



# Stressful Life Events and Heart Failure: A Mixed-Method Study to Analyze the Patient's Perspective

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## ABSTRACT

**Introduction:** The challenge in heart failure medical practice is to address the clinical and laboratory method integrations for the shared decision-making process in caring for patients and families. Furthermore, stressful life events may worsen outcomes in patients with heart failure. This study aimed to explore patient perceptions regarding cardiac care analyzing the individual needs and features of adverse life event experiences.

**Methods:** A mixed-methods design was used in this study. This quantitative research focuses on clinical (medical and psychological) data. Giorgi's phenomenological method was applied to the interview analysis.

**Results:** Qualitative analyses highlighted the role of patient-engagement strategies powered by cardiologists in a personalized approach that favors adherence to complex medical therapies. Active patient involvement and associated engagement based on cardiologists' confidence are focal points for facilitating management-therapy strategies to improve outcomes and reduce the perception of the frailty burden. The quality of therapeutic relationships with cardiologists is a key protective factor for accurate risk stratification and therapeutic decision-making in patients, addressing the potential benefits of therapeutic interventions.

**Conclusions:** In conclusion, the engaged patient contributes to more efficient cardiological care and the personalized patient-centered approach leads to the more efficient 'cure and care' clinical model. In adverse life events, acute psychological and physiological stress responses intensify detrimental outcomes for patients with cardiovascular disorders. Integrative management of physical risks and mental resilience factors in the development of cardiac disease appears to be strategic for patients with a positive quality of life (QoL) and clinical management of heart failure (HF).

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**Keywords:** Heart failure; Monitoring heart failure risk; Adverse life events; Emotional trigger; Patient engagement; Buffering effect of

medical–patient relationship; Personalized care approach; Quality of life; Ageing

### Key Summary Points

#### *Why carry out this study?*

Our study focused on analyzing the interplay between physical and mental determinants in patients with adverse life experiences in lifelong cardiological care.

This study aimed to explore the perspectives of patients with heart failure (HF) by analyzing the mental dimensions and identifying variables that have a buffering effect on cardiological care.

#### *What was learned from the study?*

Patient engagement could enhance patient experience to potentially increase treatment concordance and enable cardiologists to review and intervene.

In the personalized patient-centered approach, the relationship between cardiologist and patient is relevant to improve the ‘cure and care’ clinical perspective.

The quality of therapeutic relationships with cardiologists has emerged as a key protective factor for accurate risk stratification and therapeutic decision-making in patients with cardiovascular disorders, addressing the potential benefits of therapeutic interventions.

The integrated management of physical and mental factors in cardiological care appears to be strategic. The focal point is the patient's perspective of a positive quality of life as a determinant for efficient clinical management of HF.

## INTRODUCTION

Heart failure (HF) is defined as a clinical syndrome with different etiologies and

pathophysiology rather than a specific disease (p. 355) [1] by universal consensus; thus, HF is a complex disease challenging clinical practice regarding diagnosis and treatment. HF is a multifaceted, life-threatening syndrome characterized by significant morbidity, mortality, poor functional capacity and poor quality of life (QoL). Moreover, the prevalence of HF affects more than 64 million people worldwide and is projected to increase by 2030 [2]. The increase in prevalence is based on multifactorial points: (a) HF survives longer with advanced therapeutics, (b) ageing population is exposed to a higher risk for HF and comorbidities and (c) increasing non-communicable diseases are risk factors for HF.

The implementation of HF management using guideline-directed medical therapy (GDMT) and monitoring of HF risk using continual reassessment of risk factors, qualification for therapies, and meeting guideline-directed benchmarks for risk factor management must be prioritized in medical practice [3]. Optimizing the use of guideline recommendations for secondary preventative therapies is crucial for preventing the development of HF and should adhere to therapeutic planning. The recent American Heart Association (AHA) Scientific Statements [4] highlighted the relevance of patient-centered adult cardiovascular care, providing cardiovascular clinicians with the understanding and practical tools to incorporate a patient-centered care approach into routine clinical practice. Specifically, a patient-centered approach should be based on personalized medicine, in which the individual's needs and desired health outcomes are prioritized in therapy planning and decision-making, taking care of disease advances and the relationships among patients, family and health-care professionals.

Among the HF risk factors, frailty is increasingly recognized as a significant health concern, particularly because of its association with heart pathologies. An overlap frequently occurs between the symptoms of frailty and HF [5]. Volis and Zafrir [6] debated the bidirectional association between frailty and cardiovascular diseases, paving the way for personalized and patient-centered care for older individuals with cardiovascular (CV) disorders, making frailty a pivotal factor.

Frailty is characterized by a decline in the reserve capacity of physical function with age, which affects overall health. Recently, age-related changes in cognitive and mental function have been reported in frailty [7, 8]. Concerning HF risk factors, frailty status should be considered in the risk–benefit evaluation of cardiac procedures in older adults [9]. Specifically, elderly patients with heart disease often have comorbidities [10, 11], exposure to polypharmacological therapies and reduced physical function [11–13]. Older patients are highly diverse, including those with a wide range of cardiovascular and other medical conditions, cognitive states, functional statuses and social context [14, 15]. In existing risk predictions for HF, stressful life events may be significant social determinants of the health index. Consensually, severe adverse life experiences can threaten one's social determinants, self-esteem, identity, or physical well-being. These experiences could be the death of a spouse or learning of a diagnosis of imminent death [16]; moreover, they turn them into acute occasions expected to result in psychological stress for the individual towards increasing frailty that is detrimental to the clinical outcome of patients with HF [17]. HF risk accumulates throughout life, and the stressful life events people live in play an important role in its development [17]; however, the relationship between recent life events and the onset of heart disease has received less consideration in research plans, even in clinical practice, which patients frequently reported [18]. Navigating lifelong care of patients with CV disorders means calibrating the cures to meeting patient needs and take care of pathology multicomplexity (i.e., cognition, physical function and individual factors) [15, 19]: the symptom approach needs to be integrated with patient engagement to build an efficient system of care, actively involving health professionals, therapists and patients. Frailty assessment is increasingly important for accurate risk stratification and therapeutic decision-making in patients with CV disorders. A personalized and patient-centered approach reflects all the above dimensions using integrated quantitative and qualitative methods. Laboratory examinations should be integrated with clinical evaluation. Additionally, clinimetrics could be

an effective tool for applying patient-centered approaches. We defined a 'discipline aimed at creating indices, rating scales and other expressions to describe or measure symptoms, physical signs and other clinical phenomena, including the psychosocial impact of the disease, as well as related treatments and therapies for individuals, families and interpersonal relationships affecting well-being in daily living' [20]. Clinimetrics is the science of measurements related to the identification of a clinical disorder, tracing the progression of the condition under study and calculating its impact.

The challenge in medical practice is integrating clinical and laboratory methods for shared decision-making processes in patient and family care. To better understand how to address this challenge, qualitative studies could contribute to complementary analyses to determine the patient perspective and identify the relevance of indicators and their co-occurrence in the organization of components in clinical assessment.

Our study focused on analyzing the interplay between physical and mental determinants in patients with adverse life experiences in lifelong cardiological care. We aimed to explore patient perspectives by analyzing the mental dimensions and identifying variables that have a buffering effect on cardiological care. This study explored the effect of HF on patient perceptions by analyzing the needs of individuals experiencing adverse life events in a cardiological care setting.

## METHODS

### Study Design

A mixed-methods design was used in this study. The quantitative research focuses on clinical (medical and psychological) data. The qualitative research is based on Giorgi's phenomenological method for in-depth interviews [21]. Written consent was obtained from all participants at the time of enrolment. Trained clinical psychologists and cardiologists (blinded to the study objectives) collected the data.

## Setting and Participants

Participants in this study were selected from a wider sample of the ongoing Play-UP study: of 32 patients from the research protocol, nine were included in the research protocol. Study participants were recruited from the cardiology outpatient clinic of the Cardiology Unit of the ASL 1 Abruzzo and Di Lorenzo Clinic, Avezzano (AQ), Italy. The inclusion criteria were as follows: (a) diagnosis of chronic CV disease: HF according to the criteria of the European Guidelines, ischemic heart disease (IHD) (i.e., history of previous myocardial infarction, coronary revascularization by angioplasty or bypass), cardiomyopathy of any etiology (i.e., dilated, hypertrophic, arrhythmogenic, restrictive), and valvular disease undergoing surgical treatment and (b) facing stressful life events (i.e., death of a family member, overcoming cancer diagnosis affective separation). The exclusion criteria were as follows: (a) psychiatric and/or neurological pathology under pharmacological treatment and (b) refusal of written consent.

## Ethical Statement

Ethical Committee Approval was obtained from the CEtRA Abruzzo Region (IT) (ID 0461499/23) for the Play-UP Project [19]; it was conducted according to the guidelines of the Declaration of Helsinki [22]. Written informed consent was obtained from all participants to participate in the study and publish the results.

## Data Collection

Patients who met the inclusion criteria were invited to participate in this study during their outpatient clinic visits. After recruitment by a cardiologist during the scheduled follow-up, trained clinical psychologists and cardiologists evaluated the protocol. Trained clinical psychologists collected general information (i.e., age, sex, marital status, educational level and work status) and cognitive measurements and

conducted the interviews. Trained cardiologists collected disease-related information such as clinical parameters.

## Clinical Evaluation

The clinical evaluation was based on medical and psychological parameters.

## Medical Parameters

Medical parameters included disease-related information, including diagnosis, timing of diagnosis, symptoms (New York Heart Assessment Classification [NYHA]), comorbidities, body mass index (BMI), waist-to-height ratio (WHR), blood pressure, heart rate electrocardiogram (ECG) and EF assessment by echocardiography.

## Psychological Parameters

Psychological parameters were based on psychological testing followed by interviews. Psychological testing consisted of cognitive and behavioral tests. Cognitive testing was based on two standardized tests: the Mini-Mental State Examination (MMSE) and Cognitive Reserve Index questionnaire (CRI-q). Interviews were conducted using an ad hoc experimental design. The behavioral test used was the Visual Analogue Scale (VAS) score.

Below is a brief description of adopted indicators.

MMSE [23]: This tool can be used to assess mental status. It is an 11-question measure assessing five areas of cognitive function: orientation, registration, attention and calculation, recall, and language. The maximum possible score is 30. A score of 23 or lower indicated cognitive impairment. MMSE takes 5–10 min to administer. The researchers' team used the MMSE test.

CRI-q [24]: It estimates individuals' cognitive reserve by collecting information about their lives. The questionnaire consisted of 20 items divided into three sections: CRI-School, CRI-Work and CRI-Leisure. The CRIq levels

were divided into five ranges: Low level ( $\leq 70$ ), Medium–Low level (70–84), Medium level (85–114), Medium–high (115–130), High level ( $\geq 130$ ).

VAS (part of EuroQoL) [25]. This is a single-item VAS incorporated into the EuroQoL test for measuring QoL. It is an instrument for measuring QoL based on a visual single-item analogue scale in which patients can report their perceived health status with a grade ranging from 0 (worst possible health status) to 100 (best possible health status).

AD hoc interview: One-on-one interviews were conducted in a quiet, private space at an outpatient clinic. The investigator followed interview guidelines to assist patients in recalling their experiences with emotional triggers and frailty at the time of diagnosis. Table 1 reports the interview indices developed by the research team based on practical experience and qualitative expert suggestions. All interviews lasted 30–45 min and were audio-recorded in their entirety.

**Quantitative Data Analyses: Medical and Psychological Testing**

Clinical and psychological data were obtained using standardized procedures following international guidelines. Standard scoring was used to elaborate the descriptive statistics.

**Qualitative Data: Analyses of Data Detected by ‘Ad Hoc Interview’**

Giorgi’s four-step method was applied to detected data by ‘ad hoc interview’ [21] following four steps: Step 1—reading the written account for a sense of the whole; Step 2—identifying the meaning units; Step 3—transforming psychologically sensitive statements of their lived meanings into live meaning; and Step 4—synthesizing the experience of general psychological structure.

Lincoln and Guba’s criteria [26] were adopted to ensure the rigor of the study findings. In-depth interviews were conducted using

**Table 1** Ad hoc interview guidelines

Indices	Questions
1. Emotional trigger	a. Was there an emotional trigger for your heart disease? b. What is the emotional trigger? c. Do you perceive yourself frail?
2. Family and social support	a. What was the help from your family like? b. What was the help from your friends’ companionship like?
3. Impulsiveness	a. Do you think it is at high speed? b. When you think, do you have extraneous thoughts and difficulties in maintaining your attention? c. Do you act on impulse? d. Can you only think of one thing at a time? e. Do you have self-control? f. Do you plan all your activities carefully? g. Are you more interested in the present than in the future?
4. Therapeutic relation with cardiologist	a. What is the relationship with your cardiologist like?
5. Quality of life	a. How do you define your quality of life? b. How would you rate your quality of life from 1 to 100?



open-ended questions to improve transferability. Participants with different characteristics were selected using purposive sampling to increase data diversity and abundance. To ensure dependability, experts recorded, documented in detail and reviewed the data analysis process for appropriateness of classification. For confirmability, the researchers reviewed and documented the transformation and classification processes of the data.

## RESULTS

Participants in this study were selected from a wider sample of the ongoing Play-UP study protocol aimed at analyzing the relationships among allostatic load modelling, lifestyle and cardiological risk factors. Nine of 32 patients from the Play-UP Project were included in the study because of their exposure to stressful life experiences. During the research period from March to April 2024, nine patients with cardiomyopathy, ischemic cardiomyopathy, and HF were selected for this mixed-method study. Figure 1 shows a flowchart of the patient-selection process.

### Characteristics of the Participants: Quantitative Analyses

The average age of participants (coded A to I) was 72.5 years old ( $DS \pm 7.5$ ) (range 58–80 years). There were six male participants and three female participants; seven patients were completely independent of ADLs, and two reported being slightly dependent on their wives, especially in the management of medication and cardiological follow-ups scheduled every 6–8 months (Tables 2 and 3).

Patients were assessed based on demographics and lifestyle variables (age, sex, marital status, educational level and BMI), as well as comorbidities (e.g., diabetes mellitus, hypertension, chronic obstructive bronchopneumonia, atrial fibrillation, and cancer). Laboratory test results (high-density lipoprotein cholesterol, lipoprotein, triglycerides, blood pressure, albumin-to-creatinine ratio, and natriuretic peptides) and

clinical parameters (i.e., blood pressure and heart rate) were reported. Medications (i.e., ACE-inhibitors, beta-blockers, antihypertensives, diuretics, lipid-lowering agents, neprilysin inhibitors and gliflozins) have also been reported. A list of diagnoses, comorbidities and clinical data is presented in Tables 2 and 3: almost all patients showed hypertension as a comorbidity, while a few patients also had diabetes and chronic obstructive broncho-pneumopathy.

Almost all patients also showed CV disease from relevant time (>4 years of disease) and they were undergoing polypharmacological therapies demanding medical treatment regimen; NYHA classification evidenced four patients had no limitations of physical activity, three suffered slight limitation of physical activity in the presence of fatigue and two showed marked limitation of physical activity. Regarding anthropometric factors (WHR index), six patients were at high risk of cardiovascular disease. Patients were treated according to guideline recommendations [27]. Patients discussed treatment options with cardiologists; specialists prescribed the therapies, how to take them and information about side effects as well as alternative treatments. All patients accepted the treatments, and to develop adherence, cardiologists planned a check to favor complex treatment regimens in 2 weeks. Follow-ups were scheduled every 6–8 months.

Cognitive reserve (by CRIq) and risk of cognitive decline (by MMSE) were evaluated (Table 4). The CRIq scores showed that one patient reported a high level of cognitive reserve, one reported a low level and seven reported a medium level. Using MMSE, we identified only two patients at risk of mild cognitive impairment. The combined MMSE and CRIq indices highlighted the resilience of patients because they showed high ADL function (Table 2). Finally, self-perception of QoL was high: one patient reported a reduced QoL perception related to living alone and suffering from affective separation (divorce) and another reported a decrease in cancer diagnosis and treatment.

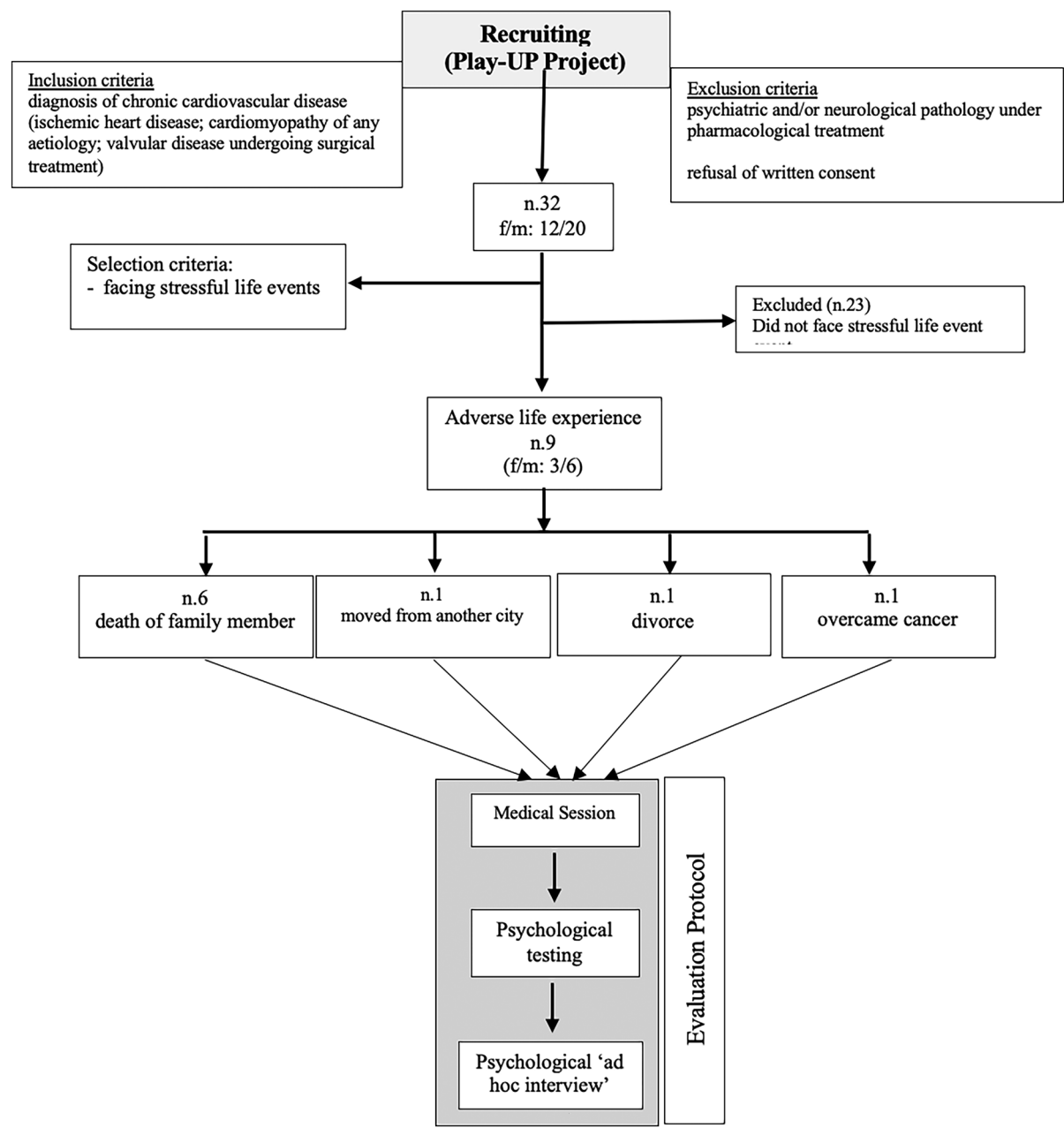


Fig. 1 Flow chart of recruiting

Qualitative Analyses

The interviews were based on five themes: (1) emotional triggers, (2) family and social

support, (3) impulsiveness, (4) therapeutic relationship with the cardiologist, and (5) QoL. Table 5 presents the themes and related quotes from the interviews.

**Table 2** Demographic characteristics of participants

Code	Age (years)	Gender (M/F)	Marital status	Educational level	Living with whom	Diagnosis	Timing diagnosis	Comorbidities	Overall ADLs function
A	65	M	Married	Graduate	Family member (wife)	Cardiomyopathy	> 4 years	–	Completely independent
B	75	M	Married	High school	Family member (wife)	Ischemic cardiomyopathy	> 4 years	Hypertension	Slightly dependent
C	77	F	Divorced	Graduate	Alone	Heart failure	> 4 years	Hypertension	Completely independent
D	71	F	Widowed	Primary school	Alone	Ischemic cardiomyopathy	2–4 years	Hypertension	Completely independent
E	71	M	Divorced	High school	Alone	Heart failure	> 4 years	Hypertension	Completely independent
F	57	M	Married	High school	Family member (wife and daughter)	Heart failure	> 4 years	Hypertension and chronic obstructive bronchopneumopathy	Completely independent
G	80	M	Widowed	Primary school	Alone	Cardiomyopathy	> 4 years	Hypertension	Completely independent
H	79	F	Widowed	Primary school	Alone	Heart failure	> 4 years	Hypertension	Completely independent



**Table 2** continued

Code	Age (years)	Gender (M/F)	Marital status	Educational level	Living with whom	Diagnosis	Timing diagnosis	Comorbidities	Overall ADLs function
I	78	M	Married	Primary school	Family member (wife)	Ischemic cardiomyopathy	> 4 years	Diabetes, hypertension, chronic obstructive bronchopneumopathy	Slightly dependent

*ADLs* activities of daily living

**Table 3** Medical parameters

Code	BMI index	DBP (mmHg)	SBP (mmHg)	Heart rate (b/min)	ECG rhythm	WHR value	WHR grade	NYHA
A	24.4 (Normal)	80	110	59	Sinus	0.78	No risk	I
B	28.3 (Overweight)	80	150	72	Sinus	1.0	High	II
C	33.7 (Obese)	80	140	75	Sinus	0.97	High	III
D	23.4 (Normal)	80	120	60	Sinus	0.90	High	I
E	27.4 (Overweight)	80	130	52	Sinus	1.0	High	II
F	27.5 (Overweight)	70	120	57	Sinus	0.96	High	I
G	22.4 (Normal)	90	130	60	A.F	0.77	No risk	I
H	36.1 (Obese)	80	135	76	A.F	1	High	III
I	29.7 (Overweight)	70	130	55	Sinus	0.79	No risk	II

*BMI* body mass index, *DBP* diastolic blood pressure, *SBP* systolic blood pressure, *ECG* electrocardiogram, *WHR* wait-to-height ratio, *A.F* atrial fibrillation, *NYHA* New York Health Assessment Classification

### Theme 1—Emotional Trigger

Participants' responses to the interview were as follows: when asked, 'Was there an emotional trigger for your disease?' Nine reported their own CV condition related to the emotional trigger regarding the adverse life experience: six patients witnessed the death of a family member (e.g., father, daughter, husband), one patient described the divorce from his wife as

very painful, one moved to another city for economic reasons and one reported the impact of the cancer diagnosis. Patients perceive specific life experiences as negative outcomes for their well-being that compromise their heart health.

To the question 'Do you perceive yourself as frail?' all patients described themselves as frail. Even family members who were present believed that these patients were frail. People with HF felt frail in relation to life experiences associated with a high level of negative emotions; almost

**Table 4** Psychological parameters

Code	MMSE score	MMSE index	CRI score	CRI index	VAS
A	26	Mild	134	High	95/100
B	27	Normal	104	Medium	72/100
C	27	Normal	110	Medium	70/100
D	27	Normal	66	Low	97/100
E	26	Mild	112	Medium	50/100
F	27	Normal	118	Medium	80/100
G	30	Normal	90	Medium	99/100
H	30	Normal	122	Medium	70/100
I	29	Normal	111	Medium	40/100

*MMSE* Mini Mental State Examination, *CRI* Cognitive Reserve Index, *VAS* Visual Analogue Scale

all had dealt with the death of family members and reported a decrease in physical and mental well-being. Analyzing the quote, patients referred to experiencing mental discomfort directly linked to physical impairment (health failure or cardiopathy). Our patient reported a lived adverse experience as a precursor to CV issues.

## Theme 2—Family and Social Support

Family and social support are buffering factors for frailty. Cardiovascular patients experience difficulty in managing and caring for their health; therefore, family and/or social support, as well as healthcare providers, have emerged as important. Particularly, intimate relationships such as marriage, family members and/or friends are integral aspects of behavioral or psychosocial influences on the development, course, impact and management of cardiovascular disease. Smith [28] highlighted that cardiovascular patients living with partners generally seemed more adaptively engaged in healthcare than single patients: the author highlighted the relevant role of caregiver/partner engagement in the cure of the patient and more in the understanding of emotional distress, as their expressions of distress may modulate patients' own fears and concerns. Furthermore, the adjustment to coping

with the disease and related care could present negatively in both patients and partners, who each may have different views of the disease. Participant A reported that his family did not know about his check-up and the possible surgery in a few months; he sustained that his wife was unable to manage her distress for his health, so he preferred not to say anything. Health behaviors as prevention targets result in affective dynamics. Finally, intimate relationships are an important aspect of patients' adjustment to stressful events caused by cardiovascular disease and its treatment.

To the questions 'What was the help from your family like?' and 'What was the help from your friends' companionship like?' patients A, C, G, I, and H responded that they received family or social support for their daily or leisure activities (Table 5). Evidence of the importance of family and social support is typically associated with a reduced risk of cardiovascular disease, improved prognosis, more effective health-behavior changes and patient management and maintenance. In contrast, strained and disrupted relationships can exacerbate cardiovascular risk and complicate patient care. Family and social support appeared to have negative/positive buffering effects on the interactive process between social networks and individuals with cardiovascular disease in maintaining self-care behaviors that enhance optimal health.

**Table 5** Details of interview: themes, questions and quotes

Themes and questions	Quotes from the interviews
Theme 1—Emotional trigger	
Was there an emotional trigger for your diagnosis?	‘Yes. I think I can trace it back to the death of my father. He died of a sudden heart attack when he was very young, and I was a teenager. It was difficult growing up without such an important reference figure, I think it affected me all my life.’ (Participant A, 65 years)
What is the emotional trigger?	<p>‘My emotional trigger is the death of my daughter when she was 13... six months before my diagnosis. Life for me and my wife was never the same again, especially for my wife... I had to become strong for two...’ (Participant B, 75 years)</p> <p>‘It all started when my son began having financial problems. I had to move from my city house to a house in a mountain village. I had to change all my habits and leave my friends.’ (Participant C, 77 years)</p> <p>‘I first started having symptoms when my son died... and the diagnosis came after two years, when I also lost my husband. I found myself alone inside the house and outside. It took time to realize that maybe my life was not over, but that I had to move on.’ (Participant D, 71 years)</p> <p>‘Yes, I think I had an emotional trigger, namely when I had to divorce my wife. It was very painful for me. I did not want a divorce... and separating from her and my daughter was not easy. I still suffer from it today. I longed for the family we had built.’ (Participant E, 71 years)</p> <p>‘I first felt something wrong with my heart when I was in America and my wife called me to tell me to take the first flight home because my father had passed away. The hours on the plane seemed like the longest hours of my life. When I left, he was fine. I couldn’t imagine that happening.’ (Participant F, 57 years)</p> <p>‘My wife’s death has made my heart fragile. In the last few years, she could no longer walk and take care of the house. So, I decided to do it for her. I took her to the kitchen and prepared delicious dishes while she watched me. In the afternoons we went to the park and talked about our experiences together. I miss her very much.’ (Participant G, 80 years)</p> <p>‘I felt that something was wrong after the cancer. After an intense year spent treating myself for cancer and chemotherapy... I felt that something was wrong with my heart. Probably, all the stress undergone to treat myself, but more importantly, the fear after the diagnosis and showing myself strong to my family affected my heart failure.’ (Participant I, 78 years)</p> <p>‘I think I started having the first symptoms when my husband died... I found myself alone in the house having to manage the family.’ (Participant H, 79 years)</p>
Do you perceive yourself frail?	<p>‘Yes, very much, now I need my wife to remind me of the medicines I must take... there are many of them... As well as the doctor’s visit.’ (Participant B, 75 years)</p> <p>‘Yes, since after the funeral of my dad. I felt small and fragile. And since then, this feeling has not left my head.’ (Participant F, 57 years)</p>

Table 5 continued

Themes and questions	Quotes from the interviews
Theme 2—Family and Social Support	
What was the help from your family? And your friends' companionship?	<p>'My son will handle everything for me if I tell him...But my family don't know i am here today. My son will take care of everything for me if I tell him.... But my family does not know that I am here today. They get very agitated when I must do the checks, and they agitate me too, especially my wife. So, I go alone to medical check-ups. Now I have to find a way to tell them about the operation...' (Participant A, 65 years)</p> <p>'My friends always urge me to go out and talk to them. We always go for walks in the mountains. Sometimes we walk in silence, other times we chat a lot. We help each other when we need something. We also accompany each other when we have medical appointments. We are all alone, so we are there for each other.' (Participant C, 77 years)</p> <p>'My sons always, they are very close to me. Is always there, helps me do everything even when I don't ask for it. It makes me happy because then I have someone to talk to and spend some time with.' (Participant G, 80 years)</p> <p>'My wife takes care of me... She always cured me, even more now with disease: just now she's outside the door waiting for me, and... I love her for the patience she has with me!' (Participants I, 78 years)</p> <p>'Yes, my daughter helps me... Also, I am lucky because I have friends with whom we go together for medical check-ups. They make me happy because then I have someone to spend time with and we also take the opportunity to plan holidays together.' (Participant H, 79 years)</p>
Theme 3—Impulsiveness	
Do your thoughts go at high speed?	<p>'No possible to stop them. Ever since my father died, I couldn't stop thinking, after the diagnosis everything is amplified.' (Participant F, 77 years)</p> <p>'Sometimes yes... and I do something in the garden to stop them. Although it doesn't always work, but I always try to come up with something new in the garden.' (Participant D, 71 years)</p>
When you think, do you have extraneous thoughts and difficulties in maintaining your attention?	<p>'My intrusive thought is my daughter. How can I not think about it? I've tried every which way, but I can't. My thoughts automatically go there...' (Participant B, 75 years)</p> <p>'Almost all the time... even when I do activities I have them and my attention is gone. Almost all the time... even when I'm doing activities, I get it, and my attention is lost. I think about many things, maybe too many...' (Participant D, 71 years)</p>
Do you act on impulse?	<p>'No... Rarely. I was never impulsive, even as a boy. I have always thought calmly about what I have to do. It rarely happens to me when I am not paying attention to what I am doing or when I am really angry.' (Participant A, 65 years)</p> <p>'Lately, yes, but only if I am angry. Before, it hardly ever happened to me.' (Participant F, 57 years)</p> <p>'Never. I have always been very thoughtful before acting.' (Participant G, 80 years)</p> <p>'No... I can't act on impulse...sometimes I want to do it but it's difficult for me. Sometimes I want to say what I think immediately, but I stop myself to avoid unpleasant reactions from others.' (Participant H, 79 years)</p>

Table 5 continued

Themes and questions	Quotes from the interviews
Can you only think of one thing at a time?	‘Rarely, only when my head is not full of thoughts. And when I am in the garden.’ (Participant D, 71 years) ‘I often fail. And I feel that way because it is as if I can no longer control my mind. Especially at night, when I go to bed.’ (Participant F, 57 years)
Do you have self-control?	‘Yes, of course. How can you not have it? Walking in the mountains helps me a lot to have self-control. It allows me to think calmly about things that happen.’ (Participant C, 77 years) ‘Sometimes... But sometimes not... It depends perhaps on how I feel at that moment. But most of the time it does.’ (Participant E, 71 years)
Do you plan all your activities carefully?	‘Always! Since I have been diagnosed all the time. I need to do this to arrive more calmly at the planned activity. It also helps me to control my thoughts.’ (Participant A, 65 years) ‘Very often. By now I have planned almost everything. At my age, it is necessary, I think.’ (Participant C, 77 years) ‘Yes, often. Now that I am retired, I might not plan... but my previous job influenced me so I always plan everything, even now that I could do without it.’ (Participants I, 78 years)
Are you more interested in the present than in the future?	‘Not too much to the present and little to the future. At my age... why should I think about the future?’ (Participant B, 75 years) ‘Yes, sometimes. I think a lot about how things will go, I wonder if the same thing will happen to me as to my father. This is my thoughts of the future.’ (Participant F, 57 years)
Theme 4—Therapeutic relation with cardiologist	
What was the relationship with your cardiologist like?	‘He knows everything about my life... even that my family doesn’t know I’m here... there is deep trust and esteem.’ (Participant A, 65 years) ‘A good relationship! He is always very clear and decisive... I feel comfortable with him telling him everything.’ (Participant I, 78 years) ‘I can rely on him. I’m really trust what he tells me, and his advice are always efficient and help me to live better.’ (Participant C, 77 years) ‘It is a relationship I do not have with other medical doctors... He listens to me, is very clear and attentive in explaining the information to me every time.’ (Participant H, 79 years) ‘He is able to establish a professional and trusting relationship, is very attentive when I talk and when he is explaining information to me.’ (Participant E, 71 years) ‘Always very helpful, I was impressed from the first visit. For all the questions I have he gives me an answer, I never leave with doubts.’ (Participant F, 57 years) ‘He is very attentive, caring. He has a lot of impact on me.’ (Participant I, 78 years) ‘I feel supported by him—... he is always available, even though we have been seeing the doctor for a short time.’ (Participant H, 79 years) ‘When I don’t understand something, he knows how to explain it to me and that calms me down ... he is always very helpful, calm and attentive.’ (Participants I, 78 years)

Table 5 continued

Themes and questions	Quotes from the interviews
Theme 5—Quality of Life	
How do you define your quality of life?	‘Very well! I have everything I need to live well.’ (Participant A, 65 years) ‘Not bad. I cannot complain. I am still quite autonomous.’ (Participant C, 77 years) ‘It could be better. It could be better. I imagined things would be different.’ (Participant E, 71 years) ‘As always.’ (Participant G, 80 years)

Theme 3—Impulsiveness

Impulsivity is a psychological dimension based on the inability to conform to context or consequences and is a predictive dimension of maladaptive behaviors. In cardiology patients, the behavioral component could be a predictive factor for poor prognosis of cardiology events. Our patients reported fairness in reducing their QoL, showing relevant impulsive thoughts of intrusive thinking about difficulties in concentration. Moreover, maladaptive behaviors with high impulsivity can favor unhealthy behaviors and increase the risk of adverse events. Leroy et al. [29] evidenced that impulsivity is related to individual temperament and moderated by emotional characteristics, highlighting that impulsivity could be either a pejorative or protective risk factor. Participant B reported to have intrusive thinking regarding the dead daughter (‘My intrusive thought is my daughter. How can I not think about it? I’ve tried every which way, but I can’t. My thoughts automatically go there...’), as Participant E sustained not having enough self-control (‘Sometimes... But sometimes not... It depends on how I feel at that moment. But most of the time, it does’). Few patients reported good self-control and low impulsivity. Our participants with intensive emotional triggers tended to feel impulsive and, following Leroy’s [29] suggestions, this could indicate a persistent risk of low adherence to healthy behaviors and coping with medical advice. Providing personalized and patient-centered care based on patient engagement could be a promising cure setting that buffers the impact of the convergence of symptoms between CVs and frailty, facing challenges

in determining higher adherence to therapeutic solutions.

Theme 4—Therapeutic Relation with Cardiologist

Clinical practice and scientific evidence have highlighted the need to engage patients in clinical relationships to manage the burden of cardiovascular risk of adverse events [30, 31]. This finding appeared to be salient for our participants. Participant B revealed the human relationship regarding own fears, ‘I feel comfortable with telling him everything’. Participant I talked about the fear of change in the management of the disease (‘When I don’t understand something, he knows how to explain it to me and that calms me down ... he is always very helpful, calm and attentive’) and the ability of the cardiologist to overcome and make it more suitable considering being in a new care scenario. Cardiologists appeared to apply their technical skills better using interpersonal skills to build rapport and address fears. Building trust represents almost all features needed to improve and manage patient outcomes. Feeling ‘cured and cared for’ is a psychological dimension detected in spontaneous talking of patients and seemed to be a pillar in their health management. Considering Gringras’s [32] suggestions, all highlighted that the human link with cardiologists featuring a therapeutic relationship is basilar in the quality of patient experience. In treatment compliance, the connection between an alliance with doctor and patient medication adherence appeared salient to cure patients: according to the literature [33], medication non-adherence is



prevalent among patients with chronic diseases and is influenced by patient-, medication- and illness-specific and contextual factors.

### Theme 5—Quality of Life

The self-perception of our patients' QoL was good; they felt cured by medical staff, supported by suggestions. Additionally, pharmacological treatments helped them manage their frailty efficiently. Even by VAS evaluation, the score was high; Participant E appeared aware of their own cognitive decline related to living alone and economic issues. All medical evaluations highlighted physical weaknesses that were supported by polypharmacological treatments. Although they were almost autonomous, they needed help from caregivers and felt satisfied with the balance between clinical risk and QoL.

## DISCUSSION

Our study aimed to propose complementary analyses to determine the patient perspective to identify the relevance of indicators and their co-occurrence in the organization of components in clinical assessment. We analyzed the physical and psychosocial determinants of interplay as emotional triggers in lifelong cardiac care in patients with intensive psychological distress. The psychosocial factors analyzed in our study included emotional triggers, family and social support, impulsiveness, therapeutic relationships with cardiologists and QoL. We aimed to investigate the individual details of the impact of the factors examined in patients with CV who experienced stressful life events.

Applying the combined test–interview approach, we found that patients who experienced negative life events (e.g., death of family members, affective separation) and developed cardiovascular disorders could feel frail; usually, they say that their lives changed after a negative event, making them even more susceptible to heart diseases. The combination of cardiological symptoms and frailty could be associated with worse QoL and adverse outcomes following

acute disease events and comorbidities and, consequently, an increased risk of CVs progression. This is more relevant in polypharmacological treatments, as symptoms attributed to frailty may partly represent reversible manifestations of underlying cardiac disorders [6].

Family and social support appear to be protective factors modulating impulsiveness and making patients more resilient. Adherence to complex medical therapies is tempered by patient-engagement strategies powered by cardiologists. Patients felt confident about the specialists and perceived them as a part of their lives. The therapeutic relationship with medical doctors is a determinant of medication non-adherence, which is prevalent among patients with chronic diseases. Integrative management of both physical and mental resilience factors is essential in the development and continuation of lifelong care to support a positive QoL.

The quality of therapeutic relationships with cardiologists has emerged as a key protective factor for accurate risk stratification and therapeutic decision-making in patients with CV, addressing the potential benefits of therapeutic interventions. As suggested by Butt et al. [34], in HF care, systematic assessment should be periodically performed and may be the best strategy for preventing further functional loss and limitations due to increased comorbidity. From this perspective, active patient involvement and associated engagement based on cardiologists' confidence are focal points for facilitating management-therapy strategies to improve outcomes and reduce the burden of frailty in high-risk, vulnerable populations. Our analysis confirmed and better defined the clinical care implications of the therapeutic relationship with cardiologists (based on the dynamic interaction between doctor and patient) in prolonged care of chronic conditions, not only dealing with the side effects of CV functional capacity but also a significant improvement in patients' QoL.

Our qualitative study highlighted the significance of integrative or comprehensive multidisciplinary care for patients with CV, an emerging medical perspective as the optimal model. It facilitates coordinated efforts across multiple approaches, favoring effective health-behavior changes and patient management. In this

pathway, the clinimetric perspective facilitates clinical decision-making, contributing efficiently to tailoring methods for formulating a comprehensive care plan grounded in individualized healthcare goals and preferences. The clinimetric approach is concerned with the quality of clinical assessments and medical parameters and is based on standardization and sensibility aspects of evaluations [35, 36]. Fava et al. [35] outlined the features of clinimetrics as the science of clinical measurements; the key is the exploitation of the measurement components in clinical phenomena (which cannot be expressed in numerical dimensions), remodeling the clinical assessment.

Finally, Reddy et al. [36] defined lifestyle medicine as ‘an antidote’ to cardiovascular disease and debated the need for constructive and collaborative partnerships among healthcare professionals and educational institutions to consolidate the pillars in cardiological clinical practice. Although social determinants are pressing and core components of monitoring CV and chronic diseases, lifestyle implementations, especially in populations with adverse social factors, often present structural and systemic barriers [3]. In this framework, patient education regarding the mechanisms of lifestyle changes is relevant to enhancing self-care skills through tailored education based on scientific evidence or expert opinion [10].

A limitation of this study is related to the sample size: the reduced size of participants could affect the generalization of the results; however, despite this, the research focused on narrative tracks regarding participants’ experiences, perceptions and behaviors. The outcome of the research was to propose the ‘hows’ and ‘whys’ instead of ‘how many’ or ‘how much’. Additionally, the key objective of the protocol was to combine qualitative and quantitative data, making the patients’ perspectives more relevant.

## CONCLUSIONS

In conclusion, our investigation focused on the engaged patient that could contribute to

more efficient cardiological care: the personalized patient-centered approach can make the ‘cure and care’ clinical model more efficient. Adverse life events and acute occasions for psychological and physiological stress responses intensify the detrimental outcomes for patients with CV. The interplay of physical and mental determinants in patients with lifelong adverse life experiences could improve the quality of cardiological care, making it possible to identify the variables that have a buffering effect on cardiological care. The integrated management of physical and mental factors in cardiological care appears to be strategic. The focal point is the patient’s perspective of a positive QoL as a determinant for efficient clinical management of HF.

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**Data Availability.** The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

## Declarations

**Conflict of Interest.** Dina Di Giacomo, Eleonora Cilli, Federica Guerra, Francesco Barbatì, Renata Petroni, Luigi Sciarra and Silvio Romano have nothing to disclose with respect to personal, financial, commercial, or academic conflicts of interest.

**Ethical Approval.** Ethical Committee Approval was obtained from the CEtRA Abruzzo Region (IT) (ID 0461499/23) for the Play-UP Project [19]; it was conducted according to the guidelines of the Declaration of Helsinki [22]. Written informed consent was obtained from all participants to participate in the study and publish the results.

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## REFERENCES

- Bozkurt B, Coats AJS, Tsutsui H, et al. Universal definition and classification of heart failure: a report of the Heart Failure Society of America, Heart Failure Association of the European Society of Cardiology, Japanese Heart Failure Society and Writing Committee of the Universal Definition of Heart Failure: Endorsed by the Canadian Heart Failure Society, Heart Failure Association of India, Cardiac Society of Australia and New Zealand, and Chinese Heart Failure Association. *European J of Heart Fail.* 2021;23(3):352–80. <https://doi.org/10.1002/ehf.2115>.
- Savarese G, Becher PM, Lund LH, Seferovic P, Rosano GMC, Coats AJS. Global burden of heart failure: a comprehensive and updated review of epidemiology. *Cardiovasc Res.* 2023;118(17):3272–87. <https://doi.org/10.1093/cvr/cvac013>.
- Patel R, Peesay T, Krishnan V, Wilcox J, Wilsbacher L, Khan SS. Prioritizing the primary prevention of heart failure: Measuring, modifying and monitoring risk. *Prog Cardiovasc Dis.* 2024;82:2–14. <https://doi.org/10.1016/j.pcad.2024.01.001>.
- Goldfarb MJ, Saylor MA, Bozkurt B, et al. Patient-centered adult cardiovascular care: a scientific statement from the American Heart Association. *Circulation.* 2024. <https://doi.org/10.1161/CIR.0000000000001233>.
- Xu Q, Jia Y, Wang Y, et al. The bidirectional association between frailty index and cardiovascular disease: A Mendelian randomization study. *Nutr Metab Cardiovasc Dis.* 2024;34(3):624–32. <https://doi.org/10.1016/j.numecd.2023.10.018>.
- Volis I, Zafir B. Frailty and Cardiovascular Disease: A Bidirectional Association. *Cardiology.* 2024;149(3):205–7. <https://doi.org/10.1159/000535494>.
- Ticinesi A, Tana C, Nouvenne A, Prati B, Lauretani F, Meschi T. Gut microbiota, cognitive frailty and dementia in older individuals: a systematic review. *CIA.* 2018;13:1497–511. <https://doi.org/10.2147/CIA.S139163>.
- Gray SL, Anderson ML, Hubbard RA, et al. Frailty and incident dementia. *J Gerontol A Biol Sci Med Sci.* 2013;68(9):1083–90. <https://doi.org/10.1093/gerona/glt013>.
- Epstein RM, Street RL. The values and value of patient-centered care. *Ann Fam Med.* 2011;9(2):100–3. <https://doi.org/10.1370/afm.1239>.
- Scarà A, Palamà Z, Robles AG, et al. Non-pharmacological treatment of heart failure—from physical activity to electrical therapies: a literature review. *JCDD.* 2024;11(4):122. <https://doi.org/10.3390/jcdd11040122>.
- Lund LH, Crespo-Leiro MG, Laroche C, et al. Heart failure in Europe: Guideline-directed medical therapy use and decision making in chronic and acute, pre-existing and de novo, heart failure with reduced, mildly reduced, and preserved ejection fraction – the ESC EORP Heart Failure III Registry. *Eur J Heart Fail.* 2024. <https://doi.org/10.1002/ehf.3445>.

12. D'Andrea A, Caso P, Cuomo S, et al. Myocardial and vascular dysfunction in systemic sclerosis: The potential role of noninvasive assessment in asymptomatic patients. *Int J Cardiol.* 2007;121(3):298–301. <https://doi.org/10.1016/j.ijcard.2006.08.119>.
13. Giardina B, Penco M, Lazzarino G, et al. Effectiveness of thrombolysis is associated with a time-dependent increase of malondialdehyde in peripheral blood of patients with acute myocardial infarction. *Am J Cardiol.* 1993;71(10):788–93. [https://doi.org/10.1016/0002-9149\(93\)90825-W](https://doi.org/10.1016/0002-9149(93)90825-W).
14. Cilli E, Ranieri J, Guerra F, Ferri C, Di Giacomo D. Cardiovascular disease, self-care and emotional regulation processes in adult patients: balancing unmet needs and quality of life. *BioPsychoSocial Med.* 2022;16(1):20. <https://doi.org/10.1186/s13030-022-00249-y>.
15. Di Giacomo D, Ranieri J, Guerra F, Cilli E, Sciarra L, Romano S. Cardiovascular risk and biopsychosocial interplay: Association among hypertension, anxiety, and emotional dysregulation—observational study in primary care setting for efficient self-care. *Clin Cardiol.* 2024;47(1): e24152. <https://doi.org/10.1002/clc.24152>.
16. Kershaw KN, Brenes GA, Charles LE, et al. Associations of stressful life events and social strain with incident cardiovascular disease in the women's health initiative. *JAHA.* 2014;3(3): e000687. <https://doi.org/10.1161/JAHA.113.000687>.
17. Rafanelli C, Pancaldi LG, Ferranti G, et al. Stressful life events and depressive disorders as risk factors for acute coronary heart disease. *Ital Heart J Suppl.* 2005;6(2):105–10.
18. Quaresma A, Alves E, Fraga S, Henriques A. Stressful life events and heart disease and stroke: a study among Portuguese older adults. *Stress Health.* 2024;40(2): e3312. <https://doi.org/10.1002/smi.3312>.
19. Di Giacomo D, Sciarra L, Fusco L, Robles AG, Pernat A, Romano S. Allostatic load modelling, lifestyle and cardiometabolic risk factor: evidence for integrating patient profiling in the optimisation of pharmacological therapies during follow-ups in hospital setting—PLAY-UP cohort study protocol. *BMJ Open.* 2024;14(11): e082459. <https://doi.org/10.1136/bmjopen-2023-082459>.
20. Fava GA. Forty years of clinimetrics. *Psychother Psychosom.* 2022;91(1):1–7. <https://doi.org/10.1159/000520251>.
21. Giorgi A, Aanstoos CM, editors. Phenomenology and psychological research. 6. print. Duquesne Univ. Pr; 1994.
22. World Medical Association. WMA DECLARATION OF HELSINKI. Published online 2008. <https://www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects/>. Accessed 3 Jan 2025.
23. Folstein MF, Folstein SE, McHugh PR. Mini-mental state. *J Psychiatr Res.* 1975;12(3):189–98. [https://doi.org/10.1016/0022-3956\(75\)90026-6](https://doi.org/10.1016/0022-3956(75)90026-6).
24. Nucci M, Mapelli D, Mondini S. Cognitive Reserve Index questionnaire (CRIq): a new instrument for measuring cognitive reserve. *Aging Clin Exp Res.* 2012. <https://doi.org/10.3275/7800>.
25. Balestroni G, Bertolotti G. EuroQoL-5D (EQ-5D): an instrument for measuring quality of life. *Monaldi Arch Chest Dis.* 2015. <https://doi.org/10.4081/monaldi.2012.121>.
26. Lincoln Y, Guba E. Naturalistic inquiry. Sage Publications; 1985.
27. McDonagh TA, Metra M, Adamo M, et al. 2021 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure. *Eur Heart J.* 2021;42(36):3599–726. <https://doi.org/10.1093/eurheartj/ehab368>.
28. Smith TW. Intimate relationships and coronary heart disease: implications for risk, prevention, and patient management. *Curr Cardiol Rep.* 2022;24(6):761–74. <https://doi.org/10.1007/s11886-022-01695-4>.
29. Leroy M, Loas G, Perez-Diaz F. Is impulsivity a risk factor of clinical events in acute coronary syndrome? A three-year follow-up study. *Prog Neuropsychopharmacol Biol Psychiatry.* 2013;40:149–52. <https://doi.org/10.1016/j.pnpb.2012.10.004>.
30. Kinsella M. Exercising leadership within the therapeutic alliance: an autonomy-grounded perspective. *J Humanist Psychol.* 2023;63(1):103–25. <https://doi.org/10.1177/0022167818805568>.
31. Howgego IM, Yellowlees P, Owen C, Meldrum L, Dark F. The therapeutic alliance: the key to effective patient outcome? A descriptive review of the evidence in community mental health case management. *Aust N Z J Psychiatry.* 2003;37(2):169–83. <https://doi.org/10.1046/j.1440-1614.2003.01131.x>.
32. Gringras D. From clinical competence to human connection: a reflective journey to patient-centred care. *Lifestyle Medicine.* 2024;5(2): e2101. <https://doi.org/10.1002/lim2.101>.
33. Tu P, Smith D, Clark R, Bayzle L, Tu R, Lin C. Patients' characterization of medication, emotions, and incongruent perceptions around

- 
- adherence. JPM. 2021;11(10):975. <https://doi.org/10.3390/jpm11100975>.
34. Butts B, Gary R. Coexisting frailty, cognitive impairment, and heart failure: implications for clinical care. J Clin Outcomes Manag. 2015;22(1):38–46.
35. Fava GA, Tomba E, Sonino N. Clinimetrics: the science of clinical measurements: clinimetrics. Int J Clin Pract. 2012;66(1):11–5. <https://doi.org/10.1111/j.1742-1241.2011.02825.x>.
36. Reddy KR, Freeman AM. Lifestyle medicine: an antidote to cardiovascular diseases. Am J Lifestyle Med. 2024;18(2):216–32. <https://doi.org/10.1177/15598276221130684>.
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