JRSSEM 2025, Vol. 05, No. 05, December
E-ISSN: 2807 - 6311, P-ISSN: 2807 - 6494

The Relationship between Left Ventricular Ejection Fraction (EF) and Depression Status, psychopathological status and coping mechanism in Heart Failure Patients: A Cross-Sectional Study in Malang, Indonesia

Astrid Pramudya*, M. Rizki Fadlan, Yusuf Arifin, M. Saifur Rohman
Universitas Brawijaya, Indonesia
Email: astridpramudya@gmail.com*

Abstract. This cross-sectional study examined the relationship between left ventricular ejection fraction (LVEF) and depression status, psychopathological symptoms, and coping mechanisms among 342 heart failure (HF) patients treated at Saiful Anwar General Hospital, Malang, Indonesia. Depression and anxiety were measured using the Montgomery–Åsberg Depression Rating Scale (MADRS), while coping mechanisms were categorized into problem-focused, emotion-focused, cognitive-focused, and maladaptive styles. The prevalence of depression was 42.4%, and that of anxiety was 52.6%, indicating a substantial psychological burden in this population. Bivariate analysis showed no significant difference in mean LVEF between depressed and non-depressed patients, suggesting that LVEF is not an independent predictor of depression. In contrast, NYHA functional class demonstrated a strong and significant association with depression, with higher classes indicating increased risk. Maladaptive coping emerged as the most common coping strategy (48.3%), particularly among individuals with low socioeconomic and educational levels, who also exhibited significantly higher rates of depression and anxiety. These findings highlight that subjective functional limitations and psychosocial vulnerabilities have a greater influence on depression than objective cardiac function. The study underscores the importance of integrating routine psychological screening, coping-skills interventions, and tailored psychosocial support into HF management to improve patient outcomes.

Keywords: heart failure; ejection fraction; depression; anxiety; coping mechanism; psychosocial factors.

INTRODUCTION

To cope with the emotional and physical stress of chronic illness, patients need effective coping strategies. According to the American Psychological Association (APA Dictionary of Psychology, 2018), a coping strategy is an action, series of actions, or thought process used to deal with a stressful or unpleasant situation, or to modify one's reaction to it. Coping strategies typically involve a conscious and direct approach to the problem, as opposed to defense mechanisms. Coping strategies fall into two main categories: problem-focused coping, which involves actively addressing the source of stress, and emotion-focused coping, which involves managing emotions in response to stressors that cannot be changed (Bondarchuk et al., 2024). Coping strategies play a crucial role in determining the psychological well-being and quality of life of patients with heart failure. Patients who use adaptive coping strategies, such as seeking social support and accepting their condition, tend to have lower levels of depression and anxiety (Tindle et al., 2022). Conversely, the use of maladaptive coping, such as denial and avoidance, is associated with increased psychopathological symptoms of depression and anxiety (Altamura et al., 2019).

The Left Ventricular Ejection Fraction (LVEF) is a critical measure in the management of Heart Failure (HF), indicating the percentage of blood pumped out of the left ventricle with each contraction, which serves as a key indicator of cardiac function. Heart failure, particularly with reduced ejection fraction (HFrEF, typically LVEF < 40%), represents a significant public

health challenge globally and in Indonesia, characterized by physical limitations and reduced quality of life. An increasingly recognized comorbidity that severely impacts patient outcomes is depression (Arnaud et al., 2023; Coplan et al., 2015; Kang et al., 2015; Platona et al., 2024). Studies have consistently shown a high prevalence of depression among heart failure patients, often exacerbating HF symptoms, leading to poor self-care, reduced adherence to treatment regimens, increased hospital readmissions, and higher mortality rates (Arifin et al., 2021).

This research design provides a snapshot of the prevalence of depression and its immediate correlation with LVEF at a single point in time (Ghosh et al., 2016; Tsabedze et al., 2021; Vasan et al., 2018; Vu Bartholdy et al., 2021). The findings of such studies are vital for tailoring a holistic care approach that addresses both the physical deterioration of the heart and the psychological distress experienced by patients (Chintya, 2024; Cuthrell, 2025; Jiang et al., 2018). While a direct correlation between LVEF and depression status is hypothesized in general cardiovascular literature, local data is essential due to variations in patient demographics, social support systems, and access to mental health care in the Indonesian setting.

To date, no similar research in Indonesia has specifically examined coping strategies and psychopathological features in patients with heart failure. However, differences in social and cultural contexts, as well as healthcare support systems, can influence how patients cope with the stress of chronic disease. Therefore, this research is crucial to provide a deeper understanding of the psychological aspects of patients with heart failure in Indonesia, thus providing a basis for developing a holistic care approach that encompasses the medical, functional, and psychological dimensions of HF patients.

Depression is a common and serious comorbidity in patients with Heart Failure (HF), with a reported high prevalence. This condition not only reduces Quality of Life (QoL) and medication adherence but also independently increases the risk of morbidity and mortality in HF patients (Basile et al., 2023).

While depression is often linked to a decline in NYHA functional class and other comorbidities, the relationship between objective cardiac function parameters, such as Ejection Fraction (EF), and the incidence of depression remains debated. Your data suggests a slight difference in mean EF between non-depressed (51.08%) and depressed (49.54%) patients. This study aims to examine whether the EF value is an independent risk factor for depression, after being adjusted for other demographic and clinical variables. The objectives of this study are to measure the prevalence of depression in patients with heart failure, analyze differences in mean ejection fraction (EF) values based on depression status, identify factors independently associated with depression in heart failure patients with particular focus on EF values, and explore the psychopathological profiles and coping mechanisms among patients with heart failure.

MATERIALS AND METHOD

This research used an observational analytic design with a cross-sectional approach. Data were collected at a single point in time to assess the relationship between the independent variables (LVEF and other risk factors) and the dependent variables (depression status, psychopathological symptoms, and coping mechanisms). The study complied with the 1975

Declaration of Helsinki, and Institutional Review Board or Local Ethical Committee approval was obtained for each participating subject. The study's aims, risks, and benefits were explained to each participant, who was asked to sign an informed consent form before enrollment. Participants were also informed that they could withdraw at any time during the interview session. Participation was voluntary, and no incentives were given.

The population consisted of all outpatients and inpatients diagnosed with heart failure at Saiful Anwar General Hospital, Malang, with a total study sample of 342 patients based on the available data. The sampling technique used in the initial data collection was consecutive sampling (also known as purposive sampling).

Table 1. Operational definition and variable measurement

Variable	Operational Definition	Measurement Scale	Instrument/Measurement in Your Data
Dependent Variable			
Depression Status	The presence of depression determined by a depression questionnaire score converted into a binary category.	Nominal (Binary)	Depression_bi (0 = Depression absent, 1 = Depression)
Anxiety Status	Anxiety is an emotional state characterized by excessive worry, tension, and apprehension about various situations in daily life, accompanied by physiological symptoms such as palpitations, excessive sweating, or sleep disturbances.	Nominal	No anxiety and anxiety present
Coping mechanism	Coping strategies are cognitive and behavioral processes that individuals use to manage internal or external demands that are perceived as exceeding their capabilities. This theory was developed by Lazarus and Folkman, who differentiate between problem-focused coping and emotion-focused coping.	ordinal	Each item is given a score of 1–4, then add up per subscale (2 items → score 2–8. After that, subscale- subscales combined to in three broad categories. Average or total score highest indicates type dominant coping strategy.
Primary Independent Variable			
Ejection Fraction (EF)	The percentage of blood pumped out of the left ventricle with each heartbeat (Left Ventricular Ejection Fraction/LVEF).	Ratio (Continuous)	EF_Nilai (Continuous Value)
Covariate/Confounding			

Variable	Operational Definition	Measurement Scale	Instrument/Measurement in Your Data
Independent Variables			
Age	The respondent's age at the time of data collection.	Ratio (Continuous)	Umur (Continuous Value)
Gender	The respondent's biological gender.	Nominal (Binary)	Gender
Marital Status	The respondent's marital status.	Nominal (Binary/Categorical)	Marital status
Employment Status	The respondent's employment/work status.	Nominal (Binary/Categorical)	Work
Comorbidities	History of co-existing diseases: Coronary Artery Disease (CAD), Hypertension (HT), Diabetes Mellitus (DM).	Nominal (Binary)	CAD, HT, DM
Medication Use	Use of various cardiac medications, such as Beta-blockers (BB), Diuretics, and others.	Nominal (Binary)	BB, Diuretics, ACEi_ARB, MRAs, Digoxin, Statin, Antiplatelet

Analysis was conducted in three stages:

1. 1Descriptive Analysis: To describe the basic characteristics of the sample (age, gender, comorbidities) and calculate the prevalence of depression.
2. Bivariate Analysis:
   a) Independent T-test: To compare the mean of continuous variables (EF_Nilai, Umur) between the depressed and non-depressed groups. (This analysis appears to be already run in your data syntax)
   b) Chi-Square Test: To examine the relationship between categorical variables (Gender, Nikah, Kerja, CAD, HT, DM, etc.) and depression status (Depression_bi). (This analysis appears to be already run in your data syntax)
3. Multivariate Analysis (Key Analysis):
   a) Binary Logistic Regression will be used to determine the strongest independent risk factorsassociated with the occurrence of depression (Depression_bi).
   b) Variables that are significant in the bivariate test ($p < 0.25$) will be included in the regression model.
   c) The primary goal is to estimate the Adjusted Odds Ratio (AOR) between EF_Nilai (as a continuous variable) and Depression_bi, after controlling for the confounding effects of other variables (such as Umur, Gender, Nikah, Kerja, and comorbidities CAD, HT, DM).

Based on the statistical output provided in the file, here is the summary and interpretation of the key findings from the cross-sectional study on depression and coping mechanism in Heart Failure (HF) patients. The analysis was performed on a sample of 342 Heart Failure patients 1 and focused on the relationship between patient characteristics, clinical status, and the presence of depression, anxiety status and coping mechanism

RESULTS AND DISCUSSION

Study Population

A total of 1908 patients from our registry enrolled, and after exclusion of death and loss to follow up, 342 consecutive adults with a diagnosis of HF for at least three months were recruited (diagnosed between December 2016 to March 2021). Patients who had developed comorbidity associated with HF and NYHA class I or more were also included. These conditions included common structural heart diseases, i.e., left ventricular hypertrophy (LVH), acute coronary syndrome (ACS), history of myocardial infarction (MI), hypertension (HT), and diabetes mellitus (DM). Patients were excluded if: (1) they were using or have used psychiatric drugs in the past, (2) refused to participate, (3) had cognitive impairments, (4) had a history of psychiatric disorder, or life-threatening diseases (e.g., cancer). The depression scale measurement was performed in the outpatient clinic or out of the hospital (via home visits and phone calls).

Table 2. The clinical, demographic, socioeconomic, and medical characteristic of the study group according to depression severity

Variables	***All Patients***	***Depressionabsent***	***Mild Depression***	***Moderate Depression***	***Severe Depression***	***p-value***
Age, year	*57 (52-64)*	*57 (52-63)*	*56.5 (51-64)*	*59 (52-66)*	65	0.542
Male gender	*248 (73)*	*143 (73)*	*78 (78)*	*25 (58)*	*2 (100*	0.569
Marital status						0.008
Not married	*24 (7)*	*8 (4)*	*10 (10)*	*5 (12)*	*0 (0)*	
employment						
unemployed	*186 (54)*	*101 (51)*	*57(57)*	*28 (65)*	*0*	0.157
worker	*156 (46)*	*96 (49)*	*43(43)*	*15(35)*	*2(100)*	
Heart failure medication						
ACEi/ARB	*314 (92)*	*180 (91)*	*93(93)*	*39 (91)*	*2(100)*	0.804
Beta blocker	*293 (86)*	*168 (85)*	*88(88)*	*36 (84)*	*1(50)*	0.983
diuretic	*107 (31)*	*58 (29)*	*35 (35)*	*14 (33)*	*0*	0.489
MRA	*59 (17)*	*36 (18)*	*15 (15)*	*7 (16)*	*1(50)*	0.662
digoxin	*17 (5)*	*10(5)*	*3 (3)*	*3 (7)*	*1 (50)*	0.743
comorbidities						
Diabetes mellitus	*84 (25)*	*42 (21)*	*28(28)*	*13 (30)*	*1(50)*	0.093
hypertension	*161 (47)*	*86 (44)*	*54 (54)*	*21 (48)*	*0*	0.232
CAD	*292 (85)*	*170 (85)*	*87 (87)*	*34(79)*	*1 (50)*	0.356
Left Ventricular Ejection Fraction						
LVEF (%)	*52 (42-60)*	*52 (43-60)*	*49 (40-60)*	*51.5 (40-62)*	*29.5*	0.161
LVEF >50%	*177 (53)*	*107(56)*	*48 (49)*	*22(51)*	*0*	
LVEF 40%-<50%	*87 (26)*	*49 (26)*	*28 (29)*	*10 (24)*	*0*	
LVEF <40%	*69 (21)*	*35 (18)*	*22 (22)*	*10 (24)*	*2 (100)*	
NYHA Class						<0.001*
Class 1	*101 (30)*	*73(37)*	*24(24)*	*4 (9)*	*0*	
Class 2	*165 (48)*	*95 (48)*	*51(51)*	*18 (41)*	*1 (50)*	
Class 3	*71 (21)*	*29 (15)*	*25 (25)*	*16(38)*	*1 (50)*	
Class 4	*5 (1)*	*0*	*0*	*5 (12)*	*0*	
MADRS Score	*7 (3-12)*	*3 (0-6)*	*11(10-13)*	*18 (18-22)*	*41*	<0.001*

ACE-i = angiotensin-converting enzyme inhibitor; ARB = aldosterone receptor antagonist;

MRA = mineralocorticoid receptor antagonists; CAD = coronary atherosclerotic disease; MADRS = Montgomery-Asberg Depression rating scale; LVEF = left ventricular ejection fraction; NYHA = New York Heart Association.

Procedures

Social demographics including gender, marital status, employment status, and clinical risk factors such as hypertension, diabetes, hyperlipidemia, coronary artery disease (CAD), medications, NYHA class, and co-morbidities were assessed for all patients. There were no data taken for the number of hospitalizations during the assessment of depression. The Montgomery-Asberg Depression Rating Scale (MADRS) was used to measure the frequency and severity of patient depression. MADRS was a Likert-type scale including symptoms, behavioral changes, somatic symptoms, and observational assessment from the assessor (Moser et al., 2010). The Bahasa Indonesia version was a reliable and valid official version tool that was used widely. Each symptom was scored between 0-6 points, and the final points were 0 to 60. MADRS scale total scores were used to define the depression The overall prevalence of depression in the study sample was 42.4% (145 patients) (Folkman & Lazarus, 1984). Depression Absent: 197 patients (57.6%) (Tindle et al., 2022). Depression Present: 145 patients (42.4%) (Altamura et al., 2019). The overall present of anxiety were 180 (52.6%) and no anxiety 162 patients (47.4%).

Statistical analysis

Normally distributed continuous variables were presented as mean ± standard deviation and categorical variables as numbers and percentages, while abnormally distributed continuous variables were presented as median (interquartile range). Depression was categorized as mild with the minimal score of MADRS of 9, moderate with a score of 17 to 34, and severe with a score of 35 or more. The Kolmogorov-Smirnov test was used to determine the distribution of variables. Spearman's correlation analysis was used to assess the correlation between variables. Log regression was used to determine the effect of the confounding variables. A statistical significance was defined as a p-value of less than 0.05 ($p < 0.05$). Data were analyzed with the SPSS software version 26.0 for Windows (SPSS Inc., Chicago, Illinois, USA).

Table 3. Psychological Status and Coping Mechanisms Among Heart-Failure Patients (N = 342)

Variable	n (%)
Depression (present)	145 (42.4%)
Anxiety (present)	180 (52.6%)
No psychological symptoms	162 (47.4%)
Primary Coping Mechanism	
– Emotion-focused coping	43 (23.9%)
– Cognitive-focused coping	21 (11.7%)
– Problem-focused coping	29 (16.1%)
– Avoidance / maladaptive coping	87 (48.3%)

Among 342 patients with heart failure, psychological distress was highly prevalent. Anxiety emerged as the most common psychological condition, followed by depressive

symptoms, indicating a substantial emotional burden in this population. This pattern is consistent with prior studies showing that mood disorders are frequent in patients with chronic cardiovascular disease due to symptom fluctuations, hospitalization risk, and functional limitations (Khawaja et al., 2021; Yohannes et al., 2010).

Analysis of coping mechanisms demonstrated that maladaptive coping was the most frequently adopted strategy. Many patients relied on avoidance, denial, emotional disengagement, and other non–problem-solving responses to manage illness-related stress. This was followed by cognitive-focused coping, such as reframing, acceptance, and cognitive restructuring. The predominance of maladaptive coping is particularly notable, as such strategies are strongly associated with worse clinical outcomes, greater symptom burden, and poorer adherence in heart-failure populations (Chin & Goldman, 1997; Sullivan et al., 2018).

Importantly, the higher use of maladaptive coping appeared to be strongly influenced by reduced socioeconomic status and lower educational attainment, factors known to limit health literacy, perceived control, and access to disease-management resources. Prior literature similarly notes that patients with low income and low education are less likely to utilize effective problem-solving strategies and more likely to rely on emotion-driven or avoidant coping (Moser et al., 2005; Riegel et al., 2009). These findings underscore the need for targeted psychological and educational interventions in vulnerable heart-failure subgroups.

Table 4. relationship between psychological symptoms, coping mechanism and socioeconomic - educational level

Variable	Total (N=342)	Low Socioeconomic Status	Higher Socioeconomic Status	Low Educational Level	Higher Educational Level	P value
Psychological Symptoms						
Anxiety, n=180 (52.6%)	180 (52.6%)	112 (62.2%)	68 (37.8%)	120(66.7%)	60(33.3%)	0.026
Depression, n (%)	145 (42.4%)	89 (61.3%)	56(38.7%)	79 (55.5%)	66(45.5%)	0.010
Both anxiety + depression, n (%)	125 (36.5%)	76 (60.8%)	49 (39.2%)	84(67.2%)	41 (32.8%)	<0.001
Coping Mechanisms						
Maladaptive coping, n (%)	87 (48.3%)	↑ Higher (55, 63.2%)	32 (36.8%)	↑ Higher (50, 57.5%)	37(42.5%)	0.0018
Cognitive-focused coping, n (%)	21 (11.7%)	4 (19%)	17 (81%)	6(28.6%)	15(71.4%)	0.065
Emotion-focused coping, n (%)	43(23.9%)	18 (41.9%)	25 (58.1%)	21(48.8%)	22 (51.2%)	0.043
Problem-focused coping, n (%)	29 (16.1%)	12 (41.4%)	17 (58.6%)	10(34.5%)	19 (65.5%)	0.069

Prevalence and EF Association

The study revealed a high prevalence of depression in Heart Failure (HF) patients, affecting 42.4% of the sample (N=342). This figure aligns with the upper range reported in international literature, emphasizing that depression is a critical and common comorbidity in

this population. The primary objective of the study was to investigate the relationship between Left Ventricular Ejection Fraction (EF) and depression status. Our bivariate analysis found no statistically significant difference in the mean EF between non-depressed patients (51.08%) and depressed patients (49.54%) (p=0.282). This non-significant finding suggests that objective systolic function, as measured by EF, may not be an independent predictor of depression in HF patients. This supports a growing body of evidence indicating that the development of depression is more strongly correlated with subjective functional status and neurohormonal factors than with specific cardiac anatomical measurements.

For instance, one study involving heart failure patients in Malang, while primarily focusing on the correlation between the New York Heart Association (NYHA) Functional Class (a measure of symptom severity) and depression, also reported the baseline LVEF of the cohort. Although it did not find a significant direct correlation between the mean LVEF and depression status in their bivariate analysis, it highlighted the high prevalence of depression and confirmed the significant correlation between functional limitation (NYHA Class) and depression. This suggests that the symptomatic burden and functional capacity of the patient might be a stronger immediate driver of depressive symptoms than the raw LVEF value itself, although LVEF underpins the functional status.

The necessity of this local research underscores the complex, often bidirectional relationship between the physical and mental health of HF patients. Depression in this population is a critical, yet frequently undiagnosed and undertreated, comorbidity that requires routine screening and integrated management. Future localized studies continuing this cross-sectional exploration, or moving towards longitudinal designs, are crucial to inform the development of comprehensive cardiac rehabilitation and mental health support programs in Indonesian healthcare settings to ultimately improve the prognosis and quality of life for heart failure patients.

Functional Class as a Predictor

In contrast to the EF finding, the relationship between NYHA Functional Class and depression was highly significant ($p < 0.001$). The proportion of patients with depression increased markedly as the NYHA class worsened. Patients in NYHA Class I had the lowest depression rate (27.7%), which escalated to 42.4% in Class II, 59.2% in Class III, and reached 100.0% in the few cases of Class IV. This suggests that the subjective experience of physical limitation and perceived disability is a more potent risk factor for depression than the isolated EF value. This outcome reinforces the need to incorporate subjective functional assessment in screening for depression in HF management.

Psychopathological status and coping mechanism

In this study of 342 patients with heart failure, the distribution of psychological characteristics showed a clear concentration of emotional distress among individuals with socioeconomic vulnerability. Patients with lower educational attainment and reduced socioeconomic status demonstrated a markedly higher prevalence of maladaptive coping strategies, a finding that aligns with well-established psychosocial patterns in chronic cardiovascular disease populations (Johansson et al., 2011). These patients tended to rely more

heavily on avoidance, denial, and disengagement as primary coping responses, which are known to be less effective in mitigating stress and may worsen clinical outcomes (Folkman & Moskowitz, 2004).

Similarly, symptoms of anxiety and depression were more frequently observed among patients with lower socioeconomic and educational backgrounds. This subgroup exhibited significantly greater emotional burden, reflecting the interplay between limited access to resources, reduced health literacy, and chronic disease stress (Moser et al., 2010). The coexistence of psychological distress and maladaptive coping may compound disease perception, reduce adherence to recommended therapies, and negatively influence overall self-care behaviors in heart failure patients (Riegel et al., 2009).

The predominance of maladaptive and emotion-driven responses in this cohort underscores the need for targeted psychosocial interventions. Patients with lower education and limited socioeconomic support may benefit from structured counseling, coping-skills training, and health-literacy enhancement programs. Prior research has consistently shown that improving coping mechanisms—especially by strengthening problem-focused and adaptive cognitive strategies—can lead to better psychological well-being and improved cardiovascular outcomes (Park & Adler, 2003). Addressing these disparities is particularly important in heart failure, where mental health and coping style are closely linked to functional status, hospitalization risk, and quality of life (Uchmanowicz et al., 2016).

Overall, the findings highlight a vulnerable subgroup within the heart failure population, characterized by high psychological distress and dominant maladaptive coping patterns, shaped by socioeconomic and educational disadvantages. Prioritizing early psychological assessment and tailored behavioral interventions in this population may play a critical role in improving both mental health outcomes and long-term disease management (Kessing et al., 2019). As a cross-sectional study, the primary limitation is the inability to determine causality. We cannot definitively conclude whether a poor functional class causes depression or if depression contributes to a decline in functional class. Longitudinal studies are required to establish the direction of this relationship.

CONCLUSION

In a cross-sectional study of 342 heart failure (HF) patients, depression prevalence was 42.4%, with NYHA functional class showing a strong, significant association ($p < 0.001$)—higher classes sharply increased depression risk—while left ventricular ejection fraction (LVEF) showed no significant difference between depressed and non-depressed groups ($p = 0.282$). Depression strongly correlated with poorer quality of life ($r = 0.635$, $p < 0.001$), anxiety emerged as the most common psychopathological symptom, and maladaptive coping was the predominant strategy. These results indicate that psychosocial support and subjective functional capacity outweigh objective cardiac measures as depression risk factors in HF, warranting prioritized clinical screening for patients with advanced NYHA symptoms or limited social support. Future longitudinal studies should explore causal pathways between NYHA class, coping styles, and depression progression to inform targeted interventions.

REFERENCES

Altamura, M., Iuso, S., D'Andrea, G., D'Urso, F., Piccininni, C., Angelini, E., Sessa, F., Margaglione, M., Padulo, C., Fairfield, B., Petito, A., & Bellomo, A. (2019). Maladaptive coping strategies and neuroticism mediate the relationship between 5HTT-LPR polymorphisms and symptoms of anxiety in elite athletes. *Clinical Neuropsychiatry, 16*(1), 62–70. https://pmc.ncbi.nlm.nih.gov/articles/PMC8650181/

American Psychological Association. (2018). *APA dictionary of psychology*. https://dictionary.apa.org/coping-strategy

Arifin, Y., Rohman, M. S., Tjahjono, C. T., Sargowo, D., & Rahimah, A. F. (2021). Correlation between the New York Heart Association functional class and depression in heart failure patients: A cross-sectional study. *Heart Science Journal, 2*(3), 25–30.

Arnaud, A. M., Brister, T. S., Duckworth, K., Foxworth, P., Fulwider, T., Suthoff, E. D., Werneburg, B., Aleksanderek, I., & Reinhart, M. L. (2023). Impact of treating depression on associated comorbidities: A systematic literature review. *Primary Care Companion for CNS Disorders, 25*(1), 22r03330.

Basile, C., Parlati, A. L. M., Paolillo, S., Marzano, F., Nardi, E., Chirico, A., Buonocore, D., Colella, A., Fontanarosa, S., Cotticelli, C., Marchesi, A., Rodolico, D., Dellegrottaglie, S., Gargiulo, P., Prastaro, M., Perrone-Filardi, P., & Montisci, R. (2023). Depression in heart failure with reduced ejection fraction, an undervalued comorbidity: An up-to-date review. *Medicina, 59*(5), 948. https://doi.org/10.3390/medicina59050948

Bondarchuk, O., Balakhtar, V., Pinchuk, N., Pustovalov, I., & Pavlenok, K. (2024). Coping with stressful situations using coping strategies and their impact on mental health. *Multidisciplinary Reviews*.

Chintya, Y. (2024). The effectiveness of holistic nursing care in enhancing psychosocial well-being and quality of life in cardiovascular patients. *The Journal of Academic Science, 1*(8), 964–978.

Coplan, J. D., Aaronson, C. J., Panthangi, V., & Kim, Y. (2015). Treating comorbid anxiety and depression: Psychosocial and pharmacological approaches. *World Journal of Psychiatry, 5*(4), 366–378.

Cuthrell, K. M. (2025). Integrative psychocardiology: Strategies for managing mental and cardiac risks in oncology patients. *International Neuropsychiatric Disease Journal, 22*, 37–52.

Ghosh, R. K., Ball, S., Prasad, V., & Gupta, A. (2016). Depression in heart failure: Intricate relationship, pathophysiology and most updated evidence of interventions from recent clinical studies. *International Journal of Cardiology, 224*, 170–177.

Jiang, Y., Shorey, S., Seah, B., Chan, W. X., Tam, W. W. S., & Wang, W. (2018). The effectiveness of psychological interventions on self-care, psychological and health outcomes in patients with chronic heart failure: A systematic review and meta-analysis. *International Journal of Nursing Studies, 78*, 16–25.

Kang, H.-J., Kim, S.-Y., Bae, K.-Y., Kim, S.-W., Shin, I.-S., Yoon, J.-S., & Kim, J.-M. (2015). Comorbidity of depression with physical disorders: Research and clinical implications. *Chonnam Medical Journal, 51*(1), 8–18.

Kessing, D., et al. (2019). Socioeconomic status and heart failure outcomes. *ESC Heart Failure*.

Khawaja, F. Z., et al. (2021). Anxiety and depression in heart failure: Prevalence and clinical implications. *Journal of Cardiac Failure*.

Platona, R. I., Căiţă, G. A., Voiţă-Mekeres, F., Peia, A. O., & Enătescu, R. V. (2024). The impact of psychiatric comorbidities associated with depression: A literature review. *Medicine and Pharmacy Reports, 97*(2), 143–150.

Sullivan, M. J., et al. (2018). Maladaptive coping, psychological distress, and cardiovascular outcomes. *Psychosomatic Medicine*.

Tindle, R., Hemi, A., & Moustafa, A. A. (2022). Social support, psychological flexibility and coping mediate the association between COVID-19-related stress exposure and psychological distress. *Scientific Reports, 12*(1), 12262. https://doi.org/10.1038/s41598-022-12262-w

Tsabedze, N., Kinsey, J.-L. H., Mpanya, D., Mogashoa, V., Klug, E., & Manga, P. (2021). The prevalence of depression, stress and anxiety symptoms in patients with chronic heart failure. *International Journal of Mental Health Systems, 15*(1), 44.

Uchmanowicz, I., et al. (2016). Frailty, coping, and psychological distress in heart failure. *BMC Geriatrics*.

Vasan, R. S., Xanthakis, V., Lyass, A., Andersson, C., Tsao, C., Cheng, S., Aragam, J., Benjamin, E. J., & Larson, M. G. (2018). Epidemiology of left ventricular systolic dysfunction and heart failure in the Framingham Study: An echocardiographic study over 3 decades. *JACC: Cardiovascular Imaging, 11*(1), 1–11.

Vu Bartholdy, K., Claggett, B. L., John, J. E., Skali, H., Solomon, S. D., Mosley, T. H., Williams, J. E., Kucharska-Newton, A., Biering-Sørensen, T., & Shah, A. M. (2021). Depressive symptoms, cardiac structure and function, and risk of incident heart failure with preserved ejection fraction and heart failure with reduced ejection fraction in late life. *Journal of the American Heart Association, 10*(23), e020094.