

Sense of coherence and psychological well-being in cardiac patients: Is the association mediated by self-efficacy?

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Summary

Aim of the study: A large deal of research on cardiac patients concentrates on analyses of mutual relationships between sense of coherence and psychological well-being, sense of coherence and self-efficacy, or psychological well-being and self-efficacy. It has been proven that self-efficacy plays a crucial role as a mediator of the relationships between various psychological constructs.

Material and method: A total number of 176 patients (82 women and 94 men), age 45-82 years ($M = 58.56$, $SD = 8.25$) participated in the study. All participants were patients admitted to the cardiology department with coronary heart disease and undergoing medical interventions. All participants were asked to fill in the Polish adaptations of Sense of Coherence Scale (SOC-29), General Self-Efficacy (GSE) scale, and The Psychological Well-Being Scale (PWB).

Results: Positive correlations were found between sense of coherence (SOC), self-efficacy (SE), and psychological well-being (PWB), as well as between subscales of SOC and PWB. Positive correlations were revealed between SE and subscales of PWB as well. SE was proved as a mediator between SOC and PWB.

Discussion: Results obtained in the presented study provide an empirical proof of complexity of the relationship among sense of coherence, psychological well-being, and self-efficacy. The mediation of SE between SOC and PWB appears to be partial which indicates indirect effects among the variables.

Conclusions: The main finding was to demonstrate the mediating role of self-efficacy between sense of coherence and psychological well-being. Some additional personality variables need to be considered in further research.

sense of coherence, psychological well-being, cardiac patients, self-efficacy

INTRODUCTION

A large deal of research concentrates on psychological functioning of cardiac patients [1-3]. Among the most popular psychological con-

structs taken into account one may find sense of coherence, psychological well-being and self-efficacy. Many studies have examined mutual relationships between sense of coherence and psychological well-being [4,5]. A number of studies focuses on the relationship between sense of coherence and self-efficacy [6]. There is also research exploring the relationships between psychological well-being and self-efficacy [7].

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Sense of coherence is defined as a global orientation of extent to which individual has an enduring, and dynamic feeling of confidence in their life [8]. It is described throughout three dimensions: comprehensibility, manageability, and meaningfulness. Comprehensibility reflects the extent to which one perceives the stimuli that confront them as consistent, structured, and clear. Manageability is defined as an extent to which one understands that the resources at their disposal are adequate to meet life's demands. Meaningfulness is the extent to which one feels that life makes sense [8]. Psychological well-being is defined in terms of six constructs: self-acceptance, positive relations with others, autonomy, environmental mastery, purpose in life, and personal growth. It focuses on growing and developing as a person, i.e. coping with life challenges, pursuing meaningful values and goals [9, 10]. In other words, psychological well-being is understood in terms of virtues, and it is considered to be an eudaimonic construct [11]. Self-efficacy is defined in terms of capability of performing behaviours required to attain certain outcomes and goals [12].

Antonovsky [8] argues that sense of coherence (SOC) assesses the ability to manage stress, using various coping mechanisms. Many studies proved SOC to be an important variable in predicting health components in cardiac patients. For example, Myers, Drory, and Gerber [13] proved SOC to be a factor predicting physical activities in myocardial infarction survivors. Gallagher [14] has shown that SOC promotes self-management in patients with heart failure. It was also proven that SOC reduces symptoms of anxiety in patients with coronary artery disease [15]. Strong SOC is perceived to be connected to health related quality of life as individuals with a stronger SOC can effectively handle stress and protect their health [8]. They also report fewer symptoms of depression [16].

Based on the abovementioned data it can be stated that general belief that one is able to cope with negative life outcomes improves their well-being. This assumption gives an impression that coping is possible and leads to measurable behavioural changes. Since SOC is understood as a global orientation that expresses the extent to which individuals have an enduring and dynamic feeling of confidence in their life [8, 17],

the positive relationship between SOC and well-being can be expected. This result was reported for example in the studies of Rahman, Hudson, Thøgersen-Ntoumani, and Doustd [18] and in the research conducted by [19].

Since self-efficacy is understood as a specific belief needed for attaining specific goals [12], it is expected to be positively correlated with SOC. This relationship was described in details by Kroninger-Jungaberle and Grevenstein [20]. As it is stated by some researchers, self-efficacy is one of the most important traits during cardiac rehabilitation [21]. Increased self-efficacy facilitates involvement in certain coping behaviours such as exercising [22] or use of dietary practices [23]. Furthermore, higher levels of self-efficacy were proved to be linked to increased social, as well as physical, functioning of cardiac patients [24]. Since patients with high levels of self-efficacy expect more positive life changes in the future [25], it can be expected they also believe in their ability to deal with life stressors better.

Psychological well-being (PWB) is mostly understood as involvement in existential life challenges [9, 10, 26]. Self-efficacy, as it was defined by Bandura [12], is connected to dealing with life difficulties. Therefore, one can expect the relationship between self-efficacy and PWB. This result was reported for example in the studies of de Castro, Ponciano, Meneghetti, Kreling, and Chem [27], and Salami [28].

Self-efficacy seems to be crucial in the functioning of cardiac patients, since its motivational role for participation in cardiac rehabilitation programmes [18], enhancing patients' functioning after cardiac problems [29] or influencing the patients' quality of life in general [30]. One can expect that people with a higher level of self-efficacy will declare a higher level of well-being in comparison to people with a lower level of self-efficacy. A growing number of studies prove the existence of consistent relations between PWB and physical health, mostly in regard to affect regulation mechanisms [30]. In other words, patients with higher PWB adjust better to new life challenges (e.g. give sense to their new experiences, search for positive outcomes, adjust their goals).

To sum up, the presented overview leads to conclusion that SOC, PWB, and self-efficacy are

crucial in analysis of functioning of cardiac patients. All of the foregoing variables have been incorporated into explaining the differences between high and low functioning cardiac patients. Generally speaking, subjects reporting high SOC, PWB, and self-efficacy also report a high level of functioning in different fields of their lives.

Many studies have been conducted in order to explore and explain mutual relationships between SOC and PWB, SOC and self-efficacy, PWB and self-efficacy. It needs to be emphasized that self-efficacy was proved to be a mediator in many studies [e.g. 31-33]. At the same time, empirical studies have examined bilateral relationships between SOC, PWB, and self-efficacy, but little attention has been paid to the potential mediators and underlying mechanisms of the abovementioned ties. Although research exploring the mediating role of self-efficacy on the relationship between sense of coherence and psychological well-being *per se* was not conducted, one may expect such relations as some indirect connections could be shown. For example, it was proven by Ando et al [34] that nurses after mindfulness meditation therapy (i.e. therapy indirectly increasing nurse's self-efficacy) reported higher levels of SOC and PWB in comparison to the nurses without such treatment. Results obtained by Wang et al [35] on Chinese unemployed population proved the mediating role of self-efficacy on Big Five personality traits and depressive symptoms. This result is important especially in light of the studies that proved relations between SOC and Big Five personality traits [36], and negative correlations between PWB and depression [37]. Some results partially corresponding to current analyses proved the mediating role of self-efficacy in the development of entrepreneurial intentions [38]. The abovementioned study is important in the context of our study since entrepreneurship requires confidence in life (described as SOC) and involvement in life challenges that may be partially identified as PWB. Trap, Reijkjær, and Hansen [39] showed positive relations between self-efficacy, SOC, and health promoting behaviours that could be connected to PWB. Similar results in different group of participants were obtained by de Souza et al. [40].

To sum up, there is a growing amount of data proving the mediating role of self-efficacy

among the variables connected to SOC and PWB. Since the abovementioned variables were not explicitly taken into account yet, it seems crucial to further explore this hypothesized connection.

CURRENT STUDY

The current study aims to explore relationships among sense of coherence, self-efficacy, and psychological well-being. Taking into account previous research the study examines self-efficacy as a potential mediator in the relationship between sense of coherence and psychological well-being in cardiac patients. We hypothesized that: (1) Sense of coherence is positively related to self-efficacy, (2) Both sense of coherence and self-efficacy are positively related to psychological well-being, and (3) Self-efficacy mediates the relationship between sense of coherence and psychological well-being. The conceptual model of the relationships proposed in the current research is shown in Figure 1.

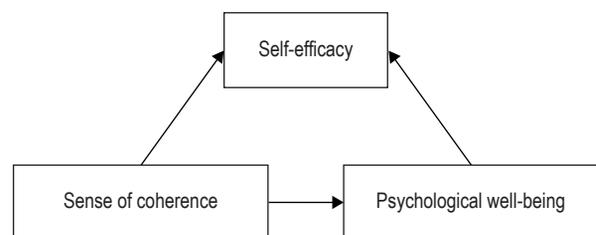


Figure 1. A conceptual model of the mediational role of self-efficacy in the relationship between sense of coherence and psychological well-being.

PARTICIPANTS AND PROCEDURE

Participants

Participants were patients admitted to the cardiology department with coronary heart disease who were undergoing medical interventions. The reason for admission was most often coronary disease in varying degrees of severity, from the stable form (CCS II, CSS III) to the unstable one. In the scheduled admission procedure, non-invasive diagnostics (ECG by Holter's method, transesophageal stimulation, tilt test, etc.) and, in special cases, invasive diagnostics

(electrophysiological examination) were performed. The scheduled admissions were associated with the implantation of devices: stimulator, ICD, CRTD. Some scheduled patients also had ablation of arrhythmias.

Inclusion criteria were the following: (1) patient had a diagnosis of coronary heart disease, (2) age more than 18 years, (3) ability to read and communicate in Polish, and (4) ability to give informed consent. Exclusion criteria were the following: (1) severe non-cardiovascular comorbidities (e.g. cancer, major psychiatric conditions – every participant was asked about continuing serious mental problems and those individuals who expressed such difficulties were excluded from the research group), (2) pregnancy, (3) inability to fill out a questionnaire for any reason (e.g. cognitive deficiencies, partial blindness), and (4) life-threatening conditions.

A total of 211 patients were recruited; 29 were excluded based on inclusion and exclusion criteria; 6 patients refused to participate (the most common reasons provided for study refusal were that it is too exhausting considering the patient's current health conditions (4 patients) or that it would take too much time (2 patients)). As a consequence, the final number of patients included in this study was 176 (82 women and 94 men). Participants ranged in age from 45 to 82 years ($M = 58.56$, $SD = 8.25$).

Among the patients who participated in the study were people with coronary artery disease (55 patients), heart failure (38 patients), heart defects (41 patients), and cardiac arrhythmia (42 patients). Among the patients with coronary artery disease were people with a stable form, scheduled for invasive diagnostics (coronary angiography). In the subgroup with heart failure, there were most frequently patients admitted urgently due to exacerbation of chronic heart failure (exertional dyspnoea – NYHA III, dyspnoea at rest – NYHA IV). In the subgroup of patients with arrhythmias, there were also patients who were admitted to the hospital in the scheduled and urgent mode.

Procedure

Patients were recruited for the study participation from the inpatient clinic and outpatient cen-

tre in the cardiology department in Opole (Poland). Within the group with coronary heart disease, there were patients admitted in the scheduled and urgent procedure. In the scheduled mode, people with stable chronic coronary disease (the severity of chest pain – CCS II, III) were admitted. In contrast, patients admitted in the urgent mode were people with acute coronary syndrome (unstable angina, NSTEMI, STEMI). These patients had coronary angiography and simultaneous coronary angioplasty (PCI). Some patients were diagnosed with multi-vessel coronary artery disease and they were qualified for CABG. Participants who met the above inclusion/exclusion criteria were identified and approached by research assistants either on the medical ward or after an outpatient visit. They were given a written informed consent document and the study questionnaire to complete. The majority of patients signed consent forms and completed the survey (83.41%). Some of the patients were hospitalised so they filled in the questionnaires during their stay in hospital, while other patients who were treated in the ambulatory were given the questionnaires to be filled in at home. After the study participants were debriefed and given the contact information of the researcher in case of any questions or concerns. The study procedure was approved by the ethics committee of The University of Opole.

Measures

The following questionnaires were used in the current research. They were all Polish adapted versions.

Sense of coherence. The Sense of Coherence Scale (SOC-29) is a widely used questionnaire which evaluates the strength of the sense of coherence [8]. It consists of 29 items rated on a 7-point scale ranging from 1 (*never*) to 7 (*very often*). Higher scores represent a greater SOC, which is understood as a global orientation that expresses the extent to which individuals have an enduring and dynamic feeling of confidence in their lives. The scale consists of three subscales: comprehensibility, manageability, and meaningfulness. The test-retest correlations show considerable stability, e.g. 0.54 over a 2-year period.

The Cronbach's alpha coefficients for the present study ranged from .74 to .90 for the subscales and .82 for the total score.

Self-efficacy. The General Self-Efficacy Scale (GSE) developed by Schwarzer and Jerusalem [41] was used in this study. The scale assesses a general sense of perceived self-efficacy that refers to global confidence in one's coping ability across a wide range of demanding or novel situations. It comprises 10 items to which responses range from 1 (*strongly disagree*) to 4 (*strongly agree*). Higher scores on the scale indicate more levels of perceived general self-efficacy. The high validity and reliability of the scale was demonstrated in many studies across various research contexts and ethnically diverse populations [e.g. 42]. The Cronbach's alpha coefficient for the present study was .90.

Psychological well-being. The Psychological Well-Being Scale (PWB) is a 42-item questionnaire that evaluates the level of individuals' development and self-realization on a 6-point scale

[10]. It comprises six subscales: autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance. Participants respond to the items on a 6-point Likert scale ranging from 1 (I strongly disagree) to 7 (I strongly agree). A total PWB score was computed by summing the six subscale scores. The Cronbach's alpha coefficients in this sample ranged from .73 to .92 for the subscales and .86 for the total score.

RESULTS

Relations among sense of coherence, self-efficacy, and psychological well-being

In the first step of statistical analyses, correlations were computed among sense of coherence, self-efficacy, and psychological well-being (total results). They are presented in Table 1.

Table 1. Correlations and their effect sizes among total results of sense of coherence, self-efficacy and psychological well-being.

Variables	M	SD	1	2	3
1. Sense of coherence	4.18	.69	–		
2. Self-efficacy	2.26	.41	.57*** (.33)	–	
3. Psychological well-being	4.59	.67	.69*** (.47)	.57*** (.32)	–

*** $p < .001$

The effect sizes (coefficient of determination, r^2) for correlations were given in parentheses.

The results showed that all the variables turned out to be associated with one another. Sense of coherence was positively related to self-efficacy and psychological well-being. Self-efficacy also positively correlated with psychological well-being.

As regards the sense of coherence group score profile, the patients' global sense of coherence oscillated around 113 points. The result showed that in cardiac patients the global sense of coherence was below the norms obtained in the Polish population which range from 133 to 160 points. The results in two subscales of sense of coherence were lower among cardiac patients than in the Polish population: comprehensibility – 42 points (norms: 50-61) and manageability – 40 points (norms: 45-55), and the result in meaningfulness was on the lower threshold of the Polish population – 36 (norms: 36-44).

The global SOC level of the subjects oscillated around 119 points. Norms of the sense of coherence, which amount to 133-160 points, show that in patients with lung cancer the global SOC was understated.

In order to examine more precisely the relations among sense of coherence, self-efficacy, and psychological well-being correlations were computed between their subscales. They are shown in Table 2.

All the subscales of sense of coherence, i.e. comprehensibility, manageability, and meaningfulness were positively related to the subscales of psychological well-being, i.e. autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance. Comprehensibility, manageability, and meaningfulness positively correlated with self-efficacy. Self-efficacy also showed positive associations with all the subscales of psychologi-

cal well-being. The other associations were inter-correlations among subscales of sense of coherence and psychological well-being, respectively, which were not taken into account.

The meditational effect of self-efficacy on the relationship of sense of coherence and psychological well-being

In order to examine whether self-efficacy mediates the relationship between sense of coherence and psychological well-being, we performed regression-based mediation analyses estimating all paths depicted in Figure 2 by employing the procedures provided by [43]. Their approach tests for mediation by assessing the statistical significance of the indirect effect, that is, the path from the independent variable via the mediator vari-

able to the dependent variable. The significance of the indirect effects at the .05 level is supported, if the 95% CIs for the estimates exclude zero. In line with Preacher and Hayes [43], all analyses were based on 5.000 bootstrapping samples. SPSS PROCESS was used for mediation analyses [44].

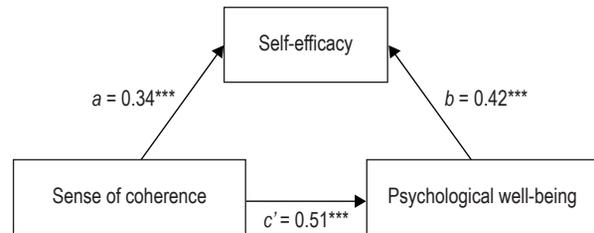


Figure 2. Self-efficacy as mediating the association between sense of coherence and psychological well-being. (***p<.001)

Table 2. Correlations and their effect sizes among subscales of sense of coherence, self-efficacy and psychological well-being

Variables	Comprehensibility	Manageability	Meaningfulness	Self-efficacy
Autonomy	.27*** (.07)	.40*** (.16)	.30*** (.09)	.22** (.05)
Environmental mastery	.52*** (.26)	.53*** (.29)	.49*** (.24)	.48*** (.23)
Personal growth	.33*** (.11)	.47*** (.22)	.53*** (.29)	.45*** (.20)
Positive relations with others	.36*** (.13)	.51*** (.26)	.52*** (.27)	.47*** (.22)
Purpose in life	.39*** (.15)	.43*** (.18)	.52*** (.27)	.41*** (.17)
Self-acceptance	.46*** (.21)	.63*** (.40)	.54*** (.30)	.63*** (.40)
Self-efficacy	.39*** (.15)	.56*** (.32)	.52*** (.28)	–

***p<.001; **p<.01

The effect sizes (coefficient of determination, r²) for correlations were given in parentheses.

Effect size measures indicated that self-efficacy was a significant mediator in the relationship between sense of coherence and psychological well-being (ab = .14, 95%CI[.07, .23]). Sense of coherence enhances self-efficacy (a = .34, 95%CI[.27, .42]) which in turn increases psychological well-being (b = .42, 95%CI[.22, .63]). The direct effect of sense of coherence on psychological well-being was statistically significant (c' = .52, 95%CI[.39, .64]), which indicates that the mediation was partial. According to Preacher and Hayes [43] partial mediation refers to conditions in which the direct effect of sense of coherence on psychological well-being remains statistically significant (although smaller) even in the presence of statistically significant relation-

ships between sense of coherence, self-efficacy, and psychological well-being.

Next, to provide more accurate information regarding the relationship between sense of coherence and psychological well-being in the mediational perspective of self-efficacy, we decided to test the mediating role of self-efficacy for the SOC subscales: comprehensibility, manageability, and meaningfulness, respectively. Self-efficacy turned out to be a significant mediator in the relationship between comprehensibility and psychological well-being (ab = .14, 95%CI[.09, .20]). Within these relationships, comprehensibility enhances self-efficacy (a = .20, 95%CI[.13, .27]) which in turn increases psychological well-being (b = .71, 95%CI[.51, .91]). The direct effect of comprehensibility on psychological well-being was statistically significant (c' = .27, 95%CI[.16, .37]),

which pointed to partial mediation. For manageability, self-efficacy was also a significant mediator ($ab = .17$, 95%CI[.10, .26]). Manageability was positively related to self-efficacy ($a = .33$, 95%CI[.26, .41]) which in turn was positively associated with psychological well-being ($b = .50$, 95%CI[.29, .72]). The direct effect of manageability on psychological well-being was statistically significant ($c' = .45$, 95%CI[.32, .57]), which suggests partial mediation. For meaningfulness, self-efficacy mediated its relationship with psychological well-being ($ab = .13$, 95%CI[.08, .19]). Meaningfulness enhanced self-efficacy ($a = .23$, 95%CI[.18, .29]) which in turn increased psychological well-being ($b = .55$, 95%CI[.34, .76]). There was a significant direct effect of meaningfulness on psychological well-being ($c' = .32$, 95%CI[.23, .41]), which indicates partial mediation.

DISCUSSION

The aim of the current study was to examine whether self-efficacy may be the mediator between sense of coherence and psychological well-being. Regression-based mediation analysis was conducted in order to explore hypothesized relationships between sense of coherence, self-efficacy, and well-being. The obtained results lead to the conclusion that self-efficacy is a partial mediator between SOC and PWB. In other words, self-efficacy partially mediates the relationship of SOC and PWB.

Consistent with previous research correlational results showed significant relationships between sense of coherence, psychological well-being, and self-efficacy [14]. These findings confirm the first hypothesis assuming positive relationships between sense of coherence and self-efficacy, as well as the second hypothesis assuming that both sense of coherence and self-efficacy to be positively related to psychological well-being. These results highlight the significance of one's ability to recognize life stressors and effectively utilize coping with them in order to maintain relatively good health. These results are in line with the reports of Kołodziej-Zaleska and Przybyła-Basista [44] or Piedmont, Magyr-Russell, DiLella, & Matter [45], concerning the importance of sense of coherence in difficult life situations. A feeling of confidence in life seems

to enhance well-being of a person [17]. The results reported in the article allow us to hypothesize that a belief that one is capable to manage effectively their life is positively connected with the ability to deal with stressors such as cardiac problems. The abovementioned assumption is congruent with Antonovsky's [46] salutogenic model of health. Furthermore, the results obtained in the presented study may be considered as broadening Antonovsky's health-oriented paradigm. Data presented in the article leads to the conclusion that striving to maintain an enduring feeling of confidence in one's life despite ubiquitous stressors is positively connected to a higher level of self-efficacy. Therefore, we may expect that Antonovsky's concept of ease/disease continuum should be enriched with self-efficacy. In addition, practical implications of our results should be underlined. It is possible that increasing the level of self-efficacy may result in increasing the level of health in general (as it is understood in salutogenic theory). This hypothesis needs to be tested in the future.

This discovery adheres to the framework proposed by [11] as a description of the structure of psychological well-being. In general, sense of coherence and self-efficacy are among irreplaceable indicators of psychological well-being. As Waterman [47] stated, in order to feel well and happy (i.e. report a high level of psychological well-being), one has to sense the ability to fulfil their goals (i.e. the ability to feel self-efficient). At the same time, in order to have a high level of well-being, a person needs to maintain confidence in their abilities to manage different life situations (i.e. sense of coherence).

As Ryff and Singer [10] stated, living a meaningful and purposeful life is associated with all range of health benefits. This notion needs an additional support in further empirical studies in groups of cardiac patients, especially in relation to the analysis of the interrelationships among sense of coherence, self-efficacy, and psychological well-being.

The most important result of our study refers to the mediational role of self-efficacy. The results of our study partially support the theoretical speculation regarding the mediating role of self-efficacy between sense of coherence and psychological well-being. Both direct and indirect effects of sense of coherence on psychologi-

cal well-being were significant. Therefore, these findings demonstrate that self-efficacy (i.e. an optimistic belief that one is capable of performing behaviours required to attain certain outcomes) serves as a mediator between sense of coherence, understood as a personality factor, and well-being [48]. Yet, further research is needed in order to recognize other possible variables involved in the analysed relationships.

Based on the results of the conducted study sense of coherence should be interpreted in terms of a factor working in connection with self-efficacy. This result is in line with research of Greco and colleagues [49] underlying the importance of self-efficacy in improving well-being of patients with cardiovascular disease. As it was stated by Maeda, Shen, Schwarz, Farrell, and Mallon [50], self-efficacy may be the key target for improving disease management and self-care (i.e. improving overall well-being) in heart failure patients. Self-efficacy was also found to be a predictor of well-being in highly optimistic people [7].

The results of the current study are in line with the theoretical framework proposed by Ryff [9]. As it was stated by Ryff, among core dimensions of broadly understood happiness one may find self-acceptance, positive relations with others, autonomy, environmental mastery, purpose in life, and personal growth. All of them are positively related to self-efficacy. In other words, positive functioning proposed by Ryff is a complex construct that “works” in close collaboration with one’s innate ability to achieve goals, i.e. self-efficacy. Our results extend Ryff’s [9] theory of psychological well-being since variables connected to self-efficacy understood as a mediator between SOC and PWB play a central role in defining a person’s healthy and mature functioning. It was proven that cardiac patients with a high sense of coherence and a high self-efficacy level report a high level of psychological well-being as well. Of key importance is the assumption that well-being is deeply influenced by the context of people’s lives. Therefore, further research is needed in order to identify additional variables accountable for fulfilment and growth (i.e. well-being) [10].

The current study has some limitations which need to be considered in interpreting the results. First, the study was based on cross-sectional data. Therefore, causal relations cannot be for-

mulated. Second, although the PWB scale is a reliable and widely used measure of eudaimonic well-being [2], the use of scales measuring other types of well-being, e.g. subjective well-being based on a hedonistic approach could demonstrate deeper associations between SOC, self-efficacy, and well-being in cardiac patients. Future studies may take into account different measures of well-being. Finally, the patients’ medical conditions may have affected their mental state, e.g. generating feelings of despair or despondency, which was not monitored. Future prospective studies should take into account this aspect and control participants’ mental state.

CONCLUSIONS

Despite the limitations, the current study demonstrated some interesting findings. It revealed positive relationships between sense of coherence, psychological well-being, and self-efficacy. The main finding was to demonstrate the mediating role of self-efficacy between sense of coherence and psychological well-being. The assumed mediation appears to be partial. It is possible that some additional personality variables need to be considered in further research. Results obtained in the presented study provide an empirical proof of complexity of the relationship among sense of coherence, psychological well-being, and self-efficacy.

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