

Impact of social support and religiosity/spirituality on recovery from acute cardiac events and heart surgery

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Abstract

Objective: The aim of this study was to evaluate the impact of social support and religiosity/spirituality (R/S) on the recovery from an acute cardiac event or cardiac surgery during cardiac rehabilitation (CR).

Methods: A convenience sample of 159 patients participating in a CR program were enrolled. R/S, social support, anxiety, depression, health related quality of life (QoL) and exercise capacity (6-min walk test, cycle ergometer test) were assessed.

Results: Social support was significantly associated with less anxiety ($p < 0.01$), less depression ($p < 0.01$), and better QoL ($p < 0.05$) on admission. After adjustment for age, gender, education level, and morbidity, social support remained significantly associated with less depression ($p < 0.001$). R/S was significantly associated with less depression ($p < 0.05$), better QoL ($p < 0.05$), and better exercise capacity ($p < 0.05$) at admission. After adjustment for covariates, however, significance was lost. There were no significant associations of social support or R/S with the course of CR measured by change in QoL or exercise capacity.

Conclusion: Social support may be a protective factor against depression in the recovery from cardiac events or surgery. Neither social support nor R/S had a significant impact on recovery, although follow-up time was short.

Keywords: Social support, religiosity/spirituality, cardiac rehabilitation

1. Introduction

Cardiovascular disease is the leading cause of death in Switzerland (30.7%).¹ A cardiac event is an acute, stressful and life-threatening experience in a person's life² because of the sudden change from healthy to seriously ill,³ along with a negative impact on ability to function⁴ and quality of life (QoL).^{5 6} Anxiety is the most common emotional reaction to acute myocardial infarction (AMI), which has a substantial impact on patients' physical and mental recovery.⁷ Symptoms of depression are also common,⁸ also with a negative effect on physical recovery.⁹ For this reason, the integration of psychosocial assessments and psychological support has become a mandatory part of the multidisciplinary approach to cardiac rehabilitation (CR).¹⁰

Social support has been shown to impact the course of heart disease.¹¹ Higher levels of social support at the beginning of CR are associated with an improved emotional state (less anxiety and depression) six and 24 months after CR,¹² whereas social support's effects on physical recovery is not known. Religiosity and spirituality (R/S) may also be resources in coping with cardiac events and heart surgery,^{13 14} providing comfort during the acute phases of disease.^{15 16} On the other hand, spiritual struggles (e.g., feeling punished God or unsupported by one's faith community) have been associated with more severe distress¹⁷ and greater depressive symptoms¹⁸ increasing risk of mortality by 6 to 28% among medically ill elderly patients.¹⁹

Therefore, the aim of the present study was to determine the effect of social support and R/S on psychological and physical health outcomes during a CR program for patients recovering from acute cardiac events or heart surgery. Based on previous studies, we hypothesized that social support would be inversely associated with symptoms of anxiety and depression and positively associated with quality of life

(QoL) and impact physical recovery. We hypothesized a similar effect for R/S, while acknowledging the possible negative effects due to spiritual struggles or negative religious coping.

2. Methods

2.1 Study design, population, and procedure

The present study has a prospective design, and was approved by the regional ethical review board (Ethikkommission Nordwest- und Zentralschweiz EKNZ 2019-01941). Patients admitted to the CR program at the Clinic Barmelweid, Switzerland, were enrolled in the study between October 2019 and April 2020. Informed consent was obtained from all patients. Patients with a chronic psychiatric condition, cognitive impairment, or unable to read and speak German were excluded. Of a total of 235 patients approached, 13 patients (5.5%) refused to participate in the study and 63 (26.8%) were excluded due to language problems (n=28), psychiatric conditions (n=22), or cognitive impairment (n=13). 159 patients (67.7%) made up the final sample for analysis.

CR consisted of a 3-week multidisciplinary exercise-based program, including risk factor management, nutrition counseling, and psychosocial support. On admission to the program, study participants completed a set of questionnaires on anxiety, depression, health related QoL, social support, and R/S. Exercise capacity was assessed by the 6-min walking test (6MWT) and by cycle ergometry. The QoL questionnaire and 6MWT were repeated on discharge from the CR program.

2.2 Measures of exercise capacity and comorbidity

Ergometry was performed on a cycle ergometer with a ramp protocol starting from 20 Watts (W), increasing by 10, 15 or 20 W according to the clinical status of the patient, with the goal of reaching a test duration of between 8 and 12 minutes. The final wattage goal was adjusted for age and gender. Submaximal exercise capacity was measured by the 6-min walking test (6MWT) where patients were encouraged to walk as far as possible on a 30 meter flat surface corridor for a period of 6 minutes.²⁰

Comorbidity was assessed using the Cumulative Illness Rating Scale (CIRS), which measures chronic medical illness burden. A higher score indicates greater comorbidity.²¹

2.3 Measures of psychosocial, religious and spiritual characteristics

The MacNew Heart Disease Health-related Quality of Life Questionnaire (MacNew) is designed to assess how patients feel about the impact of heart disease on their daily physical activities and emotional and social functioning.²² The MacNew questionnaire contains three subscales: emotional, social, and physical. The scale consists of 27 items.²³ The internal consistency of the German version ranges from 0.78 to 0.95 (Cronbach's alpha).²⁴ For simplicity, the subscales and the total scale scores range from 0% to 100%, where 100% reflects the highest possible QoL.

The Hospital Anxiety and Depression Scale (HADS) is a self-rated scale designed to assess the severity of anxiety and depression symptoms among non-psychiatric patients.²⁵ The HADS contains two seven-item subscales, one for anxiety (HADS-A) and one for depression (HADS-D). Participants are asked to rate each item on a four-point Likert scale, where 0 reflects no symptoms and 3 indicates severe symptoms. Both subscales are summed up to obtain scores ranging from 0 to

21. Scores ≥ 8 are suggestive of significant anxiety or depression.²⁶ The internal consistency of the German version is 0.80 for anxiety and 0.81 for depression.²⁷

The ENRICH Social Support Inventory – German (ESSI-D) is a five-item scale that measures functional as well as emotional support. Participants are asked to rate each item on a five-point Likert scale ranging from “none of the time” (1) to “all of the time” (5). The total ESSI-D score is calculated as the sum of all items, ranging from 5 to 25. Higher scores indicate more social support. Low social support is defined as a score ≤ 18 . Cronbach’s alpha for the ESSI-D is 0.89.²⁸

Religiosity was assessed using the Centrality of Religiosity Scale (CRS), which is made up of seven items (CRS-7). The CRS-7 measures the importance of religion for a person’s life and consists of five dimensions: public practice, private practice, religious experience, ideological belief, and intellectual interest. There is one question for each dimension, except for private practice and religious experience (which each are assessed by two questions). The dimension of private practice asks about the frequency of praying and meditation. The dimension of religious experience is assessed by asking about God’s divine intervention in life or by feelings of “oneness” with all existence, providing room for a more monotheistic or a more pantheistic view of God. On this dimension, only the item with the higher score enters the total CRS-7 score. Participants rate each item on a five-point Likert scale ranging from “not at all” (1) to “very much” (5). The total CRS score ranges from 1.0 and 5.0 (sum of total score divided by 5) producing three categories: the “highly-religious” (4.0 to 5.0), the “religious” (2.1 to 3.9), and the “not-religious” (1.0 to 2.0).²⁹ The CRS-7 has high internal consistency (Cronbach’s alpha=0.84).³⁰

The Spiritual and Religious Attitudes in Dealing with Illness Scale (SpREUK) questionnaire was also administered and consists of 15 items assessing how spirituality helps coping with chronic disease. It avoids exclusive religious

terminology, the SpREUK questionnaire consists of three subscales reflecting different strategies of spiritual coping. The subscales are “search” for spiritual support, “trust“ in a higher power, and “reflection” on a positive interpretation of the disease. The internal consistency alpha ranges from 0.84 to 0.91.³¹ Each subscale is assessed by five items scored from disagreement to agreement, and transformed into a score of 0% to 100%.³² All scores greater than 50% reflect spiritual coping and scores less than 50 reflect a lack of spiritual coping.³³

2.4 Statistical Analysis

Data were analyzed using the Statistical Package Social Science (SPSS) version 24.0. Descriptive statistics were performed for patient characteristics. Cardiac diagnosis groups were analyzed and compared by a Kruskal-Wallis-Test. Changes during CR were assessed by the paired t-test. The associations between social support (ESSI-D), R/S (CRS, SpREUK), and both psychological symptoms (HADS-A, HADS-D, MacNew QoL) and physical measures (cycle ergometry, 6MWT) were determined using Pearson correlations. To determine the independent associations between social support and R/S and anxiety, depression, health related QoL, and exercise capacity, multiple regression analysis was performed, using age, gender, education level, and morbidity as covariates. All statistical tests were two-sided and used an alpha level of $p < 0.05$ to determine statistical significance.

3. Results

3.1 Characteristic of the study population

The sociodemographic characteristics are depicted in **Table 1**. Participants were predominantly male and were of advanced age. The majority had a Christian

background and either Catholic or Protestant. Of participants, 75.5% underwent cardiac surgery for ischemic or valvular heart disease or aortic pathologies. Other participants suffered from an acute coronary event which was treated by percutaneous coronary intervention, were hospitalized for heart failure, or were hospitalized for other cardiac diseases.

Table 1: Sociodemographic characteristics and main diagnosis

Age, mean (SD)	70.22 (9.66)
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Gender, n (%)	
Male	115 (72.3)
Female	44 (27.7)
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Religion and Denomination, n (%)	
Christian	127 (79.9)
Catholic	60 (37.7)
Protestant	52 (32.7)
Orthodox	3 (1.9)
Evangelicals	9 (5.7)
Others	3 (1.9)
Judaism	3 (1.9)
Islam	1 (0.6)
Hinduism	0 (0)
Buddhism	2 (1.3)
None	23 (14.5)
Others	3 (1.9)
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Religiosity (CRS), n (%)	
not-religious	37 (23.3)
religious	86 (54.1)
highly religious	36 (22.6)
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Main diagnosis, n (%)	
CABS	61 (38.4)
Valvular surgery	51 (32.1)
Aortic surgery	8 (5.0)
Myocardial infarction	23 (14.5)
Heart failure	13 (8.2)
Others	3 (1.9)

CRS, Centrality of Religiosity Scale; CABS, coronary artery bypass surgery

The majority (56.0%) of participants were married, 22.0% divorced and 14.5% widowed; and 62% had 9 years of school education or less, 20.8% had a middle school diploma, and 16.4% had a university degree. Significant scores on anxiety and depression (≥ 8) were found for 20.1% on the HADS-A and 18.2% on the HADS-D. Admission to the CR program was on average 13.3 days (SD = 9.26) after surgery or the acute cardiac event. The average length of stay in the CR program was 20.1 days (SD = 5.4 days).

Table 2 displays the psychosocial and physical characteristics of the study population. Participants were evenly distributed by diagnosis groups without any significant differences on the Kruskal-Wallis-Test. Only patients with heart failure differed slightly from the other groups. Heart failure patients had more symptoms of anxiety, less social support, higher religiosity, and less exercise capacity (6MWT), but these differences were not statistically significant.

Table 2: Means of psychosocial and physical characteristics in the total sample and by diagnosis group

	Total sample	CABS	Valvular surgery	Aortic surgery	Myocardial infarction	Heart failure
n	159	61	51	8	23	13
Anxiety, M (SD)	4.7 (4.2)	4.4 (3.8)	4.6 (4.3)	4.8 (3.8)	4.4 (4.4)	6.5 (4.9)
Depression, M (SD)	4.4 (3.8)	4.1 (3.8)	4.5 (3.6)	5.4 (4.0)	4.6 (4.0)	4.7 (4.8)
Social support, M (SD)	21.6 (3.5)	22.0 (2.8)	21.7 (3.2)	22.0 (2.8)	20.8 (4.4)	20.2 (5.6)
Religiosity, M (SD)	2.9 (1.1)	2.8 (1.0)	2.9 (1.1)	2.9 (1.4)	2.9 (0.9)	3.0 (1.1)
n	140	56	44	6	20	12
QoL on admission in %, M (SD)	71.8 (14.8)	70.6 (16.2)	71.6 (13.3)	64.5 (12.7)	76.4 (16.7)	74.9 (14.4)
n	132	52	41	6	19	12
QoL on discharge in %, M (SD)	83.2 (12.2)	82.0 (12.6)	84.6 (11.9)	86.3 (8.4)	86.6 (9.6)	78.4 (15.1)
n	141	53	45	8	21	12
Exercise capacity in m, (6MWT) on admission, M (SD)	348 (133)	359 (125)	361 (136)	295 (159)	373 (122)	280 (127)
n	153	59	49	7	22	13
Exercise capacity in m, (6MWT) on discharge, M (SD)	428 (129)	447 (110)	434 (141)	411 (163)	426 (131)	361 (120)
n	136	54	40	7	22	10
Exercise capacity (Cycle ergometer) on admission in %, M (SD)	46.8 (14.6)	45.7 (14.1)	47 (15.6)	39.4 (7.8)	52.7 (15.8)	47.3 (13.1)

CABS, coronary artery bypass surgery; M, mean; SD, standart deviation; m, meter; HADS-A, Hospital Anxiety and Depression Scale-Anxiety; HADS-D, Hospital Anxiety and Depression Scale-Depression; ESSI-D, ENRICHD Social Support Inventory – German; CRS, Centrality of Religiosity Scale; QoL, Quality of Life; 6MWT, 6-min walk test; MacNew, MacNew Heart Disease Health-related Quality of Life Questionnaire. Group "others" (n=3) is not shown but included in "total sample".

Exercise capacity (6MWT) and QoL (MacNew) improved significantly over the course of CR (from 348m to 428m, $p < 0.001$, respectively, from 71.8% to 83.2%, $p < 0.001$).

3.2 Association between social support, religiosity, and clinical parameters

Table 3: Correlations of social support and R/S with psychosocial and physical variables on admission

	Anxiety (HADS-A)	Depression (HADS-D)	QoL (MacNew)	Exercise capacity (Cycle ergometer)	Exercise capacity (6MWT)
	n=159	n=159	n=140	n=136	n=141
Social Support (ESSI-D)	-0.392**	-0.560**	0.201*	0.054	0.058
Religiosity (CRS)	-0.089	-0.160*	0.190*	0.190*	-0.028
Church attendance (CRS)	-0.174*	-0.116	0.247**	0.156	-0.050
Search (SpREUK)	0.133	-0.066	0.007	0.156	0.077
Trust (SpREUK)	0.018	-0.113	0.109	0.110	-0.008
Reflection (SpREUK)	0.176*	-0.062	-0.074	0.059	0.107

* $p < 0.05$; ** $p < 0.01$

HADS-A, Hospital Anxiety and Depression Scale-Anxiety; HADS-D, Hospital Anxiety and Depression Scale-Depression; QoL, Quality of Life; MacNew, MacNew Heart Disease Health-related Quality of Life Questionnaire; 6MWT, 6-min walk test; ESSI-D, ENRICHD Social Support Inventory – German; CRS, Centrality of Religiosity Scale; SpREUK, Spiritual and Religious Attitudes in Dealing with Illness Scale

Table 3 and 4 demonstrate the relationship between R/S, psychosocial factors, and CR outcomes. On admission, greater social support was significantly associated with less symptoms of anxiety and depression, and higher QoL; the same was true on discharge. On admission, greater religiosity (CRS) was significantly associated with less symptoms of depression, higher QoL, and better exercise capacity (cycle ergometer test). In addition, frequency of church attendance was significantly associated with less symptoms of anxiety, and better QoL on discharge. A higher

score of “reflection” in relation to patients’ disease (SpREUK) was significantly associated with more symptoms of anxiety, but was not correlated with depression, QoL, or exercise capacity. There were no significant associations between other SpREUK categories (Search, Trust) and psychosocial or physical outcomes. Neither was there a significant association between either social support or R/S with change in QoL or 6MWT from admission to discharge.

Table 4: Correlations of social support and R/S with QoL and exercise capacity on discharge and over the course of CR

	QoL (MacNew)	Exercise capacity (6MWT)	Δ QoL (MacNew)	Δ Exercise capacity (6MWT)
	n=132	n=153	n=126	n=136
Social Support (ESSI-D)	0.242**	0.032	0.002	0.007
Religiosity (CRS)	0.148	-0.065	-0.085	-0.075
Church attendance (CRS)	0.176*	-0.070	-0.106	-0.057
Search (SpREUK)	-0.021	0.050	-0.064	-0.040
Trust (SpREUK)	0.101	-0.053	-0.052	-0.070
Reflection (SpREUK)	-0.073	0.020	0.000	-0.080

*p < 0.05; **p < 0.01

QoL, Quality of Life; MacNew, MacNew Heart Disease Health-related Quality of Life Questionnaire; 6MWT, 6-min walk test; ESSI-D, ENRICH Social Support Inventory – German; CRS, Centrality of Religiosity Scale; SpREUK, Spiritual and Religious Attitudes in Dealing with Illness Scale

3.3 Predictors of psychosocial and physical outcomes

Table 5: Multiple regression models for the prediction of psychosocial and physical outcomes

Predictors	Anxiety (HADS-A) ¹	Depression (HADS-D) ¹	QoL (MacNew) ¹	Exercise capacity (Cycle ergometer) ¹
Age	-0.070	0.133	0.277***	-0.082
Gender	0.082	-0.028	0.059	-0.178*
Education level	-0.012	-0.064	-0.060	-0.011
Morbidity (CIRS)	0.138	-0.119*	-0.132	-0.243**
QoL (MacNew)	-0.160	-0.358***	-	0.239*
Anxiety (HADS-A)	-	0.395***	-0.112	0.191
Depression (HADS-D)	0.518***	-	-0.557***	-0.203
Exercise capacity (Cycle ergometer)	0.150	-0.080	0.146*	-
<i>Social Support (ESSI-D)</i>	<i>-0.069</i>	<i>-0.344***</i>	<i>-0.138</i>	<i>-0.112</i>
<i>Religiosity (CRS)</i>	<i>0.022</i>	<i>-0.076</i>	<i>-0.041</i>	<i>0.098</i>
Adjusted R ² of the model	0.419	0.662	0.475	0.139

*p < 0.05; **p < 0.01, ***p < 0.001, ¹ Beta-coefficients

HADS-A, Hospital Anxiety and Depression Scale-Anxiety; HADS-D, Hospital Anxiety and Depression Scale-Depression; QoL, Quality of Life; MacNew, MacNew Heart Disease Health-related Quality of Life Questionnaire; CIRIS, Cumulative Illness Rating Scale; ESSI-D, ENRICH Social Support Inventory – German; CRS, Centrality of Religiosity Scale

Table 5 provides the results from the multiple regression analyses examining predictors of psychosocial (anxiety, depression, QoL) and physical (exercise capacity) states on admission. After controlling for sociodemographic, illness-related, and psychosocial variables, social support remained a significant correlate of depression. Religiosity (CRS) didn't reach significance for any of the outcome variables. The strongest predictor for anxiety and QoL was depression; the strongest negative predictor for exercise capacity was degree of comorbidity.

4. Discussion

The purpose of the present study was to evaluate the potential impact of social support and religiosity/spirituality on recovery from acute cardiac events or heart surgery among participants in a cardiac rehabilitation program. A total of 159 cardiac patients were included. Participants were predominantly male of advanced age, had high scores of social support, and were moderately religious. No significant difference was found between diagnosis groups (CABS, valvular surgery, aortic surgery, myocardial infarction, and heart failure).

The main result was a significant association between social support and less depression on admission to CR, supporting our hypotheses that social support enhances cardiac recovery (at least at the time of entry into CR). R/S also showed a significant association with depression, QoL and even exercise capacity but lost significance after adjustment for covariates. No impact was found for either social

support or R/S on change in health-related QoL (MacNew) or change in exercise capacity (6MWT) during the CR program.

4.1 The “impact” of social support on psychosocial and physical outcomes

This study confirmed a significant relationship between social support and psychosocial outcomes particularly depression in cardiac patients,¹¹ one that was independent of risk factors for poor cardiac outcome.³⁴ Social support may improve emotional symptoms in the short-run, and although not demonstrated here, perhaps also long-term as well.¹² Thus, social support may be considered a “buffering agent” that has the ability to reduce the negative consequences of stressors (Cohen et al., 1985). In contrast, negative social interactions may increase cardiovascular stress responses in laboratory settings.³⁵

Symptoms of anxiety and depression are associated with substantial impairment in QoL.³⁶ Our results reflected this. Depression was the strongest negative factor in the multiple regression model predicting QoL. Church attendance may also be considered a marker for social support and social integration, since it was found on admission and discharge to be positively correlated with QoL. Even though significance was lost after adjustment, church attendance can be viewed as supportive for quality of life specially for those who are religious. Support from church members has been associated with positive health and well-being,³⁷ life satisfaction,³⁸ and less depression and psychological distress.³⁹

No significant association, however, was found between social support and physical outcomes (6MWT and cycle ergometer) during CR. To our knowledge, this is the first study to examine this effect. A previous study in a healthy population found that social support was associated with greater high-density lipoprotein cholesterol levels, indicating possible mechanisms by which social support may reduce the

incidence of cardiovascular disease.⁴⁰ During CR we found a significant improvement for QoL and exercise capacity (6MWT), but this result was not associated with social support. Perhaps the duration of 21 days for an average CR program is too short to show a significant impact for with social support (or R/S).

4.2 The “impact” of religiosity and spirituality on psychosocial and physical outcomes

Several studies have reported a positive association between R/S and recovery in patients with heart disease.^{41 42 43} Contrada⁴¹ investigated 142 patients undergoing heart surgery, assessing religiosity and other psychosocial factors one week before surgery. Religiosity was related to less depression, more optimism and more social support during recovery. A systematic review has also reported a significant positive association between R/S and quality of life (QoL) in 10 out of 15 studies.⁴⁴ Similar results have been found in an European study with patients undergoing bypass surgery.⁴⁵ In the present study, we found an association between religiosity (CRS), less depression, and better QoL. But after adjustment for confounders, these associations lost significance. Therefore, the findings above could not be replicated in our patient sample.

According to the concept of “centrality of religiosity”,⁴⁶ religion has an impact on patient’s health when it is a central component of patients’ lives. Our study population was moderately religious on average (23% were “highly-religious”). In contrast, 62% of the US-population belong to the “highly-religious” group.³⁰ This might be a reason why the effects of R/S on cardiac recovery reported in the US could not be replicated in our European study.

In the unadjusted analyses, religiosity (CRS) was positively associated with exercise capacity (Table 3). This might reflect the findings by Karademas⁴² on

religiousness and physical functioning in patients with chronic heart disease. No impact, however, was found for R/S on improvement of physical fitness during CR (table 4). Spiritual and religious attitudes (“Search”, “Trust” and “Reflection”) had no effect on psychosocial or physical outcomes even though they are less oriented towards institutional religion and should therefore would be a better fit for a moderately religious or non-religious population.³²

5. Strengths and Limitations

To our knowledge, this is the first study in Europe assessing the impact of social support and R/S in the rehabilitation of cardiac patients. The study investigated 159 cardiac patients, an adequate number, that is similar to sample size reported in existing international studies.⁴⁴ Our patients were well characterized in terms of medical data, quality of life (longitudinal), and psychosocial characteristics (cross-sectional). The mean-score of social support corresponds to that in a patient sample studied in a German adaptation study²⁸ and the percentage of “highly-religious” participants matches that for a Swiss sample in a study by Gütersloh et al..³⁰ Therefore, this suggests that these results may be generalized to other German speaking populations.

One of the main study limitations was the lack of longitudinal data on anxiety and depression. Therefore, the effects of social support and R/S on the course of anxiety and depression symptoms could not be examined. Another limitation is the heterogenous cardiac sample including different diagnosis groups and therefore likely different pathways in the recovery process. Interestingly groups did not differ in medical and psychosocial characteristics (Table 4). Finally, non-German speaking patients had to be excluded, which could explain the low number of Muslims, Hindus and Jews in the sample.

6. Conclusion

This study confirmed the inverse relationship between social support and depressive symptoms in patients recovering from cardiac surgery and acute cardiac events. In contrast, social support was not related to better QoL and to physical outcomes such as exercise capacity. R/S was associated with less depression, better QoL, and greater exercise capacity on admission to the CR unit, but these relationships did not persist in multivariate analyses, as others have found.⁴⁴ These results underscore the importance of assessing and addressing psychosocial factors as social support and R/S in cardiac rehabilitation. The assessment of social support should be a standard procedure in CR, whereas the impact of R/S in cardiac recovery needs further study in secular European contexts.

Data availability statement

Written data requests can be made to the corresponding author.

Declarations of interest

none

Conflicts of interest

none

Funding source

none

Author contribution

Micha Eglin: conceptualization, methodology, investigation, data curation, writing - original draft, visualization. **Jean-Paul Schmid:** conceptualization, methodology,

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