Coping and Distress as Predictors of Glycemic Control in Diabetes

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Abstract

This study attempts to identify the relative contribution of coping styles (task-, emotion-oriented and avoidance) and anxiety and diabetes-related distress to glycemic control in IDDM (Insulin Dependent Diabetes Mellitus) patients. Recent research suggests that coping and distress may as well be determinants as consequences of certain characteristics of the illness and subject. This points to the need to control some of these variables in diabetic research. Ninety seven IDDM patients from an outpatient unit were included. Measures were self-report questionnaires (CISS, STAI-Y, PAID) and biological data (HbA_{1C} i.e. metabolic control). When potential confounds were controlled for (current age, age at onset, gender, presence of complication), three main predictors of metabolic control could be isolated through hierarchical regression analysis: (1) presence of complications; (2) task-oriented coping style; and (3) diabetes-related distress. Three steps were included in predictors: illness and subject variables (step 1); coping styles (step 2); and negative emotions (step 3). Each step contributed to a significant increase in variance. Emotion-oriented coping style appeared as redundant with distress measures. Results suggest that the relations between psychological predictors and metabolic control would be closer in women. These results partly replicate other findings, and advocate for a better consideration of emotional factors in the prediction of blood glucose control in this disease.

Keywords

anxiety, complications, coping, diabetes, distress

INSULIN-DEPENDENT Diabetes Mellitus (IDDM or Type 1 diabetes) is a major public health issue throughout the whole world. It is associated with serious somatic complications such as retinopathy and cardiac disease. IDDM is caused by a combination of genetic and autoimmunological processes that destroy the pancreatic cells that produce insulin, a hormone essential for glucose utilization and storage. The resulting insulin deficiencies lead to various major metabolic problems. IDDM can occur at any age but is typically diagnosed during childhood and adolescence. Research strongly suggests that chronic hyperglycemia is a major factor contributing to long-term complications. The Diabetes Control and Complications Trial (DCCT Research Group, 1993) demonstrated the relationship between long-term glycemic control and diabetic complications. Therefore it is of great interest to isolate correlates and determinants of long term hyperglycemia in subjects suffering from this disease. Diabetes is one of the most psychologically and behaviourally demanding of the chronic medical illnesses, and various psychosocial factors have long been recognized as relevant to nearly every aspects of diabetes and its treatment (Fisher, Delamater, Bertelson, & Kirkley, 1982). Among these factors, the authors are interested in the potential role of coping styles and distress on glycemic control. Each will now be dealt with in turn.

There is a growing evidence that personal variables may buffer negative effects of stress on blood glucose, including social support and coping styles. As noted by Maes, Leventhal & De Ridder (1996) coping with diabetes is unique because it is one of the rare chronic diseases that allows patients to control their own well-being. This could explain why many results suggest that it is only through active coping that patients are able to maintain their demanding regimen (Grey, Boland, Davidson, Yu, Sullivan Bolyai, & Tamborlane, 1998; Hanson, Cigrang, Harris, & Carle, 1989). In fact it is highly probable that most IDDM patients perceive their illness as controllable (at least partly), although blood glucose is not exclusively under behavioural control. Recent research has shown that perceived control could account for the relationship between coping reactions and health or emotional outcomes (Macromidis & Endler, 2001; Osowiecki & Compas, 1998, 1999). For example, Macromidis & Endler (2001) found that Type 2 diabetes perceived control moderated relations between: (1) instrumental coping and depression; and (2) emotional preoccupation coping and metabolic control. Under controllable circumstances the 'choice' of problem-focused coping has appeared generally appropriate (Conway & Terry, 1992).

Thus a consistent body of research advocates for a strong relationship of glycemic control to problem-focused reactions (Maes, Leventhal, De Ridder, 1996). These refer to various problem-solving reactions meant to change some parameters of the situation (e.g. glucose levels by insulin injection) or to plan various solutions (e.g. planning treatment and preparing oneself for a travel). Smari & Valtysdottir (1997) have evidenced a clear relationship between a problem-focused coping style and glycemic control in a 41 IDDM male adult sample. They also observed a positive correlation between emotional and avoidance coping reactions and long-term high blood glucose in 47 women suffering from IDDM. In children, Hanson et al. (1989) and Grey, Lipman, Cameron, & Thurber (1997) observed that failure in glycemic control was related to avoidance. Peyrot and McMurry (1992) showed that coping reactions could have a buffering effect on the relation between negative emotion and glycemic control in a 105 adult IDDM sample. These data indicate that active or problem-focused coping styles are usually found to relate to better metabolic control where the role of emotion-focused and avoidance is still unclear (contradictory results by Hanson et al., 1989; Smari & Valtysdottir, 1997).

However, research in this area has been complicated by a lack of consensus concerning the major dimensions of coping (Parker & Endler, 1992). In most models of coping there has been a distinction on the one hand between task-focused, problem-focused or active coping and on the other hand, emotion-focused coping. A third prominent dimension in recent years has been avoidance (Krohne, 1996). Recently Endler and Parker (1990, 1994) have developed a coping inventory that incorporates these three major coping dimensions and shows a satisfactory factorial structure and other psychometric properties. This inventory is used in the present study.

Recent results show that negative emotions could be responsible for difficulties in controlling blood glucose in IDDM patients. The relationship between negative emotions and glycemic control involves both the psychological impact of diabetes and the role of psychological stress on diabetes management. Several studies have found a higher incidence of anxiety disorders in IDDM patients, independently of such factors as diabetic complications and loss of function (Geringer, Perlmuter, Stern, & Nathan, 1988). Psychosocial problems can occur secondary to numerous negative diabetes-related experiences including diagnosis and onset of complications (Wulsin, Jacobson, & Rand, 1987). But relations between negative emotions and diabetes also involve the role of stress on blood glucose. Stress can directly affect blood glucose through the release of stress hormones (e.g. epinephrine, which elevates glucose) or indirectly affect blood glucose by disrupting self-care behaviours. This could be demonstrated in laboratory as well as field studies (Cox & Gonder-Frederick, 1992). However clinical observations and research suggests that the effect of negative emotions on glycemic control is a more powerful explanation when considered indirect in the long run (i.e. disrupting self-care behaviours; Frenzel, McCaul, Glasgow, & Schafer, 1988; Hoover, 1988). These self-care behaviours consist of various behaviours related to day-to-day treatment and regime, such as fingerpricks, insulin injection, exercising, or other behavioural responses under specific circumstances like infection, etc. Arguments concerning the impact of anxiety on glycemic control can be found in the effect of relaxation training on metabolic control. This appears to be beneficial for diabetic patients (Bishop, 1994; Padgett, Mumford, Haynes, & Carter, 1988). Some findings are consistent with the hypothesis that diabetes-related emotional distress, separate from general emotional distress is an important and major contributor to self-care behaviours (Polonsky, Anderson, Lohrer, Welch, Jacobson, Aponte, & Schwartz, 1995). These authors have found that a diabetes-related distress measure was associated to blood glucose control even after adjustment for age, diabetes duration and general emotional distress. However their study did not consider the relative contribution of distress and coping.

Most field researches do not control for important subject and illness variables and therefore authors cannot hypothesize causal relationships from their results. So the observed links could as well be interpreted as the emotional impact of poor glycemic control-related negative experience *or* subjects' difficulty experiencing negative emotions to equilibrate their blood glucose in the long run. To hypothesize a causal relation (from cross-sectional findings) of negative emotions to blood glucose one would need control for at least major characteristics of the person and illness directly related to poor glycemic control, i.e. the presence of complications (such as in the study of Geringer et al., 1988). In our study this issue was addressed by including the following potential confounds in predictors: presence of complications (a measure of illness severity); age and age at onset; and gender. Weight and activity level are often taken into consideration in diabetic research. However they were not considered as variables to be controlled for here since they are of better concern for Type 2 than Type 1 diabetes. In addition, most research based on a stress and coping model (Lazarus & Folkman, 1984) deals with emotions as outcomes, whereas clinical experience advocates for a better consideration of the effect of anxiety and negative emotions on blood glucose control (i.e. considering distress as a predictor). This has lead researchers to underestimate the potential effects of negative emotions (cf. Smari & Valtysdottir, 1997). The study also pointed to the effect of distress or negative emotions on blood glucose control (a gross indicator of self-care behaviours) which has rarely been investigated.

In the present study, the role of task-oriented, emotion-oriented coping styles and avoidance as well as psychological distress in disease-related outcomes and behaviours was investigated. The research questions addressed in the study were as follows: (1) Are task-oriented coping positively and emotion-oriented coping or avoidance negatively correlated to metabolic control? (2) Are negative emotions negatively correlated to blood glucose control (i.e. would disrupt self-care behaviours), including when various illness and subject characteristics are controlled for (complications, age, age at onset, gender)?

Methods

Participants

The clinical sample is composed of 97 insulin-dependent diabetes patients. Of these subjects, 42 were men and 55 women. The average age was 42.4 for men (SD = 15.4) and 40.6 for women (SD = 14.6). One hundred and thirty two diabetics were initially contacted before medical consultation in an outpatient unit at the Pitie-Salpetriere Hospital in Paris. This sample was not strictly randomly selected although two half-day consultations per week were chosen at random during which all patients were systematically included in the study. Ten patients declined. These did not differ from the sample in terms of metabolic control. The remaining 122 were asked to fill the questionnaires in and return them to the first author in a stamped envelope on which the first author's address was written. Ninety seven effectively returned the questionnaires. So the final response rate was 79%.

Main demographic variables are available in Table 1. All patients were born in France. Mean diabetes duration was 17.2 yrs in the total sample. In the overall sample the mean HbA_{1C} level (= 8.2%) was similar to what was found in other studies involving diabetic outpatients (Rubin, Peyrot, & Saudek, 1989; Smari & Valtysdottir, 1997). Thirty five patients (36%) had complicated diabetes (recent retinopathy exclusively).

Measures

Coping Inventory of Stressful Situations (CISS, Endler & Parker, 1990). This is a 48 item inventory. Each item is rated on a scale between 1 = 'not at all' and 5 = 'very much'. There are three scales in the inventory: task-oriented; emotion-oriented; and avoidance coping styles. In previous studies (Endler & Parker, 1990, 1994) three general factors have been found in the inventory corresponding to these scales, and the reliability has been found to be high. This was also observed in an IDDM adult sample (Smari & Valtysdottir, 1997). Although avoidance can be split into two subdimensions (social diversion and distraction), most previous research has used higher order dimensions (e.g. Smari & Valtysdottir, 1997). Also not to underpower our analyses only the three main dimensions were considered. The CISS was translated into French and tested with 1056 subjects of different professions and age. In that study the factor structure and reliabilities were comparable to those of the original (Endler & Parker, 1998; Rolland, 1994). In our study, α coefficients for problem-, emotion-oriented and avoidance were respectively .92, .91 and .89. Sample items were for problem-oriented coping 'schedule my time better' or 'outline my prorities', for emotion-oriented 'blame myself for procrastinating' or 'feel anxious about not being able to cope', and for avoidance: 'window shop' or 'visit a friend'.

State-Trait Anxiety Inventory (STAI, Spielberger, 1983). This is a two-part self questionnaire with each part bearing 20 items. Each item must be rated on a four point scale, depending on its intensity or frequency for the subject. The first part deals with state anxiety and allows measuring of modifications due to various experimental situations. The second part deals with trait-anxiety mostly used to assess stable anxiety characterictics of personality. The psychometric adequacy of the French version of this inventory has been supported (Bruchon-Schweitzer & Paulhan, 1990; Gauthier & Bouchard, 1993). In the study, alpha coefficients for state and trait anxiety were respectively .91 and .92. Sample items are for state anxiety 'I feel afraid' or 'I am worried', for trait anxiety 'I worry about unimportant things' or 'I feel nervous and restless'.

Problem Areas in Diabetes Survey (PAID, Polonsky et al., 1995). It is a 20 item questionnaire in which each item represents a unique area of diabetes-related psychosocial distress, and is rated on a six point Likert scale, reflecting the degree to which the item is perceived as currently problematic. A total score measures the overall level of diabetes-related emotional distress. Psychometric properties were good in the original. Items were translated into French and back-translated into English. A factor analysis of the translated items yielded one factor. In our sample alpha for this scale is .94. Sample items of the questionnaire are 'feeling constantly concerned about food and eating' or 'feeling discouraged with your diabetes regimen'.

Disease-related variables. After subjects filled in an informed consent and medical

Table 1. Means and standard deviations of principal variables

	Total (n = 97)		*Men (n = 42)*		*Women (n = 55)*			
Variables	*M*	*SD*	*M*	*SD*	*M*	*SD*	*t*	*p*
Illness and subject:								
Age	41.5	14.9	42.4	15.4	40.6	14.5	1.017	.315
Age at onset	24.3	12	23.7	12	24.9	12	–.183	.855
Complications[a]								
yes	35	–	17	–	18		–	.855[a]
no	62	–	25		37		–	
HbA_{1C}	8.2	1.3	7.9	1.1	8.4	1.5	–2.002	.048*
Coping:								
CISS task	45.7	14.2	45.8	16	45.2	13.3	.179	.859
CISS smotion	36.2	14.1	37	13.9	38.8	14.2	–1.709	.091
CISS avoidance	37.9	14.1	36.7	15.3	39.4	12.7	–.940	.350
Negative emotions:								
STAI (trait)	45.2	11.1	41.8	10.6	48.3	10.7	–2.968	.004**
STAI (state)	36.5	12.8	35.4	12.4	38.4	13.2	–1.105	.272
PAID	54	23.7	48.5	23.3	59.3	23.9	–1.909	.059

Note: [a]The presence of complication is a category, figures refer to frequencies in the sample. *p* value refers to Fisher exact test.
*p <.05, **p <.01.

consultation, diabetologists were asked to fill in a questionnaire about sociodemographic data and disease-related variables. The study was mainly interested in the following measures: *age*, *age at onset*, *presence of somatic complications*, *gender* and a measure of metabolic control. Metabolic control was assessed by the proportion of glycated haemoglobin (HbA_{1C}), which is a long-term marker of hyperglycaemia and thus a gross indicator of self-care behaviours or adherence. It is noticeable that this was not assessed by self-report.

The questionnaires were assembled in order: first a letter of introduction, then the *CISS* coping inventory, the *STAI* anxiety scales and finally the *PAID* distress scale.

Results

Means and standard deviations were calculated for the principal variables (see Table 1). Scores on the *CISS* were similar to those found by Rolland (1994) in a French community sample. In comparison to Endler and Parker's community sample (1994), scores were somewhat lower for all three subscales. Anxiety measures were higher than scores obtained in community samples but somewhat lower than those found in depressed or anxious psychiatric patients (Gauthier & Bouchard, 1993). Diabetes-related distress was comparable to previous results obtained by Polonsky et al. (1995).

As for differences between genders indicated in Table 1, no significant difference could be observed between men and women in coping scores which is not in line with Endler and Parker's results (1994) or Smari and Valtysdottir's (1997) who observed higher scores in women for emotion-oriented and avoidance coping in the community and in diabetic subjects. Men and women differed in their level of trait anxiety (*STAI*, $t = -2.968$, $p < .01$) and diabetes-related distress (*PAID*) with higher scores reported by women. Blood glucose control was better (HbA_{1C} lower) for men than for women ($t = -2.002$, $p < .05$). This is in line with previous observations according to which sex and age may be important moderating variables with regard to coping in diabetics (Andersson & Ekdahl, 1992).

A hierarchical multiple regression was performed in order to estimate the role of dispositional coping, anxiety and diabetes-related distress in physical adaptation. In all analyses, *age*, *age at onset*, *presence of complications* and *gender* were entered first in the equation (Step 1). These variables were entered before coping and emotion variables as experience with

Table 2. Pearson correlations between independent variables, N = 97

Variables	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*
(1) Age							
(2) *Age at onset*	.67***	–					
(3) *CISS task*	–.31*	–.35*	–				
(4) *CISS emotion*	–.22	–.35*	.36**	–			
(5) *CISS avoidance*	–.34*	–.42**	.44***	.40**	–		
(6) *STAI trait*	–.06	–.16	.06	.65***	.15	–	
(7) *STAI state*	.00	–.16	.04	.58***	.04	.66***	–
(8) *PAID*	–.35*	–.32*	.32*	.59***	.34*	.54***	.41**

Note: *p <.05; **p <.01; ***p <.001.

Table 3. Summary of hierarchical regression analysis for illness and subject, coping and negative emotions variables predicting HbA_{1C}. total sample, N = 97

Variable	*B*	*SE B*	*β*
Step 1			
Age	–.006	.013	–.074
Age at onset	.000	.016	–.001
Complication(s)	.627	.281	.028*
Gender	.238	.258	.092
Step 2[a]			
CISS task	–.026	.010	–.296**
CISS avoidance	–.003	.010	–.035
Step 3			
STAI (trait)	.007	.017	.057
STAI (state)	.012	.013	.117
PAID	.014	.007	.253*

Note: R^2 = .26 and adjusted R^2 = .18 for global model. Step 1: ΔR^2 = .11, p <.05; Step 2: ΔR^2 = .06, p <.05; Step 3: ΔR^2 = .09, p <.05.[a] Emotion–oriented coping was excluded from the model because of probable redundancy with negative emotion measures.
*p <.05, **p <.01.

diabetes may have a systematic impact on control of diabetes. In addition complications have usually been associated to higher levels of blood glucose (Geringer et al., 1988). Also, our preliminary results indicate differences accross gender (cf. Table 1). These were followed by coping variables (Step 2) and anxiety and distress (Step 3). The dependent variable was metabolic control (HbA_{1C} levels). Correlations between the independent variables were reported in Table 2. Results of regression analyses are in Table 3 and 4.

From Table 2, significant interrelations show that *age* and *age at onset* related negatively to problem-focused coping and avoidance as well as diabetes-related distress (*PAID*). *Age at onset* also related negatively to emotional coping. A strong emotional pattern appeared when considering relations to emotion-focused coping. This variable correlated positively to negative emotions (anxiety, *STAI* as well as diabetes-related distress, *PAID*). This was in line with analyses questionning the validity of emotion-oriented coping measures. Results have shown that emotion-oriented coping measures can be contaminated by distress (Stanton, Danoff, Cameron, & Ellis, 1994). These authors' evidence showed that confounded items had weaker discriminant validity with distress measures than did unconfounded items. Also these were weaker predictors of later maladjustment when initial maladjustement was controlled then when it was not. This observation is major for our multivariate analyses since the inclusion of emotion-oriented coping as a predictor could hide the real role of distress. So this variable was excluded in subsequent regression analyses. Table 2 also reveals that all styles of coping were interrelated. This is specific to our population since validation studies of the *CISS* found low correlations between subscales, especially for the problem-focused-avoidance correlation (Rolland, 1994). Also negative emotions variables (state and trait anxiety and diabetes-related distress) were all interrelated. Since *Presence of complications* was a category, relations to other variables were explored by means of *t*-tests. As could be expected *Age* was higher in complicated diabetics (M = 48.1, SD = 14.2 when complicated, M = 37.2, SD = 13.8 when not complicated, t = –4.152, p <.001). All other tests were not significant.

When exploring the potential prediction of metabolic control by independent variables (Table 3), illness and subject variables explained

a significant proportion of variance of glycemic control (p <.05). The presence of complication was positively related to HbA_{1C}. Also, coping led to a significant increase in ΔR^2 in the overall sample (p <.05). This was also true in the case of negative emotions (anxiety and distress measures, step 3) which appeared as non redundant predictors (ΔR^2 = .082, p <.05). Among coping variables, problem-focused was negatively related to HbA_{1C} i.e. was related to a better blood glucose control. Among negative emotions, diabetes-related distress PAID scores correlated positively to the level of HbA_{1C} i.e. to difficulties in controlling blood glucose level. This is remarkable since major potential confoundings were included in the model and thus were controlled for.

Differences accross gender in HbA_{1C} levels and trait anxiety also led us to separate men and women in hierarchical regression analyses. However the number of subjects was limited, so the following figures should be interpreted cautiously. When men were considered alone (n = 42), no group of predictors brought any significant increase in explained variance of HbA_{1C} level (Step 1: ΔR^2 = .07, ns; Step 2: ΔR^2 = .12, ns; Step 3: ΔR^2 = .02, ns). Also no correlation of predictor reached significance (ps >.06). When women were considered (n = 55), Step 1 and 3 brought significant increases in explained variances of HbA_{1C} level (Step 1: ΔR^2 = .15, p <.05; Step 2: ΔR^2 = .12, ns; Step 3: ΔR^2 = .18, p <.01). In women problem-oriented coping and diabetes-related distress related to HbA_{1C} level (respectively B = –.036, $SE\ B$ = .014, β = –.326, p <.05 and B = .024, $SE\ B$ = .009, β = .399, p <.05). It is tempting to interpret these patterns as strong differences in predictability of metabolic control between gender. Yet it should be verified within larger samples.

To further justify the exclusion of emotion-oriented coping from our analyses, a regression model was computed including this variable among the predictors. The ΔR^2 brought about in this final model was marginal as compared to the model shown in Table 3 (ΔR^2 = .01). This variable was not related to HbA_{1C} (B = –.005, $SE\ B$ = .014, β = –.091, p = .71). However, the inclusion of this variable at Step 2 (coping measures) changed the level of the ΔR^2s at Step 2 *and* Step 3 (emotional measures) which were respectively .108 (p <.01) and .038 (ns). Thus there is little doubt that emotion-oriented coping should be redundant with other negative emotion measures in our sample.

Discussion

Dispositional coping was found to be related to glycemic control, largely in theoretically meaningful ways. This partly replicated previous results (Smari & Valtysdottir, 1997). Task-oriented coping was thus positively related to the biological marker of self-care behaviours. However contrary to expectations neither emotion-oriented or avoidance coping were related to this variable. These results could be due to the interrelations observed in Table 2 (all types of coping were related to each other), reflecting that subjects in our sample would have a tendency to adopt coping reactions with less distinction between the three types than in other samples (Rolland, 1994; Smari & Valtysdottir, 1997). The results concerning positive effects of task-oriented coping are in accordance with results from previous studies of the role of coping in adjustment to chronic diseases using different coping measures (e.g. Kvam & Lyons, 1991).

Negative emotions appeared to play a core role in our IDDM sample. When major characteristics of the illness and subject were controlled for diabetes-related distress brought a significant proportion of information to account for metabolic control. It is also remarkable that relations observed in our study only involved situation-specific emotions, i.e. negative emotions related to the day-to-day difficulties that diabetes imposes on subjects. This confirms the results of Polonsky et al. (1995). The subjects tested somewhat higher on the anxiety scales of the *STAI* than normal subjects, but did not fall into a pathological range. This is in line with previous results (Smari & Valtysdottir, 1997).

Our data also suggest that distress is a stronger predictor of metabolic control in women than men. Also coping styles and distress seemed to be more explanatory in women. Yet these interpretations should be confirmed by further investigations.

As for the theoretical assumptions which may underly the distress of diabetics, some relate to control. Authors have observed that the situation of diabetic patients is quite unique in terms

of perceived control. In reference to Burger's approach of perceived control and desire of control (Burger, 1999) it is clear that the clinical constraints of the illness and treatment stress day after day the possible discrepancies between the two aspects of control in people's funtioning. Desire of control is enhanced by clinical practitioners where perceived control may be low in some patients, because of difficulties in equilibrating blood glucose. In fact Conway, Vickers, & French (1992) showed that either too much or too little perceived control relative to the amount desired tended to be associated with more psychological strain. This stresses the need for further studies to investigate aspects of psychological control in IDDM.

The causal primacy of emotions and dispositional coping for outcomes in diabetes is not of course directly addressed in a cross-sectional study like the present one. Yet theoretically the *CISS* reflects relatively stable patterns of behaviours that should be less affected by time-specific measures such as HbA_{1C} which is the reflect of a two month period.

The results indicate a usefulness in struggling against emotional distress and in promoting task-oriented coping in IDDM patients. It is however uncertain to what extent intervention should target general coping styles or rather specific reactions to diabetes. The present study indicates that attention to general coping dispositions with regard to IDDM may be fruitful. Also our results are consistent with the hypothesis according to which diabetes-related distress is a major cause of difficulties in controlling one's blood glucose. This should also draw the attention of diabetes practitioners on the importance of considering emotional factors as possible determinants of higher blood glucose since they would disrupt self-care behaviours. It is probable that these emotional factors have a higher disturbing impact in women.

Main limitations of this study concern the measures used. First the redundancy observed of emotion-oriented coping style with distress underlines the danger that relations between emotion-oriented coping and metabolic control would be partially spurious. The consequence is that it is not possible to conclude in any way about the role of emotion-oriented coping from our results. Second, metabolic control has limitations as a measure of self-care behaviours or adherence (Cox & Gonder-Frederick, 1992). Several biases and confounds may play a role (e.g. adequacy of the recommended regimen, insulin sensitivity). To tackle these difficulties, further research should use other measures of emotion-oriented coping, excluding the expression of distressing emotions in emotion-oriented coping scales, as preconized by Stanton, Danoff, Cameron, & Ellis (1994) and include behavioural measures to assess adherence and self-care behaviours more accurately.

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