diabetes is a lifelong chronic disease involving frequent consultations with healthcare providers (HCPs), the healthcare service may be one support system that could influence the well-being of people with type 2 diabetes. Earlier research has suggested that professional support may be a powerful factor influencing the way the individual both adapts to and manages the disease (Thorne & Paterson 2001). However, Thorne and Paterson (2001) have also described how HCPs who did not believe them capable of managing their own disease often caused the individual with diabetes to be confused or discouraged in their self-management. This suggests that relationships with healthcare providers are not necessarily supportive and can become a stressor themselves.

Support from family has been recognized as vital for adults with type 2 diabetes, because it enhances the patient's physical and emotional functioning (Taylor 2006). In this study, family support will be understood to include perceived support from close relatives or others living with the person with type 2 diabetes. The family may provide assistance with the day-to-day management of diabetes and encouragement and support in decision-making (Ford *et al.* 1998). However, family relationships are not necessarily supportive. Non-supportive family behaviour such as nagging and criticism can reduce people's perceptions of autonomy, which in turn could make them less motivated to cope with the problems induced by the disease, resulting in increased emotional distress (Deci *et al.* 1991). Although social support may be constructive or non-constructive (Stewart 2000), most research to date has assumed that social support is only constructive. It may therefore be important to focus on the influence of both types of behaviours from professionals and family on diabetes-related distress. Our study distinguishes between behaviours that are perceived to be supportive or non-supportive.

Diabetes-related distress has predominantly been studied in relation to diabetes management and metabolic control, and to some extent in relation to coping styles and perceived social support (Lloyd *et al.* 2005, Polonsky *et al.* 1995, Snoek *et al.* 2000, Welch *et al.* 1997). To date, we have been unable to find any research that compares the relative contribution of (i) essential clinical indicators of diabetes regulation as listed in the introduction, (ii) coping styles and (iii) perceived social support to the variation in diabetes-related distress among adults with type 2 diabetes. This study is therefore a novel contribution to what extent each of these factors accounts for such distress.

The study

Aim

One aim of this study was to describe diabetes-related distress, coping styles and perceptions of social support among adults with type 2 diabetes. The main aim was to investigate the extent to which (i) clinical indicators such as HbA1c, diabetes treatment, diabetes-related complications, disease duration and BMI, (ii) coping styles and (iii) perceived support from healthcare professionals and family are related to diabetes-related distress.

Design

The study has a cross-sectional design and was conducted as the first step in a Norwegian longitudinal, prospective survey about factors in diabetes-related distress in type 2 diabetes.

Participants

A total of 689 adults with type 2 diabetes were invited to participate in the study. Inclusion criteria included people aged between 30 and 70, diagnosed with type 2 diabetes, who were willing to and able to complete a questionnaire written in Norwegian. The participants were recruited by nominators who determined if people met the inclusion criteria for the study. The nominators included seven general practitioners (GPs) in the south western part of Norway and staff of the Norwegian Diabetes Association. The researchers requested that the Norwegian Diabetes Association select people from five Norwegian counties, strategically selected to represent cultural variations between Norwegian regions and settlement patterns (urban vs. rural).

Data collection

A questionnaire was posted to 689 people in October 2008; the people were asked to return completed questionnaires in a stamped envelope addressed to the researchers in 3 weeks from receiving the questionnaire. A reminder was sent to people who had not returned the questionnaire at the original deadline. This reminder generated 95 additional completed questionnaires, yielding a total response rate of 62% (*n* = 425). Data from people who did not respond to at least 70% of items in the questionnaire were excluded from the study. Forty-seven of the respondents who did not meet the 70% response requirement were therefore excluded.

Questionnaires

Dependent variable

To capture emotional distress from living with diabetes, the Problem Areas in Diabetes (PAID) instrument developed by Polonsky *et al.* (1995) was selected. The PAID; comprising 20 items produced a total score ranging from 0 to 100, with higher scores indicating greater distress. The respondents were asked to rate how much of a problem, on a five-point scale with options from '0 = not a problem' to '4 = serious problem', they find that in each of the 20 issues raised. Examples of items are: (i) 'Worrying about the future and the possibility of serious complications', (ii) 'Feeling scared when you think about living with diabetes'. The instrument has been used extensively in diabetes research. It's responsiveness has been tested, supporting its sensitivity to change over time (Welch *et al.* 2003).

Previous research supports using a total score (with one general 20-item factor) (Welch *et al.* 1997), but both two-factor and four-factor solutions have been reported (Sigurdardottir & Benediktsson 2008, Snoek *et al.* 2000). In this study, factor analysis of the PAID, implementing principal axis factoring, oblique rotation and a minimum eigen-value of one, yielded a one factor solution explaining 52.3% of the variance in the PAID-items. Results indicated that the PAID measured a uniform concept. The PAID had a Cronbach's alpha of 0.95 in our study.

Independent variables

Coping styles were assessed by four sub-scales from the dis- positional version of the COPE Inventory (Carver *et al.* 1989) and one sub-scale from the Ways of Coping Questionnaire (Folkman & Lazarus 1988). The sub-scales from the COPE were as follows: 'Active coping', 'Planning' and 'Behavioural disengagement'; each scale including four items. Moreover, a subscale labelled 'Seeking social support' with two items from the two original sub-scales on seeking instrumental and emotional support was included. This sub-scale consisted of the following items: 'I talk to someone to find out more about the situation' and 'I talk to someone who could do something concrete about the problem' 'I discuss my feelings with someone' and 'I talk to someone about how I feel'. This was considered relevant because the two social support functions often co-occur in practice (Carver *et al.* 1989). The sub-scale from the Ways of Coping Questionnaire assessing self-blame included the following three items: (i) 'I blame myself', (ii) 'It is my fault' and (iii) 'I am criticizing myself'. Based on earlier research (Karlsen & Bru 2002), this sub-scale is considered relevant in assessing coping among people with type 2 diabetes. The respondents are requested to indicate what they usually do and feel when they experience stressful events on a four-point scoring format with the following responses: (i) 'I usually don't do this at all', (ii) 'I usually do this a little bit', (iii) 'I usually do this a medium amount' and (iv) 'I usually do this a lot'. The higher the scores on each coping style, the greater was the use of the specific coping style. Factor analysis of items assessing coping styles, implementing principal axis factoring, oblique rotation and a minimum eigenvalue of one, yielded a five factor solution. This solution was in accordance with the intended coping styles dimensions, explaining 60.1% of the variance in the coping styles' items. Correlations between scores for coping styles ranged from 0.05 to 0.60. The highest coefficient was computed for the correlation between 'Active coping' and 'Planning'. Cronbach's alphas for the five sub-scales assessing coping styles in this study were: 'Active coping'; 0.74, 'Planning'; 0.87, 'Behavioural disengagement'; 0.86, 'Seeking social support'; 0.80 and 'Self blame'; 0.90.

Support from healthcare providers (physicians, nurses and other healthcare personnel) was assessed using an 18-item scale derived from the Patient Questionnaire on Empowerment; 12 items focusing on perceptions of constructive support, and six authored by the researchers to capture non-constructive support. The focus of items is especially on positive and negative aspects of guidance support. Respondents rated the degree to which they agreed with items such as, 'They listen to me and my concerns', 'The way they told me that I have diabetes made me feel guilty' on a 5-point Likert scale format, ranging from 'agree strongly' to 'disagree strongly'. The higher the scores were on positive items, the more constructive support from the healthcare providers, and the higher the scores were on negative items, the more non- constructive support. Factor analysis of items assessing support from healthcare providers, implementing principal axis factoring, oblique rotation and a minimum eigenvalue of one, yielded a two-factor solution. This was in accordance with the intended dimensions of support from healthcare providers, explaining 54.8% of the variance in these items. The correlation between the two sub-scales was -0.34. Cronbach's alphas for the two subscales were 0.94 and 0.85 in this study, respectively.

Supportive and non-supportive family behaviours specific to diabetes were assessed using 14 items from the 16 item Diabetes Family Behaviour Checklist (DFBC) developed by Schafer *et al.* (1986). The scale has proved to be a useful measure of family support for people suffering from type 1 or type 2 diabetes (Schafer *et al.* 1986, Trief *et al.* 1998). The following two items were not included from the 16-item DFBC, 'let you sleep late rather than getting up to take your insulin' and 'eat foods that are not part of your diabetic diet'. This decision was made on the basis of a study by Karlsen *et al.* (2004), which found non-significant associations between these two items and the other items in the scale. The items in the instrument were rated according to a 5-point Likert scale: 'never', 'seldom', 'sometimes', 'often' and 'very often' (scores from 1 to 5), and according to how often the respondents perceived that close relatives or others living with them provide constructive support or demonstrates non-supportive behaviour. High scores on positive items indicated high perceived constructive support from family/others; high scores on negative items indicated high perceived non-supportive behaviours. Factor analysis of items assessing supportive and non-supportive family behaviours, implementing principal axis factoring, oblique rotation and a minimum eigenvalue of one, yielded a two-factor solution that were in accordance with the intended dimensions of such behaviours, explaining 49.5% of the variance in these items. The correlation between the two sub-scales was 0.22. The subscale of positive items had a Cronbach's α of 0.79 in this study, whereas the subscale of negative items had a Cronbach's α of 0.78.

Clinical indicators were determined by self-reports, asking the respondents about disease duration, treatment regimen, HbA1c, BMI and diabetes-related complications. Disease duration was scored as a continuous variable (in years). Treatment regime was assessed by asking the respondents to indicate whether they were treated by means of diet only, oral medication or insulin. HbA1c was determined by asking the participants about their most recent values. BMI was calculated as weight in kilograms divided by height in metres squared. Diabetes-related complications were assessed by asking the respondents to indicate whether they have complications such as retinopathy, leg ulcers, neuropathy, heart/ vascular disease, kidney disease or amputation of a leg. A dichotomous variable for complications was obtained by assigning the value 1 to those who reported one or more diabetes complications and the value 0 to those who did not report complications.

Control variables
Demographical information about age and gender was implemented as control variables. *Age* was scored as a continuous variable (in years). Gender was graded as follows: women = 1 and men = 2.

Ethical considerations

The Norwegian Regional Committee for Medical and Health Research Ethics (No. 055.08), the Norwegian Social Science Data Services NSD and the Privacy Ombudsman for Research (No. 18770) approved the study. Information about the study, the possibility of withdrawing at any time and the fact that confidentiality was guaranteed were included in the letter that accompanied the questionnaire.

Data analyses

The analyses were conducted using the SPSS 15.0 statistical package (version 15.0, Chicago, IL). They included descriptive statistics, reliability testing, product moment correlation, factor analyses and multiple hierarchical regression analysis. The 0–100 total score of PAID was computed by adding the 0–4 responses and multiplying this sum by 1.25 (Polonsky *et al.* 1995, Welch *et al.* 1997). To determine whether more severe diabetes-specific emotional problems were present, a cut-off of ≥40 in the PAID was selected (Pouwer *et al.* 2005, Snoek *et al.* 2000). The hierarchical multiple regression was implemented to test the associations between the PAID and the study variables. Study variables were entered into the hierarchical regression in four steps. In the first step, only the control variables were entered, constituting model 1. Then clinical variables were added in model 2, followed by coping styles variables in model 3, and finally, all independent variables including variables assessing social support were entered in model 4. This hierarchical structure of the analysis presupposes that clinical variables influence coping styles and social support and that coping styles influence perceived social support. Statistical significance was established at $P \leq 0.01$ and ≤ 0.05. Missing data were handled by giving a missing item the mean score for the other items in each scale completed by the individual.

Results

A detailed description of the demographical and clinical variables of the sample population is provided in Table 1. The mean age of the participants was 58.1 years (8.7), and their mean disease duration was 8.2 years (6.2). The majority of the participants were men (54.2%) and used oral medication as treatment for type 2 diabetes (52.9%).

Approximately, 22% of the participants scored 40 or higher on the PAID questionnaire, indicating a great amount of diabetes-related distress in one-fifth of the sample. The mean score for the PAID was 26.0 (18.0).

The descriptive information pertaining to the independent variables is presented in Tables 2 and 3a,b. Table 2 demonstrates that the majority of the respondents, 85.8% and 77.5% reported occasionally or frequently using coping styles such as 'active coping' and 'planning', respectively. In contrast, 45.2% reported occasionally or frequently 'seeking social support'. Regarding the sub-scales 'behavioural disengagement' and 'self-blame', 30.7% and 63.5% reported occasional or frequent use of the current coping styles, respectively.

	(N = 378)	
	Count/mean (SD)	Percentages
Invited	689	
Response before exclusion	425	62
Response after exclusion	378	55
Demographical factors		
Male	205	54·2
Female	173	45·8
Age (years) Mean (SD)	58·1 (8·7)	
Clinical parameters		
Disease duration (years) Mean (SD)	8·2 (6·2)	
HbA1c (%)	7·1 (1·1)	
BMI (kg/m^2) Mean (SD)	29·7 (5·2)	
N reporting ≥1 complications	202	53·4
N reporting diet treatment	62	16·4
N reporting oral medication	200	52·9
N reporting insulin treatment	108	28·6

Table 1 Response rate and characteristics of the samples recruited from GPs and Norwegian Diabetes association

GP, general practitioners; BMI, body mass index.

The majority of the respondents scored high on the indicators of social support from healthcare providers. About 75.2% reported that they 'agree a little' or 'agree strongly' that they perceived constructive support. In contrast, relatively few participants reported non-constructive support (14.8%) from healthcare providers (Table 3a). About 11% of the respondents reported 'often' or 'very often' receiving supportive behaviour from family, whereas very few (2.4%) reported often receiving non-supportive behaviour from family (Table 3b).

Results from the correlation and hierarchical multiple regression analyses for associations between the study variables and the PAID are presented in Table 4. When entering the control variables, only age yielded statistically significant negative association with the PAID score, reflecting that younger people had higher scores for distress. Model 1, comprising the control variables, accounted for 2.5% of the variance in the PAID-scores. The clinical indicators such as tablet and insulin treatment, BMI and complications yielded statistically significant positive bivariate associations with scores on the PAID, whereas disease duration and HbA1c showed non-significant associations. However, it should be noted that insulin treatment yielded a statistically significant bivariate association and multivariate association, with emotional distress in model 3 and 4, but not in model 2. In total, clinical variables added 5.8% to the explained variance in scores for emotional distress. Entering the coping styles variables in the third model led to a statistically significant increase of 21.3% in variance accounted for in emotional distress. 'Behavioural disengagement' and 'Self-blaming' were primarily responsible for this increase in explained variance. In the final model, the social support variables were entered, leading to an additional increase in explained variance of 19.7% in emotional distress. This final model including all independent variables explained 49.3% of the variance in the PAID. All four social support variables yielded statistically significant bivariate correlations with scores on the PAID, reflecting that supportive behaviours from healthcare providers and family were associated with less distress, whereas non-supportive behaviours were associated with higher distress. The same tendency was found for the positive and negative support variables in the regression analysis, except for the non-significant association detected between supportive family behaviour and the PAID. Inspection of the bivariate correlations and the beta- coefficients in the final model showed that non-supportive family behaviour accounted for the highest amount of variance in the PAID-scores (13.1%), followed by non-constructive support from healthcare providers (9.0%), behavioural disengagement (8.8%), self-blaming (7.4%), constructive support from health professionals (6.3.%) and, finally, insulin treatment (2.6%).

Table 2 Sections of scoring intervals in percentages (low quarter of scoring range to higher quarter of scoring range), mean scores and standard deviation for subscales assessing coping styles for the total sample of people with type 2 diabetes (N = 378)

	Usually don't do this at all (%)	Usually do this a little bit (%)	Usually do this a medium amount (%)	Usually do this a lot (%)	Mean	Standard deviation
Active coping	2·9	11·4	43·7	42·1	3·2	0·6
Planning	5·3	17·2	39·7	37·8	3·1	0·7
Seeking social support	10·8	43·9	28·0	17·2	2·6	0·7
Behavioural disengagement	32·3	37·0	27·0	3·7	2·2	0·7
Self-blaming	15·9	20·6	40·5	23·0	2·7	0·8

Table 3 (a) Percentages with sections of the scoring range (low fifth 'Disagree strongly' to high fifth 'Agree strongly'), mean scores and standard deviation for social support from HCPs for the total sample of people with type 2 diabetes (N = 378). (b) Percentages with sections of the scoring range (low fifth 'Never' to high fifth 'Very often'), mean scores and standard deviation for social support from family for the total sample of people with type 2 diabetes (N = 378)

(a)

	Disagree strongly (%)	Disagree a little (%)	Neither agree nor disagree (%)	Agree a little (%)	Agree strongly (%)	Mean	Standard deviation
Constructive support from HCPs	2·6	6·3	15·9	23·3	51·9	4·0	0·9
Non-constructive support from HCPs	33·6	27·2	24·3	9·8	5·0	2·3	1·0

(b)

	Never (%)	Seldom (%)	Sometimes (%)	Often (%)	Very often (%)	Mean	Standard deviation
Supportive family behaviour	19·8	40·5	28·0	11·1	0·5	2·5	0·7
Non-supportive family behaviour	59·3	28·6	9·8	2·1	0·3	1·8	0·7

HCP, healthcare provider.

Table 4 Results from correlation (Pearson's *r*) and regression analysis [standardized beta weights (β)] for associations between independent variables and PAID. Independent variables were entered hierarchically in sections: model 1 (control variables), model 2 (control and clinical variables), model 3 (control, clinical and coping variables) and model 4 (control, clinical, coping and support variables) (N = 378)

	PAID (diabetes-related distress)				
		Model 1	Model 2	Model 3	Model 4
	r	β	β	β	β
Control variables					
Age	−0·14**	−0·14**	−0·10	−0·14**	−0·11*
Gender	−0·07	−0·07	−0·08	0·02	−0·05
Clinical indicators					
Disease duration	−0·03		−0·08	−0·06	−0·11*
Oral medication	0·17**		0·03	−0·03	−0·02
Insulin treatment	0·15**		0·10	0·13*	0·17**
BMI	0·13*		0·11*	0·05	0·00
HbA1c	0·05		0·11*	0·09	0·03
Complications	0·11*		0·11*	0·04	−0·01
Coping variables					
Active coping	−0·07			−0·07	−0·04
Planning	−0·02			0·04	0·08
Seeking social support	0·00			−0·01	−0·02
Behavioural disengagement	0·44**			0·31**	0·20**
Self-blaming	0·39**			0·24**	0·19**
Support variables					
Constructive support from HCP	−0·33**				−0·19**
Non-constructive support from HCP	0·41**				0·22**
Supportive family behaviour	−0·14**				−0·01
Non-supportive family behaviour	0·41**				0·32**
R^2		0·025**	0·082**	0·296**	0·493**
R^2 change			0·058**	0·213**	0·197**

*$P < 0.05$; **$P < 0.01$.
BMI, body mass index; HCP, healthcare provider; PAID, Problem Areas in Diabetes Scale.

Discussion

Study limitations

Some limitations pertaining to our findings should be mentioned. First, the cross-sectional design of the study limits the ability to draw conclusions about causality or directions of the relationships between emotional distress and the study variables. Second, as all data were based on self-reports, we cannot exclude the possibility of recall bias. It should also be borne in mind that the clinical indicators are measured through self-report, and the validity of these measures could be questioned. The self-reported HbA1c value is, however, unlikely to be subject to important systematic distortion as it is a numerical value and probably highly relevant for people with diabetes (Cox & Gonder-Frederick 1992). Finally, the sample was not randomly selected and therefore, generalization of the findings should be made with caution. Further research should adopt a longitudinal design to identify causal effects and directions.

Discussion of findings

This study is one of the few to examine the degree to which clinical indicators, coping styles and perceived support from healthcare professionals and family are related to diabetes- related distress. Beginning with the descriptive results, about one-fifth of the respondents in our study reported more severe diabetes-related distress. This finding is in line with earlier research, which has shown that a substantial percentage of people with type 2 diabetes experience relatively high levels of diabetes-related distress (Fisher *et al*. 2008, 2007). Moreover, pertaining to the coping variables, our group of type 2 diabetes people reported using problem-focused coping styles to a greater extent than avoidance coping. Approximately, 86% and 78% reported occasionally or frequently using coping styles such as 'active coping' and 'planning', whereas only 31% and 64% reported occasional or frequent use of the 'behavioural disengagement' and 'self-blame'. The findings support research reviewed by Maes *et al.* (1996), which showed a general tendency for people with diabetes to use more task-oriented coping than emotion-focused coping. It may reflect the fact that people are more likely to use problem-focused coping when dealing with a controllable stressor, such as type 2 diabetes (Macrodimitris & Endler 2001). It should also be noted that around 64% of the respondents reported that they often blamed themselves when facing distress and this may reflect the specific constraints of having type 2 diabetes. This finding is in agreement with an earlier study which indicated that self-blaming is often found among people with type 1 and type 2 diabetes (Karlsen & Bru 2002).

Approximately, 75% of the respondents felt they received constructive support from healthcare providers, whereas only about 11% felt they received supportive behaviour from family. On the other hand, very few reported receiving non-constructive support from the two sources often. The difference between the perceived constructive support from healthcare providers and from family is striking and implies that there may be potential for increasing supportive behaviour from family members.

The results from the multiple regression analyses showed that substantially greater variance in emotional distress was accounted for by subjective variables such as coping styles and perceived support rather than by clinical indicators. Our findings may reflect that diabetes-related distress is only to a fairly small degree influenced by clinical indicators, whereas psychosocial variables such as coping styles and perceived support seem to have a greater influence. The findings of moderate associations between clinical variables and diabetes-related distress are to some extent in line with earlier research (Fisher *et al.* 2009, Polonsky *et al.* 1995, Welch *et al.* 1997). The coping styles, 'behavioural disengagement' and 'self-blaming' showed significant relationships with emotional distress. The negative influence of these coping styles on distress is not surprising, and is in accordance with the literature (de Ridder 1997, Lazarus 1991). Behavioural disengagement is likely to reflect a sense of perceived helplessness in relation to achieving diabetes-related goals. Moreover, blaming oneself for not achieving the perceived standards of diabetes regulation may contribute to experiencing emotional distress. This is also in line with earlier findings that have suggested that self-blame could lead to guilt and even depression among people with diabetes (Taylor 2006). It is important to note that our results suggest that the links between behavioural disengagement and self- blame and emotional distress were, to a large extent, unrelated to clinical status and may, thus be unrelated to poorer self-regulation. Results are therefore likely to reflect a tendency for people with type 2 diabetes experiencing emotional distress to perceive their diabetes management too negatively or to be worried even though they have adequate metabolic control.

This is in line with general psychological research that shows that people with a tendency for negative affectivity have poorer perceptions of own abilities and performances and their life situation (Chang & Sanna 2007). When interpreting reports of diabetes-related distress, it is important to note that for some people this may primarily reflect a negative perception of their own self-management. Such people need to be assured that they can achieve appropriate self-regulation and need to be encouraged to keep up their good efforts in self-care.

Finally, constructive support from healthcare providers and non-supportive behaviours from both HCPs and family accounted for substantial amounts of variance in diabetes-related distress. The perceived constructive support from healthcare providers was negatively associated with diabetes-related distress, indicating that this support may be an important resource for these individuals in their adjustment to diabetes. On the other hand, the non-constructive dimension of HCP support was relatively strong and was positively associated with emotional distress. This may reflect that these individuals are vulnerable to criticism and judgmental opinions about their health behaviour, which in turn can result in higher levels of distress. However, healthcare professionals should be aware of the possible influence on people of non-supportive behaviour.

Assumptions about the links between supportive family behaviour and distress received little support in this study. In contrast, non-supportive family behaviours were positively associated with emotional distress. When family members are behaving negatively, for example by nagging or criticizing specific health behaviours, people with type 2 diabetes may respond to problems by perceiving higher levels of diabetes-related distress. Earlier research also shows that low level of social support between family members is likely to manifest itself in more negative social interactions, which are predictive of greater depression (Sacco 1999, Sacco & Vaughan 2006).

It should also be mentioned that the positive associations of non-supportive HCP and family behaviours with diabetes-related distress in this study were largely unrelated to clinical variables. This may suggest that perceptions of non-supportive behaviour could be a source of distress regardless of clinical status and possibly also of self-management. Efforts to enhance positive social interactions with healthcare providers and with family may therefore be conducive to reducing levels of emotional distress in people with type 2 diabetes.

Conclusion

This study offers unique insights into how clinical indicators, coping styles and social support from healthcare providers and family contribute to variations in diabetes-related distress. However, one should note the modest contribution of clinical indicators compared with the more significant role of coping styles and perceived support.

The findings suggest that factors beyond the biomedical realm should be considered as essential when addressing diabetes-related distress. This offers valuable information to healthcare providers when choosing interventions aimed at reducing distress. Healthcare providers should be aware of that interventions aimed to reduce distress and interventions aimed to improve metabolic control may not necessarily be the same. In helping people to reduce diabetes-related distress, it is important to develop methods that prevent the use of negative coping styles such as behavioural disengagement and self-blaming and enhance patients' perceptions of own abilities to self-manage their diabetes. Efforts to involve family members in a supportive manner may also be valuable in helping adults with type 2 diabetes. Finally, healthcare providers should consider ways to offer more constructive support and encourage people in their efforts to manage their disease.

Author contributions

EB, BK & BO were responsible for the study conception and design. BK, BO & EB performed the data collection. BK, EB & BO performed the data analysis. BK, EB & BO were responsible for the drafting of the manuscript. BK, EB & BO made critical revisions to the paper for important intellectual content. EB provided statistical expertise.

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