

Laura Suarez, MD,¹ Shehzad Niazi, MD,² Candace Moose, RN,⁴ Leslie T. Cooper,^{3,4} William V. Bobo, MD, MPH²

¹Division of Psychiatry and Psychology, Mayo Clinic, Rochester, MN; ²Division of Psychiatry and Psychology, Mayo Clinic, Jacksonville, FL;

³Department of Cardiovascular Medicine, Mayo Clinic, Jacksonville, FL; ⁴Myocarditis Foundation

Background

- Cardiomyopathy and myocarditis were responsible for an estimated 9.14 million disability-adjusted life years (DALYs) and an age standardized death rate of 5.6 per 100,000 in 2019.
- Acute myocarditis strikes suddenly, is potentially life-threatening, and can result in long-term cardiac complications including the need of a heart transplant.
- Myocarditis' fulminant presentation and the requirement of aggressive treatment can result in significant psychological distress, thus raising the risk of mood and anxiety disorders and traumatic stress syndromes.
- The available data regarding the risk of mental health conditions in people with myocarditis and their caregivers is limited.

No studies have examined the impact depression, anxiety, and traumatic stress have on quality of life (QoL) and clinical outcomes in patients with myocarditis

Objectives

- 1) Identify clinical and sociodemographic risk factors for clinically significant depression, anxiety, traumatic stress in adults with a history of myocarditis and their caregivers, as compared to unaffected controls.
- 2) Examine the effects of depression, anxiety, traumatic stress on QoL and health outcomes measured by hospitalizations in adults with a history of myocarditis, as compared to unaffected controls.

Conclusions

- The study will identify clinical and demographic risk factors for depression, anxiety, and traumatic stress on myocarditis patients and their caregivers.
- The study will identify the impact of these conditions on QoL and selected health outcomes.

This will be the **first** study to address these objectives, the results of which may **increase the awareness** of healthcare providers, patients, and families about risk factors and consequences of comorbid psychiatric conditions for people living with myocarditis and their caregivers.

Methods

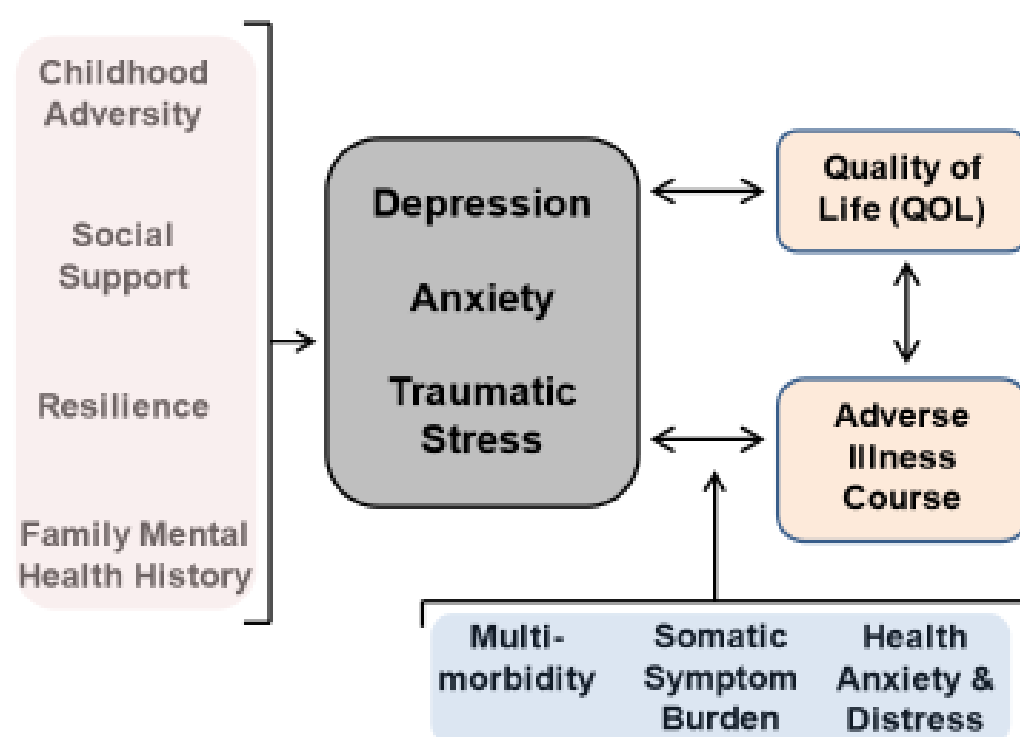
Cross-sectional survey-based study of myocarditis survivors and caregivers.

Investigator-Developed Survey	Details
Demographic characteristics Myocarditis history Personal history of mental health Family history of mental health	Patient and caregiver versions.
Illness course	Patients only
ENRICH Social Support Instrument	Caregiving and quality of social support
Center for Epidemiologic Studies Depression Scale	Clinically-significant depression
Beck Anxiety Inventory	Clinically-significant anxiety
Impact of Event Scale-Revised	Traumatic stress
Linear Analog Self-Assessment	Quality of life
Brief Resiliency Scale	Resiliency
Patient Health Questionnaire-15	Somatic symptom burden
Health Anxiety Inventory	Health anxiety
Adverse Childhood Experiences Questionnaire	Adverse childhood events/experiences
Cancer and Treatment Distress Scale (adaptation)	Distress associated with treatment

Statistical Analysis:

- Logistic regression to examine the relationship between depression, anxiety, covariables, and health outcomes (QoL and hospitalizations) for patients, caregivers, and controls.
- Independent outcome predictors will be identified using backward stepwise variable elimination (at an exit threshold $p > 0.05$). Stratified analyses using subgroups defined by underlying myocarditis diagnosis, cardiac transplant status, and active versus former caregiving.

Conceptual Framework



References

1. Mirabel M, Luyt CE, Leprince P, et al. Outcomes, long-term quality of life, and psychologic assessment of fulminant myocarditis patients rescued by mechanical circulatory support. *Crit Care Med.* May 2011;39(5):1029-35. doi:10.1097/CCM.0b013e31820ead45
2. Elamm CA, Al-Kindi SG, Oliveira GH. Characteristics and Outcomes of Patients With Myocarditis Listed for Heart Transplantation. *Circ Heart Fail.* Dec 2016;9(12):doi:10.1161/circheartfailure.116.003259
3. Kindermann I, Barth C, Mahfoud F, et al. Update on myocarditis. *J Am Coll Cardiol.* Feb 28 2012;59(9):779-92. doi:10.1016/j.jacc.2011.09.074
4. Elamm C, Fairweather D, Cooper LT. Pathogenesis and diagnosis of myocarditis. *Heart.* Jun 2012;98(11):835-40. doi:10.1136/heartjnl-2012-301686
5. Cooper LT, Jr. Myocarditis. *N Engl J Med.* Apr 9 2009;360(15):1526-38. doi:10.1056/NEJMra0800028
6. Gupta S, Markham DW, Drazner MH, Mammen PP. Fulminant myocarditis. *Nat Clin Pract Cardiovasc Med.* Nov 2008;5(11):693-706. doi:10.1038/ncpcardio1331
7. Roth GA, Mensah GA, Johnson CO, et al. Global Burden of Cardiovascular Diseases and Risk Factors, 1990-2019: Update From the GBD 2019 Study. *J Am Coll Cardiol.* Dec 22 2020;76(25):2982-3021. doi:10.1016/j.jacc.2020.11.010