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No difference in lifestyle changes by adding individual counselling to group-based rehabilitation RCT among coronary heart disease patients

THOMAS MILDESTVEDT[1], EIVIND MELAND[1] & GEIR EGIL EIDE[2]

[1]*Department of Public Health and Primary Health Care, Section for General Practice, University of Bergen,* [2]*Centre for Clinical Research, Haukeland University Hospital, Bergen and Department of Public Health and Primary Health Care, Section for Epidemiology and Medical Statistics, University of Bergen, Norway*

Abstract
Aims: First, to examine whether autonomy-supportive and self-efficacy-enhancing individual lifestyle counselling was associated with improved maintenance of heart-protective diets and smoking cessation compared with group-based counselling. Second, to investigate to what extent reported motivation was associated with maintenance of dietary changes. *Methods*: A randomized controlled trial and longitudinal study of predictor variables in a four-week heart rehabilitation setting with two years follow-up. A total of 176 (38 female) patients were included, mainly with coronary heart disease. The main outcome measures were dietary changes and smoking cessation. Motivational factors were tested for predictive power in the three dietary outcomes: daily intake of fruit and vegetables, a low saturated fat diet, and weekly intake of fish dinners. *Results*: No clinically significant difference in improvement of dietary maintenance was found between the two groups. The between-group difference in smoking status change was statistically insignificant ($p=0.12$). Both groups showed an improvement in their dietary measures. Self-efficacy predicted an increased frequency of eating fish dinners ($p=0.001$) and more daily units of fruit and vegetables ($p<0.001$). Autonomous motivation had a marginal association with increased intake of fruits and vegetables ($p=0.08$) and was significantly associated with a lower saturated fat diet ($p=0.001$). *Conclusions*: Among this highly motivated group of rehabilitation patients, no effect was found of adding autonomy-supportive, individual counselling to group-based interventions. Based on longitudinal documentation, this cardiac rehabilitation programme improves long-term maintenance of dietary changes, and this maintenance is related to autonomous motivation and self-efficacy.

Key Words: *Cardiac rehabilitation, coronary heart disease, dietary change, motivation, randomized controlled trial, secondary prevention*

Background

Many researchers recommend that modern cardiac rehabilitation (CR) should be multidisciplinary and multifaceted [1,2]. This aims at providing optimal settings for secondary preventive interventions. Dietary changes are recommended because a beneficial diet potentially improves a wide range of risk factors. Among these risk factors, blood lipids, obesity, hypertension, and diabetes are all proven to be influenced by diet. A recent systematic review found that a combination of dietary changes was associated with a possible reduction of all-cause mortality by 45% [3].

Evidence is more conflicting as to how patients are to achieve the goals of CR. The recommended lifestyle changes are difficult to attain and maintain. Different behavioural and psychosocial intervention strategies have been evaluated without finding clear evidence of the most efficient approach [4]. The need for individually based and theory-oriented interventions has been expressed by several authors [5,6]. Research on adherence to lifestyle changes has shown an overall low compliance [7]. Health information should be simple, clear, and consistent [8]; dietary advice is often the opposite, and thus

Correspondence: Thomas Mildestvedt, Department of Public Health and Primary Health Care, Section for General Practice, University of Bergen, Kalfarveien 31, N-5018 Bergen, Norway. Tel: +47 55586163. Fax: +4755586130. E-mail: thomas.mildestvedt@isf.uib.no

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healthcare providers need to be well informed in order to reduce confusion among patients with cardiovascular disease [9]. Secondary prevention patients are asked to implement a variety of health behaviour changes at the same time and the complexity of these multiple changes is likely to be an obstacle to compliance [10].

Self-determination theory (SDT) explores the relation between autonomous and controlled motivation in different goal areas, sharing common ground with the more extensively clinically explored clinical technique of motivational interviewing [11]. Researchers in the SDT tradition have focused on long-term adherence to different lifestyle and medical regimens [12,13]. According to SDT, the degree to which behaviour is autonomously motivated is an important predictor of long-term lifestyle changes. Controlled motivation, which is motivation based on guilt and pressure, is not expected to energize patients enough to maintain lifestyle changes over time. SDT holds three basic elements: (a) the need for autonomy, (b) a warm interpersonal climate (relatedness), and (c) the need for competence. The need for competence is strongly related to the more extensively studied concept of self-efficacy (SE) in Bandura's social cognitive theory (SCT) [14].

Another prominent feature in different cognitive theories is the concept of expectancy. According to SCT the likelihood that people adopt a health behaviour depends on three cognitions: (a) the perception that health is threatened; (b) the expectancy that behavioural change will reduce that threat (outcome expectancies); and (c) the expectancy that one is competent to change the behaviour (SE). SDT and SCT are regarded as complementary theories, both exploring human motivation [15]. General expectancy is a central common core of personality dispositions related to achievement areas [16]. Intervention studies based on SDT have revealed that an autonomy-supportive counselling attitude facilitated compliance with proposed behaviour changes [12], and this has also been supported by observational data [17].

In the current study, we intended to integrate SDT and SCT in a clinical strategy aimed at increasing adherence to a heart-protective lifestyle. This is in line with recent advice from SCT research [18]. Patients need support in finding meaningful lifestyle goals to pursue and maintain. Bandura argues that health habits are not changed by an act of will but require the exercise of motivational and self-regulatory skills [19].

Aims

We wished to examine whether individualized, autonomy-supportive lifestyle counselling was associated with improved maintenance of heart-protective diets and smoking cessation compared with group-based, didactic counselling. Self-efficacy, general expectancy, autonomous and controlled motivation were also examined as predictive factors in this two-year follow-up study combining the two cohorts in a randomized controlled trial.

Material and methods

A total of 266 patients attending a four-week CR programme at Krokeide Rehabilitation Centre were invited to participate in the study. This cardiac rehabilitation centre is situated outside Bergen, Norway. Patients were recruited voluntarily during hospitalization or from their GP. The calculation of power was based on the exercise outcome reported elsewhere [20]. To detect a 15% difference in change of reported exercise with 90% power at a 5% significance level, we needed 68 participants in each group. Over a two-year period ending in August 2002, 217 patients were included in the study. Forty-one patients were lost to follow-up or left the rehabilitation programme for various reasons, leaving 176 patients eligible for two-year follow-up analyses. Their data are presented in Table I. Participants not answering questionnaires or attending less than two weeks of the rehabilitation course were excluded. Participants were voluntarily recruited among patients referred to CR from hospitals and primary care physicians in the health region of western Norway. They were randomly assigned to one of two groups, according to a simple randomization procedure ensuring equal numbers in both groups. The control group received the standard rehabilitation treatment, which included dietary and smoking cessation counselling in a group setting. The intervention group received the standard treatment plus an additional individualized self-efficacy and autonomy-supportive intervention.

The key features of the intervention involved patients participating in goal setting and selecting personalized strategies to overcome barriers. This strategy was used during two individual sessions during the rehabilitation stay and two follow-up telephone calls at 6 and 24 months focusing on the personally selected goals. One aim of this cognitive intervention was to develop a discrepancy between the patient's current status and his or her desired goals in an autonomy-supportive environment. The goal was to create an accepting and cooperative

Table I The Krokeide randomized trial of additional autonomy-supportive intervention vs standard rehabilitation only: Baseline data on 176 patients.

	Group						
Variables	Intervention added		Standard rehabilitation		Total		p[a]
Total group	51%	(90)	49%	(86)	100%	(176)	
Males, % (n)	73%	(66)	84%	(72)	78%	(138)	0.09
Age, mean (SD), (*n*)	55.6 (8.5)	(90)	56.4 (10.3)	(86)	56.0(9.3)	(176)	0.57
Marital status							0.59
Married/cohabitating, % (*n*)	84%	(74)	81%	(68)	83%	(142)	
Single, % (*n*)	16%	(14)	19%	(16)	17%	(30)	
Coronary heart disease diagnosis							0.94
Angina/other, % (*n*)	36%	(32)	35%	(29)	36%	(61)	
Myocardial infarction, % (*n*)	64%	(57)	65%	(53)	64%	(110)	
Lifestyle factors							
Current smoker, % (*n*)	18%	(16)	18%	(15)	18%	(31)	0.99
Fruit and vegetables[b], mean (SD), (*n*)	3.2 (1.4)	(79)	3.1 (1.3)	(79)	3.2 (1.4)	(158)	0.82
Low fat diet, mean (SD), (*n*)	4.2 (1.0)	(90)	3.3 (0.9)	(86)	4.1 (1.0)	(176)	0.11
Fish dinners per week, mean (SD), (*n*)	2.2 (0.6)	(88)	2.3 (0.7)	(86)	2.2 (0.6)	(174)	0.11
Motivation and emotion							
Autonomous, mean (SD), (*n*)	6.2 (0.8)	(90)	6.3 (0.5)	(83)	6.2 (0.7)	(173)	0.39
Controlled, mean (SD), (*n*)	4.9 (1.2)	(89)	4.9 (1.1)	(83)	4.9 (1.1)	(172)	0.93
General expectancy, mean (SD), (*n*)	5.7 (1.0)	(90)	5.9 (1.0)	(86)	5.8 (1.0)	(176)	0.18
ADI, mean (SD), (*n*)	12.5 (3.3)	(88)	12.4 (3.4)	(85)	12.4(3.3)	(173)	0.89
Self-efficacy[c]							
Fruit and vegetables, mean (SD), (*n*)	4.1 (0.7)	(83)	4.0 (0.8)	(80)	4.0 (0.7)	(163)	0.49
Fish dinners per week, mean (SD), (*n*)	4.1 (0.8)	(84)	4.4 (0.7)	(80)	4.2 (0.7)	(164)	0.02

[a]Means are compared by independent samples *t*-tests and percentages by Pearson's chi-squared test. [b]Units weekly. [c]Questionnaires given at departure. SD=standard deviation; ADI=anxiety, depression, irritability.

interpersonal relationship exploring statements of self-motivation and focusing on competence and self-efficacy. We used an interview form stimulating each individual to specify the three most important lifestyle changes the person would like to prioritize in the future. The counselling aimed at strengthening the motivational adherence to these lifestyle changes through autonomy-supportive dialogues. The provider was educated to remain curious about the patient's progress to minimize control, and to allow the patient to specify his or her goals.

Dietary counselling was given to all patients in group-based, didactic settings and in practical training settings where they prepared their own food. Spouses were also invited for one day to receive some of the same information. Dietary counselling was based on the 'Mediterranean' diet in a group setting. This diet focuses on low intake of saturated fat and on increasing the intake of fish, fruit, and vegetables [21].

The dietary outcome measures were a low saturated fat diet, number of weekly fish dinners, and daily units of fruit and vegetables. The low saturated fat diet is a composite score measuring to what extent participants comply with a low and polyunsaturated fat diet. The three questions are all on a five-level scale previously presented with satisfactory reliability [20]. Similar questions have been used and validated in the Norwegian county health surveys [22].

Smoking status was assessed by the question ''Are you smoking?'' at inclusion, 6 months, and 24 months follow-up. We computed an outcome variable from the data at inclusion and 24 months follow-up with four possible outcomes: stopped smoking, continuous non-smoker, continuous smoker, and started smoking.

Our hypothesis was that autonomous motivation would predict long-term lifestyle improvement and that controlled motivation might hamper lifestyle changes. We also assumed that specific SE and general expectancy would be important predictors of lifestyle changes. Autonomous and controlled motivation were measured using the Treatment Self-Regulation Questionnaire (TSRQ), which is a questionnaire previously tested for reliability and validity. The TSRQ assesses domain-specific types of motivation or regulation and has been used in various behavioural studies [23]. Autonomy support provided by the rehabilitation staff was measured by the six-item short version of the Health Care

Climate Questionnaire at both the 6- and 24-month follow-up [17]. Descriptive data and reliability of the SE and general expectancy (GE) measure have been presented previously [20]. GE is a global measure to explore a person's general beliefs regarding future prospects. The SE measure is a task-specific measure to describe a person's expectancy beliefs. In this survey the SE measure was related to increasing the intake of fruit and vegetables and increasing fish dinners.

Statistical analyses

The two intervention groups were compared with regard to each variable of potential predictive value (see Table I) using the chi-squared or the *t*-test, as appropriate. For each of the three lifestyle factors, i.e. intake of fruit and vegetables, low saturated fat diets, and weekly fish dinners, the effects of the rehabilitation programme (standard or with additional intervention) and time (0, 6, 24 months) were tested in a two-way analysis of variance with one grouping factor (programme) and one repeated factor (time), also allowing testing for interaction. For this, the general linear model (GLM) procedure in SPSS (version 14.0) was used. This model was also chosen for the covariate analyses. The predicting variables (autonomous and controlled motivation, SE and GE) were controlled for gender and age for each of the outcome measures at 6 and 24 months. The results are reported with estimated regression coefficients (b) and *p*-values. The time effect for each of the dietary outcomes is presented with their estimated means and standard errors at inclusion, 6 months, and 24 months. Smoking status was analysed using the chi-squared test.

Intention-to-treat analyses were performed on the group lost to follow-up by replacing the missing values at 24 months with the lowest score at inclusion or at 6 months' follow-up.

Ethics

The Regional Committee for Medical Research Ethics, Health Region III, and the Norwegian Data Inspectorate approved the study.

Results

Randomization was effective, as may be seen from Table I. *T*-tests and chi-squared tests revealed that the groups did not differ significantly on key demographic and outcome variables at the start of the study. However, gender distribution was borderline significantly different ($p=0.09$) and SE for increased fish dinners was statistically significantly different between the groups ($p=0.02$).

There was no clinically significant difference in improved dietary change between the two groups. The standard rehabilitation group reported a statistically significantly higher weekly fish intake ($p=0.004$). The interaction between intervention group and reported lifestyle at three measuring points was non-significant. As described in Table II, both groups showed an overall improvement in their intake of fruit and vegetables (0.6 units or 18%, $p<0.001$), low saturated fat products (13%,

Table II Analysis of variance of dietary measures with regard to time (T) and rehabilitation group.

Outcome		T=0 mth		T=6 mth		T=24 mth		*p*-values		
Rehabilitation group	*n*	Mean	SD	Mean	SD	Mean	SD	Time	Between group[a]	Interaction[b]
Units of fruit and vegetables per day	132									
Standard rehabilitation	63	3.1	1.3	3.8	1.2	3.7	1.2	<0.005	0.79	0.66
Intervention	69	3.2	1.4	3.8	1.2	3.7	1.2			
Fish dinners per week	156									
Standard rehabilitation	74	2.3	0.7	2.6	0.6	2.4	0.7	=0.008	0.004	0.17
Intervention	82	2.2	0.6	2.2	0.6	2.2	0.5			
Low saturated fat	159									
Standard rehabilitation	75	3.3	0.9	3.9	0.8	3.8	0.8	<0.005	0.22	0.11
Intervention	84	3.5	0.8	4.0	0.7	3.8	0.6			

n=number of participants; SD=standard deviation. [a]Between group from within-subjects effects. Time and Interaction from multivariate test. [b]Interaction with time.

Table III. Change in smoking status from 0 to 24 months.

	Intervention added % (*n*)	Standard rehabilitation % (*n*)	Total % (*n*)
Stopped smoking	7 (6)	4 (3)	5 (9)
No change in smoking status	92 (78)	90 (75)	91 (153)
Started to smoke	1 (1)	6 (5)	4 (6)
Total	100 (85)	100 (83)	100 (168)

$p=0.12$ in a chi-squared test (linear-by-linear).

$p<0.001$) and weekly fish dinners (0.1 times weekly or 3%, $p=0.02$) in a general linear model.

We found no significant difference in smoking status at any of the measuring points. Table III shows the change in smoking status from inclusion to 24 months' follow-up. No statistically significant difference between the groups was proved in a linear-by-linear test ($p=0.12$).

Table IV shows the predictors of dietary changes in a general linear model. Self-efficacy was significantly associated with an increased intake of fruit and vegetables ($p<0.001$) and weekly fish dinners ($p=0.001$). Autonomous motivation was significantly associated with a low saturated fat intake ($p=0.001$). Controlled motivation at inclusion was negatively associated with a low saturated fat intake ($p=0.02$). A low saturated fat diet was also statistically associated with younger age ($p=0.03$) and female gender (main effect $p=0.04$). Older people reported a higher weekly intake of fish dinners ($p<0.001$). General expectancy did not show any significant associations. None of the associations had a significant association with time. Smoking cessation was not tested for predictive factors owing to the small numbers of participants changing their smoking habits. Autonomy support from the clinical staff was not perceived differently in the two groups measured at 6 months and 24 months.

Significantly more dropouts occurred among younger and male participants, and borderline significant lower general expectancy was demonstrated among dropouts. They also reported eating fish dinners less frequently. Of the 41 dropouts 24 belonged to the standard treatment group. In an intention-to-treat analysis with worst-case scenarios, low saturated fat diet was significantly improved in the group receiving additional intervention. In the dropout group, mean values of low saturated fat diet at baseline were significantly different in the group with additional intervention compared with the standard treatment group (mean 3.5 vs 3.1, $p=0.001$ for the difference). Improvements in a low saturated fat diet were no longer predicted by being young. Other main outcomes were not significantly altered by the intention-to-treat analyses.

Discussion

We found no improvements in dietary habits in the intervention group compared with the standard treatment group. A small but statistically significant increased intake of weekly fish dinners was found in the standard rehabilitation group. This may partly be explained by the greater proportion of dropouts in the standard rehabilitation group, as dropouts reported eating fish dinners less frequently. The standard rehabilitation group also reported significantly higher self-efficacy for increased fish intake at baseline. Both groups of rehabilitation patients improved all of their dietary measures over 24 months. Self-efficacy and autonomous motivation for lifestyle changes were important predictors of dietary changes. Controlled motivation, the degree to which participants felt internal or external pressure for change, was inversely associated with low saturated fat intake. In the intention-to-treat analyses, low saturated fat intake improved significantly in the group with additional intervention. This may, however, be explained by a significantly uneven distribution of the measure at baseline among the dropouts.

This study illuminates the complexity of adherence to lifestyle changes in a clinical setting with a randomized controlled design. The strengths of the study are its randomized design and the repeated assessments of outcomes over time (24 months' follow-up). Evaluation at both 6 and 24 months allowed us to detect relapses in both the short and long term. This is important because behavioural change tends to occur at different times and maintenance is considered a dynamic process [6]. The clinical significance of the dietary changes is debatable. The change in the frequency of fish dinners was not substantial. Improvement in units of fruit and vegetables consumed might be clinically important, whilst the low saturated fat diet was a composite score more difficult to transcribe into clinically important changes of a low saturated fat diet. The difference in smoking status might be of clinical importance even though no statistically significant difference was detected between the groups.

There are several limitations. This was a self-recruited rehabilitation group that reported being

Table IV. Predictors of dietary changes in a general linear model.

	Main effects	Estimated regression coefficients (standard errors)			Interaction with time
	p-value	0 mth	6 mth	24 mth	*p*-value[a]
Units of fruit and vegetables per day					
Time	<0.001[b]	3.28 (0.12)[c)]	3.87 (0.10)[c]	3.76 (0.10)[c]	0.267
Intercept	0.096[d]	2.44 (1.16)	2.13 (1.20)	0.56 (1.16)	
Age (in years)	0.594[d]	<0.01 (0.01)	<0.01 (0.01)	0.01 (0.01)	0.703
Gender[e]	0.006[d]	−0.37 (0.31)	−0.68 (0.26)	−0.78 (0.25)	0.490
Self-efficacy	<0.001[d]	0.39 (0.17)	0.46 (0.14)	0.64 (0.14)	0.273
General expectancy	0.956[d]	0.07 (0.14)	0.03 (0.12)	−0.11 (0.11)	0.310
Motivation	0.077[d]	−0.05 (0.19)	0.27 (0.16)	0.49 (0.15)	0.039
Autonomous	0.099[d]	−0.09 (0.11)	−0.14 (0.09)	−0.16 (0.09)	0.862
Controlled					
Study group[f]	0.549[d]	0.14 (0.26)	−0.29 (0.21)	−0.18 (0.21)	0.232
Fish dinners per week					
Time	<0.024[b]	2.26 (0.05)[c]	2.39 (0.05)[c]	2.33 (0.05)[c]	0.843
Intercept	0.209[d]	0.86 (0.60)	0.78 (0.62)	0.51 (0.55)	
Age (in years)	<0.001[d]	0.02 (0.01)	0.02 (0.01)	0.02 (0.01)	0.176
Gender[e]	0.541[d]	0.10 (0.13)	−0.09 (0.13)	0.17 (0.12)	0.076
Self-efficacy	0.001[d]	0.15 (0.07)	0.21 (0.07)	0.23 (0.06)	0.401
General expectancy	0.160[d]	0.00 (0.06)	−0.07(0.06)	−0.12 (0.05)	0.066
Motivation	0.449[d]	0.01 (0.08)	0.09 (0.08)	0.05 (0.07)	0.497
Autonomous	0.294[d]	−0.04 (0.05)	−0.01(0.05)	−0.07 (0.04)	0.335
Controlled					
Study group[f]	0.010[d]	−0.17 (0.10)	−0.33(0.11)	−0.15 (0.09)	0.109
Low saturated fat diet					
Time	<0.001[b]	3.39 (0.06)[c)]	3.97 (0.06)[c]	3.84 (0.05)[c]	0.121
Intercept	<0.001[d]	2.67 (0.74)	3.12 (0.68)	4.02 (0.62)	
Age (in years)	0.025[d]	−0.01 (0.01)	−0.01 (0.01)	−0.02 (0.01)	0.180
Gender[e]	0.037[d]	−0.44 (0.16)	−0.09 (0.15)	−0.25 (0.14)	0.098
General expectancy	0.229[d]	0.09 (0.07)	0.01 (0.07)	0.09 (0.06)	0.255
Motivation	0.001[d]	0.30 (0.10)	0.29 (0.09)	0.21 (0.08)	0.415
Autonomous	0.016[d]	−0.07 (0.06)	−0.11 (0.05)	−0.13 (0.05)	0.531
Controlled					
Study group[f]	0.227[d]	0.26 (0.13)	0.10 (0.12)	−0.00 (0.11)	0.113

[a]*p*-values from multivariate tests. [b]*p*-value from F-test of multivariate effect of time on diet based on the linearly independent pair-wise comparisons among the estimated marginal means. [c]Estimated marginal means for the three dietary outcomes are calculated for the covariate values below*. [d]*p*-values for between-subject effects. [e]1=female, 2=male. [f]1=standard rehabilitation, 2=intervention, and standard rehabilitation.

well motivated and emotionally well functioning. In line with other reports from CR settings, participants were mainly white, middle-aged men. They are also reported to be educated, married, and possessing high self-efficacy [24]. Baseline data indicate an initial good lifestyle, possibly too good to prove any substantial intervention effect. It is possible that important changes took place in advance of starting the rehabilitation. A recent cardiac event is a major motivating source for lifestyle changes and may overshadow any other motivational intervention.

Other reasons for not detecting any clinically important effects between groups are the rather small additional intervention. Two sessions and two telephone calls were added to the standard group-based rehabilitation programme. Further, the same highly motivated staff provided care in both groups and this could have limited the differences between groups. The statistical power in the study was calculated based on the exercise outcome, and may be insufficient for the present outcomes, especially the smoking outcome.

*Dietary outcome

Covariate	Fruit and vegetables	Fish dinners	Low saturated fat
Self-efficacy	4.00	4.20	
General expectancy	5.83	5.82	5.83
Autonomous motivation	6.14	6.17	6.19
Controlled motivation	4.79	4.86	4.88
Age	55.7	55.7	55.6
Gender	1.76	1.78	1.78

The validity of self-reported dietary measures may be questioned: in particular, the validity of measuring the intake of fish and vegetables has been unsatisfactory because it relies on memory and the perception of serving sizes [25]. A clinical setting requires a rapid assessment of an individual's usual diet. Food-frequency questionnaires are thus clinically useful and give meaningful information at a group level [22]. The young mean age among participants (56 years) might be explained by the tradition that rehabilitation at Krokeide has focused on facilitating return to work. Critics of SDT have argued that autonomous motivation may be a ''Western'' type of attitude and experience. Other cultures may rely more on social-, family-, and group-oriented types of norms and motivations. In SDT autonomy is not being independent but acting volitionally and in accordance with one's goals and attitudes [26]. Internal validity may be compromised by more women in the standard treatment group: women have been reported to achieve better dietary adherence in other studies, but are underrepresented both in our study and in cardiac rehabilitation in general [27].

Several lifestyle interventions have failed to prove any significant improvement. The Extensive Lifestyle Management Intervention (ELMI), following a cardiac rehabilitation trial, resulted in modest, non-significant benefits to global risk compared with standard care when 302 men and women were followed up for one year [7]. Other studies provide evidence that individual factors are of great importance in adherence research. Lifestyle changes might be initiated but are limited if the adverse effect on quality of life is substantial. An individual ''pain limit'' for lifestyle changes is reported in a qualitative study, and it is important to prevent the experience of powerlessness [28]. These motivational issues are not detected by measures of self-efficacy or autonomous motivation. On the contrary, the decision not to change one's lifestyle might well be based on quite autonomous considerations.

The reported relation between dietary changes and autonomous motivation and self-efficacy is in line with what we would expect from the literature. The majority of the research derives from non-rehabilitation settings, mostly primary care settings with diabetic patients [29,30]. The intervention in our study did not lead to a change in perceived autonomy support between the two groups or in the mean scores of autonomous motivation. The reported levels of these measures were all from six and upwards on a seven-point Likert scale. This ceiling effect made it difficult to detect any beneficial effects from the intervention. Williams and colleagues have used more task-specific TSRQs for diabetes in order to detect motivational changes more accurately [29].

Most existing research in this field evaluates inpatient cardiac rehabilitation provided over a period of three to five weeks. We need to focus on what happens after the rehabilitation programme is completed. We also welcome more interventional studies in rehabilitation settings. These should explore how the quality and intensity of different interventions influence long-term dietary changes. Self-recruited patients should be compared with groups of patients not attending heart rehabilitation.

Conclusions

Among this highly motivated group of rehabilitation patients, we found no effect of adding autonomy-supportive, individual counselling to group-based interventions. Based on longitudinal documentation, this cardiac rehabilitation programme improves long-term maintenance of dietary changes, and this maintenance is related to autonomous motivation and self-efficacy.

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