Psychological Stress Responses, Resilience, and Cardiovascular Health

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Introduction

Cardiovascular disease is the leading cause of death worldwide[20]. In 2023, an estimated 1 in 3 deaths within the United States could be attributed to cardiovascular disease[19]. Exposure to psychological stress has been identified as a cardiovascular disease risk factor[6], and has been hypothesized to increased risk of cardiovascular disease through:

- **Direct mechanisms** (e.g., vagal withdrawal, increased hypothalamic pituitary adrenal (HPA) axis activation[6])
- **Indirect mechanisms** (e.g., behavioral patterns such as decreases in exercise and sleep[6])

These mechanisms are both hypothesized to be influenced by differences in coping with stressors[5]. Thus, it is important to examine how various approaches to navigate psychological stressors influence cardiovascular health, in order to inform implications for prevention.

The purpose of this literature review was to examine how **demographic, life experience, and socioeconomic factors,** influence individuals' navigation of psychological stressors**,** and how these variations in coping **responses** influence **cardiovascular health outcomes,** and provide insight for public health interventions.

Methods

The PubMed database was searched to identify literature that examined relationships between psychological stress, coping strategies, resilience, and cardiovascular health outcomes.

- This search was refined to focus on sources that were published within the past 10 years, were peer-reviewed journal articles, and were written in English.

Search Terms: "psychological stress", "emotional stress", "psychological resilience", "resilience", "coping", "stress appraisal", "cardiovascular disease", and "atherosclerosis".

Exclusion criteria included articles focusing on animal models, psychiatric diagnosis or personality traits, studies examining the impact of cardiovascular disease on psychological stress levels, studies that did not address a cardiovascular outcome, and studies that did not include a measure of resilience or a measure of coping.

- 18 reports met inclusion for full text review.
- Black women were overrepresented in this review, consistent with data trends on heart disease[3].
- Measures such as the Perceived Stress Scale (PSS-10), the Holmes-Rahe Life Stress Inventory, and the Trier Social Stress Test (TSST), were most frequently used to assess stress response.
- The Brief-COPE scale, Satisfaction with Life Scale (SWLS), Problem Behavior Frequency Scale (PBFS), and the Connor-Davidson Resilience Scale (CD-RISC) were frequently used to assess resilience and coping strategies.
- Blood pressure (SBP and DBP), heart rate (HR), heart rate variability (HRV), endothelium-dependent vasodilation via brachial artery flow-mediated dilation (FMD), carotid ultrasounds, and electrocardiograms (EKG), were most frequently used to measure cardiovascular response.
- Identified coping pattern labels varied, with *emotion-focused*, *problem-focused*, and *avoidant style coping* being the most prevalent.
- Specific coping behaviors (i.e. drug use vs. meditation) were categorized as either *adaptive* or *maladaptive*.

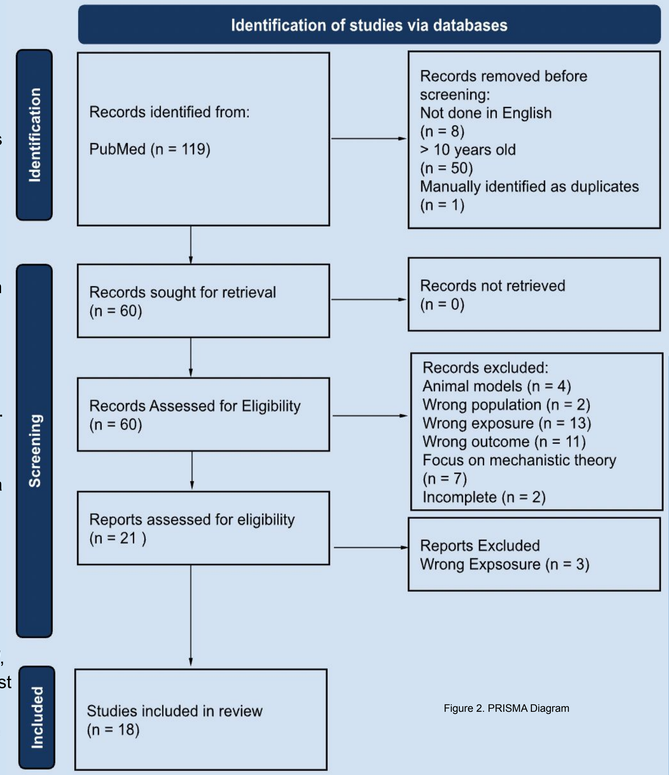

Figure 2. PRISMA Diagram

Conceptual Model of the Connections[1] between Psychological Stressors[1,2], Coping, and Cardiovascular Health Outcomes[4]

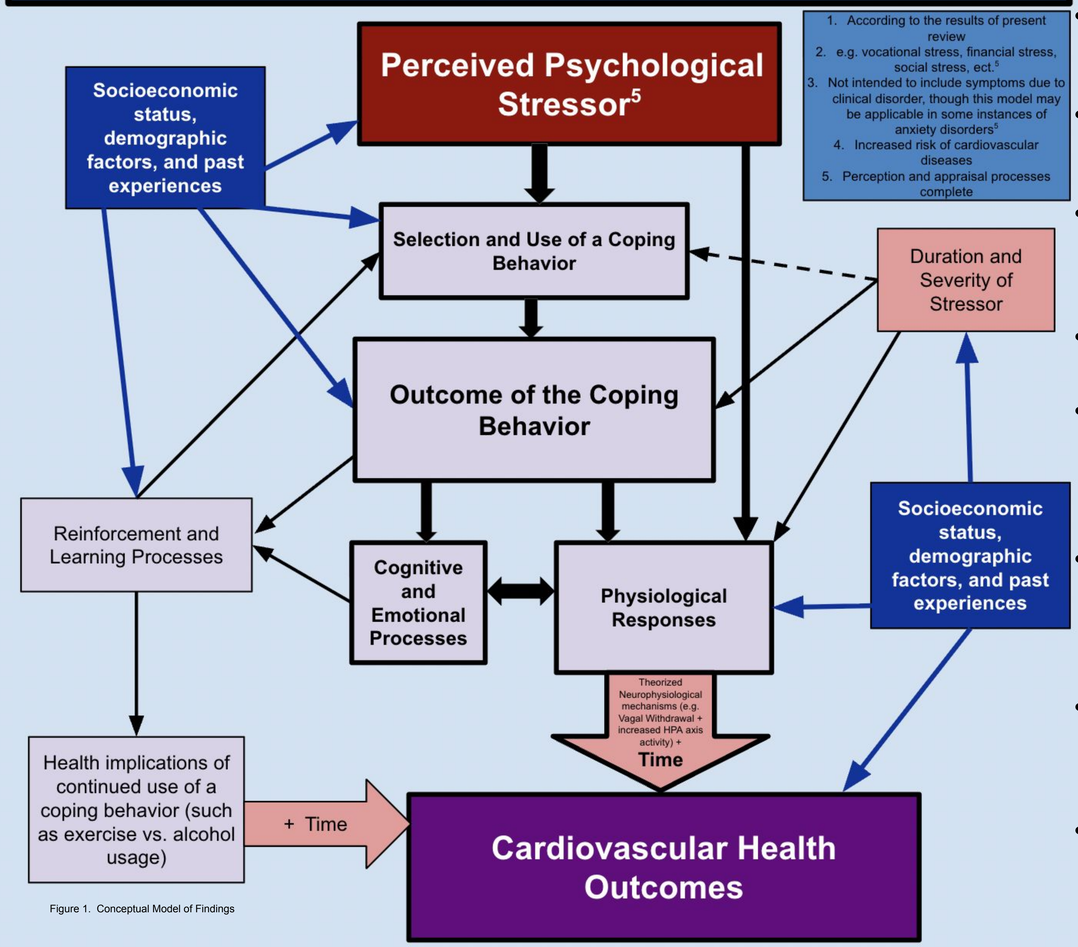

Figure 1. Conceptual Model of Findings

Results

- Results suggest that the link between psychological stress and cardiovascular outcomes is mediated by coping strategies, which can decrease or further increase stress-related cardiovascular health risks[4,5,9,16].
- Demographic and socioeconomic factors influence mindset to stress[10], reactivity[3], coping behaviors[1], coping behavior outcome[5], exposure to stress[7,13], and education on adaptive coping strategies[6].
- Use of maladaptive coping strategies may lead to decreased perceptions of psychological stress,[12] while sustaining physiological stress reactions, negatively impacting the cardiovascular system[11,18].
- Chronic life stressors (e.g., ACEs, toxic workplace) influence an individual's perception of stress[10], coping behaviors used[5,15], and health outcomes of using a coping behavior[14]; through processes of reinforcement and neuroplastic changes[5 9]
- Duration[4,12], severity[6], individual reactivity[2,4], and attitude towards[10] a stressor may influence the health outcomes of the use of a coping behavior.
- **Generally, compared to emotion and avoidant-type coping patterns, problem-focused coping behavioral patterns were identified as predictive of better cardiovascular health[5]. However, a mix of strategies that can be tailored to the situation of the stressor is best[13].**
- However, when used frequently to attempt to overcome continuous challenges caused by systemic barriers amongst marginalized populations, long-term use of problem-focused coping patterns has been linked to poor cardiovascular health outcomes[7,14], despite often leading to improved psychological outcomes[12,15].
- **Specific coping behaviors most strongly supported to decrease cardiovascular risk across a variety of populations include meditation[7], exercise[7], assessing control over the stressor and adjusting response[15], and seeking social support[17].**
- Measures of individual psychological resilience were not found to have a significant effect on cardiovascular health outcomes, within marginalized communities[8,12], those of low socioeconomic status[12], and those in high stress occupations[2].

References

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Conclusions

- There is no single type of coping behavior that will universally predict better cardiovascular health outcomes; a coping behavior must fit the stressor and situation, and not be the only option available to the individual.
- Systematic barriers increase stress-related cardiovascular disease risk by increasing stress exposure, duration, and access to healthy and fitting coping behaviors.
- Future research should investigate intervention strategies at both the individual and population levels that take into account both broader structural barriers that inhibit the ability to access healthy coping behaviors and empirical research on which coping behaviors have been identified as predictive of better physiological and psychological health outcomes.
- These interventions may include policy changes to increase access to green and blue spaces, social support, transportation, healthy workplaces, fitting education on adaptive coping behaviors, physical and mental healthcare, racial/gender equity, employee health, and accessible urban design. These policy changes will aim to remove barriers to using preventative coping behaviors, and reduce the increased frequency, length, and severity of stress exposures that impact marginalized communities.
- Future research could examine how additional coping behaviors and access to healthy infrastructure prevent stress across different demographics, prior experiences, individual stress perceptions, and other personal and environmental factors.