Clinical research

State and trait anxiety in islander cardiac patients: associated factors and the impact of perceived social support

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Abstract

Introduction: Cardiac patients frequently experience elevated levels of anxiety, which may influence clinical outcomes. Perceived social support is a precious resource with which to minimise anxiety. The aim of the study was to explore levels of perceived social support, levels of anxiety (state and trait), and the associated factors as well as the impact of patents' characteristics and social support on anxiety.

Material and methods: The study sample consisted of 82 island inhabitant patients with cardiac problems (49 men and 33 women). Data collected by the completion of the State-trait anxiety inventory (STAI) and the Multidimensional scale of perceived social support questionnaire (MSPSS). The statistical significance level was set at $p < 0.05$.

Results: Regarding state and trait anxiety, half of the patients scored below 37 and 38, respectively, (medians) while 25% of participants scored more than 50 and 48, respectively. These values indicate moderate levels of anxiety. Regarding social support, at least 50% of patients scored over 27, 27, and 20 (median) on support from significant ones, family, and friends, respectively. In addition, 25% of patients scored above 28, 28, and 26, respectively. These values indicate high levels of social support. The association between anxiety and social support was found to be linearly negative, meaning that the more support a patient felt, the less anxiety they also experienced.

Conclusions: Enhancing perceived social support may be a key-element in alleviating anxiety among cardiac patients.

Key words: perceived social support, state, trait anxiety, cardiac disease.

Introduction

During recent decades the life expectancy of cardiac patients has been prolonged due to considerable advances in the field of treatment, including progress in diagnostic tools and improvements in coronary intervention. Meanwhile, the role of demographic characteristics in the manifestation and outcome of cardiac diseases are well documented, and these parameters are evaluated in daily clinical practice [1, 2].

Furthermore, cardiac diseases often occur in parallel with psychological distress [3]. A high prevalence of anxiety is observed in many types of cardiac disease, either chronic or acute. For instance, anxiety is prevalent in 20–30% of patients after an acute coronary syndrome, which persists in half of cases up to one year post-event [1, 2].

Fotini Legaki, Fotoula Babatsikou, Charilaos Koutis, Maria Polikandrioti

Association between anxiety and cardiac disease is two faceted. Anxiety is associated with increased risk of developing cardiac disease or the deterioration of an already established one [1].

On the other hand, patients with anxiety may experience cardiovascular system symptoms, or a cardiac disease may underlie in patients with psychiatric symptoms [4–6].

Anxiety incorporates two complementary concepts: the psychophysiological state (state anxiety) and the personality trait (trait anxiety). State anxiety evaluates the current condition of anxiety or transient reaction directly related to adverse situations in a specific moment. In contrast, trait anxiety evaluates stable aspects of "anxiety proneness", thus describing an individual's tendency [7].

Nowadays, there is increasing effort to enable patients experiencing psychological distress to assume responsibility for their own health management. Therefore, it is essential in clinical settings to differentiate between temporary and long-standing conditions of anxiety.

Perceived social support has beneficial clinical implications in several chronic illness, such as haemodialyis [8], diabetic ulcer [9], and cardiac disease [10, 11]. Low social support along with depression, which often co-exists with anxiety, are significant indicators for poor prognosis in cardiac patients [11].

Undoubtedly, living on an island is associated with several barriers. The characteristics of sea islanders, such as low rates of smoking, increased daily physical activity, and healthy eating habits, are among those that contribute to longevity; however, a wide range of factors may hamper their heath, such as health care deficiencies or failure of early access to optimal healthcare, reluctance to report increased stress for fear of stigmatisation, and several others [12].

A broader understanding of factors influencing anxiety among cardiac patients living on an island as well as the impact of social support on anxiety may serve to alert clinicians in anxiety-related areas that would otherwise be overlooked.

To the best of our knowledge, data exploring anxiety among cardiac patients living on an island and the associated factors are limited.

Thus, the aim of this cross-sectional study was to explore levels of perceived social support and levels of anxiety (state and trait) and the associated factors, as well as the impact of patents' characteristics and social support on anxiety.

Material and methods

Study population

The sample of the study consisted of 82 patients with cardiac problems, living on the island of Naxos (49 men and 33 women). It was a convenience sample.

Criteria for inclusion in the study were as follows: a) an established cardiac disease and not a first diagnosis, b) the ability to write and read the Greek language fluently, and c) permanent residency on the island.

In greater detail, cardiac disease had already been established and participants had received treatment for their cardiac disease in urban areas, mainly in Athens. The patients were included in the present study because they lived permanently on the island and they regularly visited the outpatient department of the public hospital for monitoring and follow-up.

The exclusion criteria were patients with the following: a) a history of mental illness and b) other chronic disease.

Data collection was performed by interview method using a questionnaire, which included the following: a) socio-demographic, clinical, and other patients' self-reported characteristics; b) the State-Trait Anxiety Inventory (STAI); and c) the Multidimensional Scale of Perceived Social Support questionnaire (MSPSS).

Completion of the questionnaires lasted approximately 15 min and took place after patients had finished their regular monitoring and follow-up.

In the present study there was no intervention or control group because this research merely recorded whether patients experienced anxiety and its association with social support. Literature on this association was limited and did not enable extensive comparative research.

Ethical considerations

Patients who met the entry criteria were informed by the researcher for the purposes of the study and participated only after they had given their written consent. All of the patients participated in the study on a voluntary basis and had their anonymity preserved. All participants were informed of their rights to refuse or to discontinue their participation, according to the ethical standards of the Helsinki Declaration of 1983. The study was approved by the Medical Research Ethics Committee of the hospital.

Demographic characteristics

The study collected the following socio-demographic characteristics of the participants: gender, age, marital and educational status, and job.

Clinical characteristics

In addition, data on the underlying disease of the participants were collected. More specifically, the following items were recorded: the type of car-

diac disease they were suffering from, the number of years since the onset of their cardiac problem, whether they were suffering from another disease, whether they reported insomnia.

Other self-reported characteristics

Patients were also asked about the following:
– Their level of information about cardiac disease.
– The need for written information about their cardiac disease.
– Difficulties in their everyday activities.
– Limitations in social contact due to cardiac disease.
– Their relationship with nursing, medical staff, and other patients.
– Whether they experienced dependency on health professionals.
– Whether they experienced support from their family after diagnosis.
– Whether they were satisfied with their life.
– Whether they experienced insecurity due to their life on an island.

State and trait anxiety assessment

The State-Trait Anxiety Inventory (STAI) scale was used to assess anxiety among cardiac islanders. State-trait anxiety scales (temporary and permanent anxiety) consist of 20 questions (respectively) that evaluate how respondents feel at the time of completing the questionnaire. Respondents were able to answer each question on a Likert-type scale (scores of 1–4). The scores attributed to the questions are summed, leading to a final score of temporary and permanent anxiety, respectively. Higher score values indicate higher levels of anxiety [13].

Perceived social support assessment

The Multidimensional Scale of Perceived Social Support questionnaire (MSPSS) was used to evaluate perceived social support. This scale had been translated and culturally adapted to Greek standards. It assesses three dimensions of social support: support from significant others, family, and friends. The questions of each dimension expressing "support" are rated at a seven-point Likert scale from 1 to 7. In order to calculate the final score of each dimension of perceived social support, we add the scores of questions corresponding to each dimension and divide by the number of questions included in each dimension. These scores reflect the degree of support felt by the patients. Higher scores indicate higher support [14].

Statistical analysis

Categorical data are presented with absolute and relative (%) frequencies, whereas continuous data are presented with mean, standard deviation, median, and interquartile range. The normality of the data was verified by Kolmogorov-Smirnov test and graphically with histograms and Q-Q plots. The Mann-Whitney and Kruskal-Wallis tests were used to evaluate the association between anxiety scores, social support, and the patient's characteristics. Levels of anxiety and perceived social support were estimated by both mean and standard deviation (SD) and median and interquartile range (IQR).

Multiple linear regression was applied to assess the effect of the characteristics on the state and trait anxiety as well as the social support of patients. Results are presented with β coefficients and 95% confidence intervals. The observed significance level of 5% was considered statistically significant. All statistical analyses were performed with SPSS version 25 (SPSS Inc., Chicago, IL, USA).

Results

Sample description

Table I presents the demographic characteristics of the sample. In particular, men accounted for 59.8% of the sample, 32.9% were over 70 years of age, 67.1% were married, 37.8% had primary education, and 42.7% were retired.

Table II presents data related to patients' clinical characteristics. The majority of patients had myocardial infarction (34.1%) and atrial fibrillation (24.4%). Furthermore, in 28% of participants, the onset of cardiac disease was between 2 and 5 years, in 88.9% it co-existed some other disease, and 34.1% reported insomnia.

Table III presents other self-reported characteristics. In greater detail, 32.9% declared they were "very" well informed about their cardiac disease and 63.4% reported the need for written information about their cardiac disease. Difficulties in everyday activities accounted for 37.8% of the sample, while half of the patients (51.2%) did not limit their social contacts "at all" due to their cardiac disease. Moreover, 69.5%, 73.2%, and 32.9% of patients had "very good" relations with nursing, medical staff, and other patients, respectively.

Additionally, 56.1% believed that their life depended on health professionals, 69.5% believed their family supported them "very much", and 24.4% declared they were "very" satisfied with their life. Finally, the majority of the patients (65.9%) stated that they experienced insecurity because they were living on an island.

Measurement of state and trait anxiety

The results in Table IV refer to the state-trait anxiety of patients. We can observe that half of patients scored below 37 and 38 in state and trait anxiety, respectively (median), while 25% of the

Fotini Legaki, Fotoula Babatsikou, Charilaos Koutis, Maria Polikandrioti

Table I. Demographic characteristics (*N* = 82)

Parameter	*N* (%)
Gender:	
Male	49 (59.8)
Female	33 (40.2)
Age:	
< 30	2 (2.4)
30–40	8 (9.8)
41–50	11 (13.4)
51–60	14 (17.1)
61–70	20 (24.4)
> 70	27 (32.9)
Family status:	
Married	55 (67.1)
Single	8 (9.8)
Divorced	6 (7.3)
Widowed	9 (11.0)
Living together	4 (4.9)
Education:	
Primary school	31 (37.8)
High school	33 (40.2)
University	14 (17.1)
MSc – PhD	4 (4.9)
Job:	
Unemployed	3 (3.7)
Civil servant	9 (11.0)
Private employee	7 (8.5)
Freelancer	15 (18.3)
Household	9 (11.0)
Pensioner	35 (42.7)
Other	4 (4.9)

Table II. Clinical characteristics (*N* = 82)

Parameter	*N* (%)
Cardiac disease:	
Heart failure	15 (18.3)
Myocardial infraction	28 (34.1)
Atrial fibrillation	20 (24.4)
Unstable angina	12 (14.6)
Pacemaker	7 (8.5)
Number of years since the onset of cardiac disease:	
< 1	22 (26.8)
2–5	23 (28.0)
6–10	20 (24.4)
11–15	4 (4.9)
>15	13 (15.9)
Other disease:	
Yes	72 (88.9)
No	9 (11.1)
Insomnia:	
Yes	28 (34.1)
No	54 (65.9)

support from significant ones, family, and friends, respectively. In addition, 25% of patients scored above 28, 28, and 26, respectively. These values, in relation to the possible score range (4–28), indicate high levels of perceived social support for patients. Patients experienced more social support from significant ones and family and less from friends. Also, the results are presented as mean and standard deviation (SD).

Association between patients' characteristics and state and trait anxiety

Table VI presents the association between patient's characteristics and anxiety (state and trait).

Both measurements (state and trait anxiety) were found to be statistically significantly associated with the existence of other diseases (*p* = 0.037 and *p* = 0.026, respectively), whether they had insomnia (*p* = 0.037 and *p* = 0.016, respectively), whether they experienced difficulties in everyday activities (*p* = 0.032 and *p* = 0.027, respectively), whether they had limited their social contact (*p* = 0.004 and *p* = 0.025, respectively), and how satisfied they were with their lives (*p* = 0.001 and *p* = 0.001, respectively). More specifically, patients with another disease had more

patients scored more than 50 and 48, respectively. These values, in relation to the possible range of anxiety scores, indicate moderate levels of state and trait anxiety in patients. Also, the results are presented in mean and standard deviation (SD).

Measurement of perceived social support

The results in Table V refer to perceived social support experienced by patients with cardiac problems. We note that at least 50% of patients scored over 27, 27, and 20 (median) regarding

Table III. Other self-reported characteristics (N = 82)

Parameter	N (%)
Level of information about cardiac disease:	
A lot	27 (32.9)
Enough	46 (56.1)
A little	9 (11.0)
None at all	0 (0.0)
Do you need written information about your cardiac disease?	
Very much	52 (63.4)
Enough	22 (26.8)
A little	8 (9.8)
Not at all	0 (0.0)
Difficulties in everyday activities:	
Yes	31 (37.8)
No	51 (62.2)
Have you limited your social contact due to your cardiac disease?	
Very much	5 (6.1)
Enough	11 (13.4)
A little	24 (29.3)
Not at all	42 (51.2)
Relations with nursing staff:	
Very good	57 (69.5)
Good	22 (26.8)
Moderate	2 (2.4)
Bad	1 (1.2)
Relations with medical staff:	
Very good	60 (73.2)
Good	19 (23.2)

Parameter	N (%)
Moderate	3 (3.7)
Bad	0 (0.0)
Relations with other patients:	
Very good	27 (32.9)
Good	40 (48.8)
Moderate	15 (18.3)
Bad	0 (0.0)
You believe that your life depends on healthcare professionals?	
Very much	46 (56.1)
Enough	30 (36.6)
Little	6 (7.3)
Not at all	0 (0.0)
Do you believe your family supports you after the diagnosis?	
Very much	57 (69.5)
Enough	20 (24.4)
A little	2 (2.4)
Not at all	3 (3.7)
How satisfied you are with your life?	
Very much	20 (24.4)
Enough	47 (57.3)
A little	10 (12.2)
Not at all	5 (6.1)
Do you experience insecurity because you live on an island?	
Yes	54 (65.9)
No	28 (34.1)

Table IV. Measurement of patients' state and trait anxiety

Paramater	Mean (SD)	Median (IQR)
State anxiety (range: 20–80)	39.4 (13.8)	37 (29–50)
Trait anxiety (range: 20–80)	39.5 (11.0)	38 (31–48)

SD – standard deviation, IQR – interquartile range.

Table V. Levels of perceived social support

Support from	Mean (SD)	Median (IQR)
Significant ones (range: 4–28)	25.4 (3.2)	27 (23–28)
Family (range: 4–28)	25.4 (4.1)	27 (24–28)
Friends (range: 4–28)	20.9 (5.6)	20 (16–26)

SD – standard deviation, IQR – interquartile range.

state and trait anxiety (median 38 and 39.5, respectively) than patients without other disease (median 31 and 32, respectively). Patients who had insomnia (median 46 and 44.5, respectively) had more state and trait anxiety than those who did not have insomnia (median 34.5 and 35, respectively). Accordingly, patients who faced difficulties in everyday activities had more state and trait anxiety (median 44 and 43, respectively) than those who did not (median 35 and 35, re-

Fotini Legaki, Fotoula Babatsikou, Charilaos Koutis, Maria Polikandrioti

Table VI. Association between patients' characteristics and state and trait anxiety

Parameter	State anxiety Median (IQR)	P-value	Trait anxiety Median (IQR)	P-value
Gender:		0.060		0.055
Male	33 (26–46)		34(29–41)	
Female	41 (35–52)		43(35–51)	
Age:		0.309		0.282
< 50	37 (31–42)		34 (29–44)	
51-60	41.5 (35–51)		40 (33–51)	
61-70	31 (23–44)		37.5 (30.5–42.5)	
>70	38 (29–53)		43 (34–51)	
Family status:		0.936		0.163
Married/living together	37 (29–48)		35 (29–49)	
Single/widowed/divorced	38 (29–52)		42 (35–46)	
Education:		0.303		0.003
Primary school	35 (29–50)		43 (35–51)	
High school	39 (31–52)		36 (31–44)	
University	34.5 (27–40)		32.5 (28–37)	
Job:		0.800		0.067
Unemployed/household	43.5 (30–51)		45 (40.5–50.5)	
Employee	37 (31–43)		34 (29–44)	
Pensioner	34 (25–52)		38 (32–48)	
Cardiac disease:		0.438		0.898
Heart failure	35 (29–38)		38 (34–41)	
Myocardial infraction	36.5 (26–47)		35.5 (29.5–51)	
Atrial fibrillation	37 (30–45)		41 (30–45)	
Unstable angina	42.5 (30.5–53.5)		38 (32.5–52.5)	
Pacemaker	55 (23–64)		44 (26–48)	
Number of years since the onset of cardiac disease:		0.962		0.347
< 1	37 (29–46)		33.5 (29–44)	
2–5	39 (30–52)		41 (31–45)	
6–15	36.5 (26.5–51)		39.5 (33.5–47)	
> 15	35 (31–48)		40 (35–52)	
Other disease:		0.037		0.026
Yes	38 (30–51.5)		39.5 (32–49)	
No	31 (26–36)		32 (28–35)	
Insomnia:		0.037		0.016
Yes	46 (33.5–54)		44.5 (34–51.5)	
No	34.5 (29–42)		35 (29–43)	
Level of information about cardiac disease:		0.730		0.348
A lot	36 (27–46)		35 (28–44)	
Enough	38 (30–51)		40 (32–48)	
Little	34 (23–51)		38 (35–51)	
Need of receiving written information:		0.244		0.529
Very much	38 (29.5–50.5)		40 (32–47)	
Enough	35.5 (29–52)		34 (29–45)	
Little	30.5 (29–33)		34.5 (31.5–51)	

Table VI. Cont.

Parameter	State anxiety Median (IQR)	P-value	Trait anxiety Median (IQR)	P-value
Difficulties in everyday activities:		0.032		0.027
Yes	44 (34–55)		43 (34–51)	
No	35 (29–43)		35 (29–43)	
Limited social contact:		0.004		0.025
Very/enough	47 (32–57.5)		43 (34–51)	
Little	44.5 (34–52.5)		43.5 (32.5–52.5)	
Not at all	33 (23–39)		35 (29–41)	
Relations with nursing staff:		0.161		0.574
Very good	36 (28–43)		38 (32–45)	
Good	43.5 (31.5–52.5)		36 (28.5–50)	
Relations with medical staff:		0.872		0.114
Very good	37 (28.5–49)		39.5 (32.5–47)	
Good	36 (29–48)		33 (28–45)	
Relations with other patients:		0.175		0.688
Very good	39 (34–56)		40 (32–49)	
Good	35.5 (28–48)		35 (30.5–45)	
Moderate	32 (23–48)		41 (29–50)	
Dependence on healthcare professionals:		0.123		0.122
Very	40 (31–53)		40.5 (32–51)	
Enough	36 (27–44)		35.5 (29–45)	
Support from family:		0.205		0.203
Very much	36 (27–48)		40 (30–49)	
Enough	39.5 (31.5–53)		34 (31.5–39)	
Satisfied with life:		0.001		0.001
Very much	26.5 (23–36)		28.5 (26–35)	
Enough	39 (31–51)		38 (32–45)	
Little/not at all	51 (34–64)		49 (44–51)	
Insecure because you live on an island:		0.015		0.238
Yes	40.5 (31–52)		39 (30–51)	
No	32.5 (24.5–38.5)		36.5 (31.5–43)	

spectively). In addition, patients who had limited *very much* or *enough* their social contact (median 47 and 43, respectively), as well as patients who were *little* or *not at all* satisfied with their lives (median 51 and 49, respectively), had more state and trait anxiety.

In addition, patients' state anxiety was found to be statistically significantly associated with the insecurity they felt due to their living on an island (*p* = 0.015), whereas trait anxiety was found to be statistically significantly associated with educational level (*p* = 0.003). Patients feeling insecurity because they were living on an island had more state anxiety (median 40.5) than patients without such insecurity (median 32.5). Similarly, patients with primary education (median 43) had more trait anxiety than those with secondary and higher education (median 36 and 32.5, respectively).

Association between patients' characteristics and perceived social support

Table VII presents the association between patients' characteristics and social support.

A statistically significant association was observed between the score of support from significant ones and marital status (*p* = 0.001), insomnia (*p* = 0.026), limitation of social contact (*p* = 0.011), and satisfaction from life (*p* = 0.001). In greater detail, married patients experienced statistically significantly higher levels of support from significant ones (median 28) than single patients (median 24). Those who did not have insomnia had statistically significantly higher levels of support from significant ones (median 28) compared to those with insomnia (median 25). Patients who had not limited or had only slightly limited their

Fotini Legaki, Fotoula Babatsikou, Charilaos Koutis, Maria Polikandrioti

Table VII. Association between patients' characteristics and perceived social support

Parameter	Significant ones Median (IQR)	P-value	Family Median (IQR)	P-value	Friends Median (IQR)	P-value
Gender:		0.314		0.893		0.548
Male	28 (24–28)		27 (24–28)		20 (18–26)	
Female	26 (23–28)		27 (23–28)		20 (16–25)	
Age:		0.729		0.463		0.013
< 50	27 (24–28)		28 (25–28)		25 (21–28)	
51–60	28 (25–28)		28 (27–28)		19 (15–24)	
61–70	27.5 (22.5–28)		27 (24–28)		21 (19–25)	
> 70	26 (23–28)		27 (23–28)		17 (15–24)	
Family status:		0.001		0.021		0.536
Married/living together	28 (25–28)		28 (25–28)		21 (16–27)	
Single/widowed/divorced	24 (21–26)		25 (23–28)		20 (16–24)	
Education:		0.329		0.181		0.001
Primary school	25 (23–28)		26 (23–28)		18 (15–22)	
High school	27 (24–28)		28 (25–28)		20 (16–26)	
University	28 (25–28)		28 (24–28)		24.5 (24–28)	
Job:		0.073		0.058		0.001
Unemployed/household	23.5 (21–27)		24.5 (21.5–27)		15.5 (14.5–19)	
Employee	28 (25–28)		28 (25–28)		24 (20–28)	
Pensioner	26 (23–28)		27 (24–28)		20 (16–26)	
Cardiac disease:		0.609		0.309		0.862
Heart failure	26 (24–28)		27 (26–28)		22 (17–28)	
Myocardial infraction	28 (23.5–28)		28 (24–28)		20 (16.5–26.5)	
Atrial fibrillation	28 (24.5–28)		27.5 (25–28)		20.5 (16.5–25.5)	
Unstable angina	26 (21–28)		25 (20.5–27.5)		19 (16–24.5)	
Pacemaker	23 (20–28)		23 (21–28)		20 (15–28)	
Number of years since the onset of cardiac disease:		0.112		0.155		0.055
< 1	28 (26–28)		28 (27–28)		24.5 (20–28)	
2–5	27 (22–28)		27 (24–28)		21 (18–25)	
6–15	25 (22.5–28)		26 (23–28)		16 (15–20.5)	
> 15	26 (24–28)		27 (23–28)		19 (17–24)	
Other disease:		0.131		0.034		0.003
Yes	26 (23–28)		27 (23.5–28)		20 (16–24.5)	
No	28 (27–28)		28 (28–28)		28 (25–28)	
Insomnia:		0.026		0.032		0.033
Yes	25 (22–28)		25.5 (23–28)		18 (15.5–25)	
No	28 (24–28)		28 (25–28)		22.5 (18–27)	
Level of information about cardiac disease:		0.755		0.569		0.464
High	26 (23–28)		28 (25–28)		23 (16–28)	
Adequate	28 (24–28)		27 (23–28)		20.5 (16–26)	
Low	26 (23–28)		27 (21–28)		18 (17–20)	
Need of receiving written information:		0.314		0.445		0.084
High	26.5 (23–28)		27 (24–28)		20 (16–25.5)	
Moderate	28 (25–28)		28 (26–28)		24 (19–28)	
Low	24.5 (23–28)		27.5 (21.5–28)		17 (15–22.5)	

Table VII. Cont.

Parameter	Significant ones Median (IQR)	P-value	Family Median (IQR)	P-value	Friends Median (IQR)	P-value
Difficulties in everyday activities:		0.086		0.137		0.238
Yes	25 (22–28)		26 (23–28)		20 (16–26)	
No	28 (24–28)		28 (25–28)		21 (18–26)	
Limited social contacts:		0.011		0.104		0.019
Very/enough	23.5 (21.5–26)		25 (22.5–27.5)		16 (15–20.5)	
Little	28 (24.5–28)		28 (26.5–28)		21.5 (16.5–28)	
Not at all	27 (24–28)		27 (24–28)		22 (19–25)	
Relations with nursing staff:		0.903		0.898		0.709
Very good	27 (24–28)		27 (24–28)		20 (16–26)	
Good	28 (22–28)		27.5 (22.5–28)		20 (16.5–28)	
Relations with medical staff:		0.355		0.421		0.234
Very good	26 (23.5–28)		27 (24–28)		20 (16–26)	
Good	28 (22–28)		28 (24–28)		24 (18–28)	
Relations with other patients:		0.339		0.197		0.241
Very good	26 (24–28)		28 (25–28)		22 (16–28)	
Good	28 (23.5–28)		27.5 (23.5–28)		21.5 (17–26.5)	
Moderate	24 (22–28)		25 (21–28)		19 (15–21)	
Dependence on healthcare professionals:		0.888		0.697		0.268
Very	27 (23–28)		27 (23–28)		20 (16–26)	
Enough	27 (24–28)		27.5 (25–28)		20.5 (18–28)	
Satisfied with life:		0.001		0.001		0.002
Very	28 (28–28)		28 (28–28)		23.5 (19–28)	
Enough	27 (23–28)		27 (24–28)		21 (17–27)	
Little/not at all	23 (20–25)		23 (21–27)		16 (15–20)	
Insecure because you live on an island:		0.416		0.836		0.484
Yes	26 (23–28)		27 (24–28)		20 (16–26)	
No	28 (24–28)		27 (24–28)		20 (17.5–27.5)	

social contact due to cardiac problems had higher levels of support from significant ones (median 27 and 28, respectively) than those who had limited them a lot (median 23.5). In addition, patients who were very satisfied with their lives experienced higher levels of support from significant ones (median 28).

A statistically significant association was observed between the score of support from family and family status ($p = 0.021$), other diseases ($p = 0.034$), insomnia ($p = 0.032$), and satisfaction with life ($p = 0.001$). More specifically, married patients experienced statistically significantly higher levels of support from family (median 28) than single patients (median 25). Those without another dis-

ease had statistically significantly higher levels of support from family (median 28) than those with another disease (median 27). Those without insomnia also had statistically significantly higher levels of support from family (median 28) than those with insomnia (median 25.5). Patients who were very or adequately satisfied with their life had higher levels of support from family (median 28 and 27, respectively) than those who were less satisfied (median 23).

A statistically significant association was observed between scores of support from friends and age ($p = 0.013$), educational level ($p = 0.001$), occupation ($p = 0.001$), other diseases ($p = 0.003$), insomnia ($p = 0.019$), and satisfaction from life

Fotini Legaki, Fotoula Babatsikou, Charilaos Koutis, Maria Polikandrioti

(*p* = 0.002). More specifically, patients younger than 50 years experienced statistically significantly higher levels of support from friends (median 25) than patients older than 70 years (median 17). Patients with university education experienced statistically significantly higher levels of support from friends (median 24.5) than patients with primary level education (median 18). Employees also experienced statistically significantly higher levels of support from friends (median 24) than retired and unemployed patients (median 20 and 15.5, respectively). Those without another disease had statistically significantly higher levels of support from friends (median 28) than those with another disease (median 20). Furthermore, patients without insomnia had statistically significantly higher levels of support from friends (median 22.5) than those with insomnia (median 18). Lastly, patients who were very or adequately satisfied with their life had higher levels of support from friends (median 23.5 and 21, respectively) than those who were less satisfied (median 16).

Association between patients' anxiety and perceived social support

Table VIII presents the association between patients' state and trait anxiety and the social support they receive from significant ones, family, and friends. We can observe that all associations were statistically significant (*p* < 0.05). The association between anxiety and social support was found to be negative, meaning that an increase in the score of social support either by significant ones, family, or friends leads to a decrease in the score of state and trait anxiety. In other words, the more support a patient felt, the less anxiety they experienced.

The impact of patients' characteristics and social support on anxiety

Multiple linear regression was performed to assess the effect of characteristics and of social support on patients' state and trait anxiety. The results are presented in Table IX. Patients who stated that they were adequately satisfied with their life and those who stated little or no sat-

isfaction had higher state anxiety by 10.21 and 14.42 points, respectively, than patients who stated that they were very satisfied (β = 10.21, 95% CI: 3.54–16.88, *p* = 0.003 and β = 14.42, 95% CI: 4.55–24.29, *p* = 0.005). Similarly, patients who were adequately or a little satisfied with their life had 5.56 and 10.26 points higher trait anxiety, respectively, than those who were very satisfied (β = 5.56, 95% CI: 0.60–10.51, *p* = 0.029 and β = 10.26; 95% CI: 2.97–17.55, *p* = 0.006). In addition, patients who had slightly limited their social contact had 7.7 points higher trait anxiety than patients who had limited their social contact a lot (β = 7.70, 95% CI: 1.24–14.16, *p* = 0.020).

Discussion

The results of the present study show moderate levels of both trait and state anxiety among islanders with cardiac disease.

Anxiety seems to be present in several forms of cardiac disease. High levels of anxiety were observed in 34.9% of outpatients with atrial fibrillation [15], 24.7% of patients with heart failure [16], 27.2% [17] of pacemaker patients, and 20–40% [18] of cardioverter defibrillator patients.

All these figures have brought early screening for anxiety to the forefront of clinical care [1].

The main sources of anxiety in cardiac patients include complex therapeutic regimen, comorbidities, failure of coping mechanisms, frustrations with complicated healthcare system, financial worries, fear of death, hopelessness, and social isolation [1]. On the other hand, anxiety is associated with poor clinical outcomes, such as failure to participate in rehabilitation programs, recurrent cardiac events, poor quality of life, and unhealthy lifestyle behaviour (physical inactivity, smoking, and inappropriate diet) [1, 2]. Alleviating anxiety is crucial because the more anxiety cardiac patients feel, the worse their quality of life [19].

Furthermore, regarding clinical characteristics, both state and trait anxiety was associated with the existence of other disease and insomnia. Interestingly, anxiety and insomnia seem to be part of a vicious circle in which sleep deprivation may increase the risk of anxiety while insomnia may deteriorate anxiety or prevent recovery [20, 21]. Apart from this association, insomnia raises sig-

Table VIII. Association of anxiety and social support

Support from	State anxiety		Trait anxiety	
	Spearman's Rho	*P*-value	Spearman's Rho	*P*-value
Significant ones	−0.235	0.033	−0.488	0.001
Family	−0.271	0.014	−0.438	0.001
Friends	−0.266	0.016	−0.434	0.001

Table IX. Effect of characteristics and social support on patients' anxiety

Parameter	State anxiety β (95% CI)	*P*-value	Trait anxiety β (95% CI)	*P*-value
Education:				
Primary school	–		Ref. cat.	
High school	–		–2.00 (–6.63–2.63)	0.392
University	–		–5.68 (–11.82–0.46)	0.069
Other disease:				
No	Ref. cat.		Ref. cat.	
Yes	2.99 (–6.11–12.09)	0.514	3.28 (–3.06–9.62)	0.306
Insomnia:				
No	Ref. cat.		Ref. cat.	
Yes	0.36 (–5.97–6.69)	0.911	–1.51 (–6.22–3.21)	0.526
Difficulties in everyday activities:				
No	Ref. cat.		Ref. cat.	
Yes	5.02 (–1.03–11.08)	0.103	3.51 (–1.20–8.23)	0.142
Limited social contact:				
Very/enough	Ref. cat.		Ref. cat.	
Little	5.61 (–3.10–14.31)	0.203	7.70 (1.24–14.16)	0.020
Not at all	–2.30 (–10.73–6.13)	0.588	0.37 (–5.75–6.49)	0.905
Satisfied with life:				
Very	Ref. cat.		Ref. cat.	
Enough	10.21 (3.54–16.88)	0.003	5.56 (0.60–10.51)	0.029
Little/not at all	14.42 (4.55–24.29)	0.005	10.26 (2.97–17.55)	0.006
Insecure because you live on an island:				
No	Ref. cat.		–	
Yes	5.59 (–0.39–11.56)	0.066	–	
Support from:				
Significant ones	–0.30 (–1.90–1.30)	0.712	–1.14 (–2.33–0.05)	0.061
Family	–0.05 (–1.14–1.03)	0.920	0.05 (–0.77–0.86)	0.910
Friends	–0.16 (–0.71–0.39)	0.561	–0.07 (–0.51–0.38)	0.767

CI – confidence interval, Ref. cat. – Reference category.

nificant concerns within the field of cardiac diseases. It was nearly two decades ago when it was shown that sleep complaints increase the likelihood of a first myocardial infarction in adults > 65 years old, independently of classic coronary risk factors [22]. More recently, Mallon *et al.* [23], in a 12-year follow-up, showed that subjective sleep complaints may predict coronary artery disease mortality in middle-aged males.

Cardiac patients suffering from insomnia should undergo specific evaluation and treatment because improvement in insomnia is associated with improvements not only in anxiety but also in total cholesterol and depression after completion of a 12-week cardiac rehabilitation programme [24]. Another commonly held view is that insomnia among cardiac patients is attributed to ongoing stressors or may be part of a syndrome involving depression [20, 21].

Results also revealed that difficulties in daily activities and limitations in social contact were associated with both state and trait anxiety. Cardiovascular disease is associated with limitations to physical functioning, inability to continue in prior rhythms, and loss of independent living, thus triggering increased levels of anxiety [25].

On the other hand, psychological variables such as anxiety may affect cardiac patients' performance [26]. For instance, a one point increase in anxiety implied a significant deterioration in the physical and mental state by 0.57 and 0.39 points, respectively, among 100 heart failure outpatients (64 men and 36 women) [27]. Also, anxiety independently predicts a decline in physical function over 6 months in heart failure patients [28]. Restrictions in functional level represent a precursor to disability and lowering life expectancy [29]. Conversely, anxiety may prevent patients from re-

Fotini Legaki, Fotoula Babatsikou, Charilaos Koutis, Maria Polikandrioti

turning to activities that they perceive as a source of stress, even though they may be beneficial [30].

Moreover, in terms of patients' beliefs, those who reported dissatisfaction with their life experienced greater anxiety. One proposed explanation is that patients perceive no control over their illness. Personal control among heart transplantation patients was positively correlated with satisfaction with life and negatively correlated with anger and depression [31]. Patients' perceptions are a significant area of interest, which may influence all stages of a cardiac disease. Indeed, patients' views and options may play a vital role in changing personal behaviours, following recommended treatment, and rehabilitation. Exploring patients' perspectives about illness may shed more light on disease management [30].

In addition, patients reporting insecurity because they lived on island had more transient anxiety. Individuals living in the province lack immediate access to specialised medical help or may encounter transportation issues, especially in winter. Given that care of cardiac disease requires frequent contact with the healthcare system, telemedicine might be an alternative form of treatment. Interestingly, this method may minimise hospitalisation or access to emergency services, reduce the burden of traveling to and from treatment centres, and thus ultimately reduce anxiety [32].

Analysis of data showed high levels of support from family, friends, or significant others. Similarly, a high level of support among 1550 middle-aged people with implanted defibrillator was shown by Allemann *et al.* [33], whereas living alone was a major predictor of low/medium support.

Results also revealed that an increase in support implied a reduction in anxiety. The presence of supportive relatives among Danish cardiac patients having ischaemic disease, atrial fibrillation, heart failure, or valve disease was associated with lower frequency of anxiety [34]. Moreover, social support was linked to their psychosocial adjustment to coronary heart disease [35].

To the best of our knowledge, there are no related data from other areas that might permit comparisons between islander populations. Given that the interaction of environmental, behavioural, and clinical characteristics may determine the span of life, as in the island of Ikaria [36], then exploring social support among cardiac islanders might be a new area of interest.

Several limitations of our study must be acknowledged. First, convenience sampling is one of the limitations because this method is not representative of all the islanders with cardiac disease in Greece, thus limiting the generalisability of the results. The sample size was relatively small, although many significant associations were observed. Furthermore, there was no longitudinal design with follow-up data on the same patients, which may permit evaluation of possible changes in all dimensions (anxiety and perceived social support). It would be interesting to monitor anxiety 12 or 24 months after baseline. Self-report questionnaires are not considered sufficiently precise to make a psychiatric diagnosis of anxiety.

The strengths of the study include the use of the widespread STAI instrument, which may permit comparisons among cardiac populations across the world.

In conclusion, more both state and trait anxiety experienced patients who reported to have some other disease, to have insomnia, to limit social contacts and those who were not satisfied by their lives.

An increase of social support either by significant ones, family, or friends leads to a decrease in state and trait anxiety. In other words, the more support a patient felt, the less anxiety they experienced.

Stakeholders may use the evidence provided in this research and support tangible action to improve cardiac health in island areas.

Conflict of interest

The authors declare no conflict of interest.

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