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The Role of Pain Self-Efficacy and Death Obsession in Predicting Defense Mechanisms: The Mediating Effect of Coping Strategies in Heart Failure Patients

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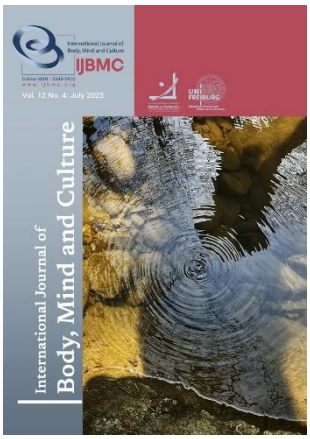

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ABSTRACT

Objective: This study aimed to examine the direct and indirect effects of pain self-efficacy and death obsession on defense mechanisms, with coping strategies serving as a mediating variable.

Methods and Materials: Using a descriptive-correlational design, 310 patients with heart failure in Kish Island were selected through purposive sampling. Participants completed validated questionnaires measuring pain self-efficacy, death obsession, coping strategies, and defense mechanisms. Structural equation modeling (SEM) was used for data analysis.

Findings: Pain self-efficacy was negatively associated with maladaptive defense mechanisms ($\beta = -0.20$, $p < 0.05$), while death obsession showed a positive relationship ($\beta = 0.26$, $p < 0.01$). Coping strategies partially mediated both relationships, with significant indirect effects confirmed via the Sobel test. Model fit indices indicated satisfactory goodness-of-fit (CFI = 0.94, RMSEA = 0.05).

Conclusion: Pain self-efficacy and death obsession significantly influence psychological defense mechanisms in heart failure patients, and coping strategies partially mediate these effects. These findings underscore the importance of psychosocial interventions that enhance adaptive coping and self-efficacy while addressing existential concerns in cardiac care.

Keywords: Pain self-efficacy, death obsession, coping strategies, defense mechanisms, heart failure.

Introduction

Given the life-threatening and chronic nature of cardiovascular diseases, they are often perceived as a life crisis for affected individuals, severely impacting not only their physical health but also their psychological state, with death obsession being one notable psychological concern (Kang et al., 2020). Death obsession refers to persistent and intrusive thoughts, beliefs, and mental preoccupations with death, comprising three dimensions: death rumination, death dominance, and repetitive death ideation (Enea et al., 2022; Enea et al., 2021). It can be stated that some individuals are particularly preoccupied with thoughts of death (Moreton et al., 2023).

Substantial evidence confirms that negative psychological factors can significantly impair patient functioning. Defense mechanisms are defined as unconscious psychological responses aimed at coping with stressors, reducing or preventing psychological stress, anxiety, and guilt, and preserving mental calmness (Wang, 2022). Research indicates that defense mechanisms exist on a continuum from highly adaptive to poorly adaptive, with mature defense mechanisms being associated with positive adaptation and reduced psychopathology (Nam et al., 2019). High-level adaptive defense mechanisms are essential for maintaining effective personality development in healthy individuals (Crouch et al., 2024).

Patients with heart failure experience numerous negative consequences across various domains of life, including physical, social, psychological, emotional, and economic aspects (Alola et al., 2018). Studies have shown that employing diverse coping strategies and having a strong sense of coherence can significantly impact emotional affect and emotional well-being in patients with chronic heart failure (Nahlen & Saboonchi, 2010). The selection of coping strategies is influenced by factors such as the duration of illness, hospitalization history, and individual perceptions of stressors (Plessis & Martins, 2019). The literature on coping strategies includes approaches such as problem-focused coping, emotion-focused coping, and ineffective coping (Desie et al., 2021). Evidence suggests that problem-focused coping is more effective than emotion-focused coping in managing stress. Additionally, coping strategies are influenced by factors such as the nature of the stressor, the individual's perception of the intensity of the experience, and the assessment of available coping resources (Azale et al., 2018).

Patients with heart failure often experience psychological distress due to the chronic nature of their condition, which can lead to the development of maladaptive defense mechanisms. Understanding the interplay between pain self-efficacy, death obsession, and coping strategies is essential for developing interventions that can enhance psychological resilience and health outcomes in this population. Identifying how these psychological factors influence each other, and the mediating role of coping strategies, can optimize existing psychological interventions or contribute to the development of more effective approaches for improving cardiac patient care.

Accordingly, the present study was conducted to examine the relationship between pain self-efficacy and death obsession with defense mechanisms, with coping strategies acting as a mediator, in patients with heart failure.

Methods and Materials

Study Design and Participants

The present study employed a descriptive design with a correlational research method based on structural equation modeling (SEM). The statistical population consisted of all patients with heart failure in Kish Island. To determine the sample size, Klein's (2005) formula was used, resulting in a sample size of 310 participants. A purposive sampling method was applied, and participants were selected by visiting cardiac hospitals. The inclusion criteria were: age between 20 and 45 years, diagnosis of heart failure, absence of acute psychiatric disorders, no concurrent psychological intervention, and willingness to participate in the study. The exclusion criteria included unwillingness to participate and incomplete completion of the questionnaires.

Instruments

Pain Self-Efficacy Questionnaire: This questionnaire consists of 10 items scored on a 7-point scale (ranging from 0 to 6). It was developed by Nicholas (1990) based on Bandura's theory of self-efficacy to

assess individuals' perceived capability in dealing with pain. Scores range from 0 to 60, with higher scores indicating a stronger belief in the ability to perform daily activities despite pain. Nicholas reported a Cronbach's alpha coefficient of 0.86 and satisfactory content validity. Asghari Moghaddam et al. reported reliability coefficients using Cronbach's alpha, split-half, and test-retest methods as 0.81, 0.78, and 0.77, respectively, indicating good and acceptable reliability (Mikaeili & Ahmadi, 2021). In the present study, the calculated Cronbach's alpha was 0.871.

Death Obsession Scale: Developed by Abdel-Khalek (1998), this scale assesses mental preoccupations, impulses, and persistent beliefs about death. It consists of 15 items and three subscales: death rumination, death dominance, and repetitive death ideation. Items are rated on a 5-point Likert scale (1 = Never to 5 = Very much), with total scores ranging from 15 to 75. Research evidence has confirmed the scale's high internal consistency, test-retest reliability, and acceptable concurrent validity. The scale's concurrent validity with death anxiety was reported as 0.62, and the Cronbach's alpha was 0.90 (Badarkhani, Zangeneh Motlagh, & Pirani, 2022). Dadfar et al. reported a Cronbach's alpha of 0.95 and a two-week test-retest reliability of 0.74 (Mohammadi Parsa, 2022). In the present study, the calculated Cronbach's alpha was 0.912.

Defense Style Questionnaire (DSQ): Developed by Andrews (1993), the Defense Style Questionnaire evaluates defense mechanisms across three styles: immature, mature, and neurotic. It consists of 40 items scored on a 9-point Likert scale. The instrument's test-retest correlations range from 0.46 to 0.86, with Cronbach's alpha coefficients reported as 0.68 for mature style, 0.58 for immature style, and 0.80 for neurotic style. Studies conducted among Iranian populations have confirmed its reliability and validity through test-retest methods, Cronbach's alpha (ranging from 0.81 to 0.87), and correlations with the NEO Personality Inventory (Saghirzadeh et al., 2019). In the present study, Cronbach's alpha coefficients were 0.731 for the mature style, 0.699 for the immature style, and 0.754 for the neurotic style, indicating satisfactory reliability of the instrument in the study sample.

Coping Responses Inventory: The Coping with Stress Questionnaire, developed by Billings and Moos (1981), consists of 19 items assessing individuals' coping responses across five dimensions: behavioral, cognitive, avoidant, problem-solving, and emotion-focused coping. Items are rated on a 4-point Likert scale (0 = Never to 3 = Always), with total scores ranging from 0 to 57. The reported Cronbach's alpha coefficients for avoidant coping, active cognitive coping, and active behavioral coping are 0.44, 0.72, and 0.80, respectively. The test-retest reliability coefficient was reported as 0.79. Internal consistency ranged from 0.41 to 0.66, and the external reliability using the Spearman-Brown formula was 0.78 (Bakhtiyarovich et al., 2023; Davoudi-Monfared et al., 2023). In the present study, Cronbach's alpha was found to be 0.881, indicating good reliability of the instrument.

Data Analysis

Structural equation modeling (SEM) was used for data analysis.

Findings and Results

The mean age of participants was 35.3 years, with a standard deviation of 4.78 years. The youngest participant was 22 years old, and the oldest was 45 years old. Among the participants, 174 individuals (56.1%) were women and 136 (43.9%) were men. Regarding educational attainment, 153 participants (49.4%) had less than a diploma or a diploma, 94 (30.3%) had an associate degree, 49 (15.8%) held a bachelor's degree, and 14 (4.5%) held a master's degree. In this study, after converting the scores to standardized scores, a range of ±2.58 was used to identify outliers. Identified outliers for each variable were replaced with the respective mean value. The Mardia's coefficient for multivariate normality was calculated to be 2.80, indicating that the assumption of multivariate normality was met. The descriptive findings of the research variables are presented in Table 1.

Table 1

Descriptive Statistics of Research Subscales

Variables	Mean	Standard Deviation	Skewness	Kurtosis
Pain Self-Efficacy	11.2	2.17	-0.668	0.127
Death Rumination	8.23	1.98	-0.739	-0.431
Death Dominance	9.40	1.31	-0.595	1.62
Death Beliefs	8.79	1.83	-0.127	0.786
Avoidant	15.9	2.19	-0.236	-0.562
Problem Solving	21.9	3.28	-0.341	-0.445
Emotion-Focused	14.4	2.37	-0.335	1.85
Immature Defense Mechanisms	44.7	5.59	-1.30	1.90
Mature Defense Mechanisms	13.9	1.79	-0.444	0.118
Neurotic Defense Mechanisms	14.5	2.88	1.17	2.08

Table 1 presents the descriptive statistics of the subscales for the studied variables. Additionally, the values for skewness and kurtosis fall within the acceptable range of ±3, indicating that the data are normally distributed.

Table 2

Tolerance and Variance Inflation Factor (VIF) Indices

Predictor Variables	Tolerance	VIF
Pain Self-Efficacy	0.685	1.45
Death Rumination	0.577	1.73
Death Dominance	0.942	1.06
Death Ideation	0.656	1.52

As shown in Table 2, all tolerance and VIF values indicate the absence of severe multicollinearity among the predictor variables.

Table 3

Factor Loadings and Significance for Measurement Models

Scale	Component	Standardized Loading	Sig
Death Obsession	Death Rumination	0.52	0.001
	Death Dominance	0.48	0.001
	Death Ideation	0.46	0.001
Coping Strategies	Behavioral	0.70	0.001
	Cognitive	0.65	0.001
	Avoidant	0.55	0.001
	Problem-Solving	0.52	0.001
	Emotion-Focused	0.67	0.001
Defense Mechanisms	Immature	0.60	0.001
	Mature	0.42	0.001
	Neurotic	0.53	0.001

The results from the table indicate that all components across the three scales exhibit statistically significant factor loadings at the 99% confidence level ($p < 0.01$). Since the tested models correspond to the research hypotheses, the next section examines direct and indirect effects, alongside relevant tables.

Table 4

Direct Effects of Pain Self-Efficacy and Death Obsession on Defense Mechanisms

Criterion Variable	Predictor Variable	Type of Effect	Standardized β	t-value	Sig
Defense Mechanisms	Pain Self-Efficacy	Direct	-0.20	-2.29	0.03
Defense Mechanisms	Death Obsession	Direct	0.26	2.50	0.01

As shown, both pain self-efficacy and death obsession have direct effects on defense mechanisms. The direct effect of pain self-efficacy on defense mechanisms was $\beta = -0.20$ ($t = -2.29$), while the direct effect of death obsession was $\beta = 0.26$ ($t = 2.50$). Therefore, the hypotheses concerning the direct effects of pain self-

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efficacy and death obsession on defense mechanisms are confirmed with 95% confidence. To assess the mediating role of coping strategies between pain self-efficacy, death obsession, and defense mechanisms, the Sobel test was employed. The Sobel test (1982) evaluates the significance of the indirect effect (ab) by comparing it against the standard normal distribution (Z-value) using the following formula: According to Sobel, if the resulting Z-value exceeds ±1.96, the mediation effect is considered statistically significant at the 0.05 level.

Table 5

Indirect Effects of Pain Self-Efficacy and Death Obsession on Defense Mechanisms

Criterion Variable	Predictor Variable	Type of Effect	Standardized β	t-value	Sig
Defense Mechanisms	Pain Self-Efficacy	Indirect (via Coping Strategies)	0.29	3.94	0.001
Defense Mechanisms	Death Obsession	Indirect (via Coping Strategies)	0.17	1.99	0.04

The results indicate that the hypotheses concerning the indirect effects of pain self-efficacy and death obsession on defense mechanisms, mediated by coping strategies, are confirmed at the 99% and 95% confidence levels ($p < 0.01$ and $p < 0.05$, respectively).

Table 6

Model Fit Indices

Fit Indices	Value	Acceptable Range
χ^2/df	2.10	Less than 3
RMSEA (Root Mean Square Error of Approximation)	0.05	Less than 0.10
CFI (Comparative Fit Index)	0.94	Greater than 0.90
NFI (Normed Fit Index)	0.91	Greater than 0.90
GFI (Goodness of Fit Index)	0.96	Greater than 0.90
AGFI (Adjusted Goodness of Fit Index)	0.94	Greater than 0.90

In working with AMOS software, no single fit index independently confirms or rejects the model's fitness; rather, all indices must be interpreted collectively. The obtained values indicate that the model demonstrates a good overall fit for explaining the observed data. The measurement model indices are presented next.

Discussion and Conclusion

The present study examined the relationship between pain self-efficacy and death obsession with defense mechanisms, mediated by coping strategies, in patients with heart failure. The results indicated that pain self-efficacy had an indirect effect on defense mechanisms among heart failure patients. These findings are consistent with prior studies (Bakan & Inci, 2021; Cheng et al., 2022; Dehestani et al., 2023; Freire et al., 2020; Garnaeva & Shishova, 2023; Mikaeili & Ahmadi, 2021; Mohammadi Zeidi et al., 2020; Monabari et al., 2021; Saghirzadeh et al., 2019; Silverman & Aafjes-van Doorn, 2023; Zerach & Elklit, 2020).

The findings can be explained through two main hypotheses: First, self-efficacy influences the effectiveness of actions required to manage or control pain. Second, perceived self-efficacy determines how individuals handle pain-related situations. For instance, patients with low pain self-efficacy may avoid activities that cause pain or rely more heavily on medications for pain relief (Lopez et al., 2020). Moreover, individuals with high self-efficacy believe they can effectively manage events and situations. They display greater perseverance, perform at higher levels, exhibit greater confidence in their abilities, and show less self-doubt compared to individuals with low self-efficacy. They view problems as challenges rather than threats and actively seek new opportunities. High self-efficacy reduces fear of failure, raises aspirations, and enhances problem-solving and analytical thinking skills. Belief in one's efficacy drives individuals toward active coping and problem-solving, whereas lack of self-efficacy tends to lead to avoidance and passive coping strategies (Chen et al., 2021).

Effective and organized coping strategies lead to positive and long-term outcomes. Stress is reduced through individual efforts, resulting in increased self-esteem and enhanced skills. Such individuals become

more resilient to future stressors. Problem-focused coping involves direct action to change the stressor, while emotion-focused coping involves efforts to manage emotional responses to stress. According to Maslow's theory, individuals who rely on emotion-focused and passive coping strategies experience lower levels of self-actualization (Benfer et al., 2018). Therefore, the indirect effect of pain self-efficacy on defense mechanisms in patients with heart failure is justifiable.

Regarding death obsession, the study found it also had an indirect effect on defense mechanisms among heart failure patients. Death obsession is closely linked to the fundamental fear of annihilation and non-existence. This fear arises from the limbic system structures, evolutionarily ancient parts of the brain crucial for human survival, particularly the amygdala and associated structures involved in unconscious fear memories, as well as the hippocampus and related cortical areas. These two memory systems (explicit and implicit) operate simultaneously in humans, activated by similar stimuli (in this case, the threat of death). Emotional memory structures play a critical role in transmitting messages and regulating emotions related to perceived threats. Thus, the perception of death-related threats integrates with cognitive processes and shapes memory structures, encompassing both conscious and unconscious elements of fear, each contributing differently to human experience (Mohammadi Parsa, 2022).

Individuals' attitudes toward death, shaped through life experiences, may predict the multidimensional nature of death obsession better than demographic variables. Researchers have emphasized the importance of cognitive beliefs in the perception of death-related threats. For instance, studies among students have shown that those employing effective coping strategies reported lower levels of death obsession, indicating that coping strategies act as buffers against death obsession by providing meaning around the concept of death. Similarly, confidence in a positive afterlife is inversely related to death obsession among terminally ill patients. Studies among the elderly also show that beliefs about reward and punishment after death predict the relationship between death obsession and coping strategies (Mirzazadeh, 2015).

Death obsession is triggered by "anticipating a future state where the self no longer exists," highlighting the importance of the conceptual ability to foresee the future. This cognitive ability increases death salience (reminders of one's mortality), which, in turn, influences death obsession through mechanisms such as: triggering regret-related thoughts, altering self-beliefs, and activating self-regulatory responses such as life review, cultural identification, and striving for self-transcendence (Masoudi, 2019). In many individuals, death obsession is suppressed or denied as a form of evolutionary adaptation to prevent overwhelming fear and paralysis that could threaten survival. Hence, death obsession is often not part of conscious awareness. Studies manipulating death awareness have shown increases in death obsession among participants. Moreover, heightened death awareness activates defense mechanisms such as diverting attention away from threatening stimuli (Kordi Nejad, 2021).

The consequences of death obsession can be categorized as either adaptive or maladaptive. Multiple studies indicate that increased death awareness leads individuals to defend their cultural beliefs more vigorously. In Western cultures, the pursuit of wealth is viewed as a coping response to death obsession (Young et al., 2023). Endorsing collective values enhances a sense of meaning, strengthens social bonds, and boosts self-efficacy, thereby enhancing self-esteem. Self-esteem itself acts as a buffer against death awareness and death obsession. Some studies have also shown that heightened death awareness increases commitment to romantic relationships, suggesting that intimate relationships, like cultural worldviews, serve as protective buffers against death obsession (Kordi Nejad, 2021).

Other studies have found that death obsession underlies defensive reactions toward vulnerable individuals, with men responding to death obsession through emotional detachment and women responding through increased compassion. This is explained through gendered socialization processes where men are taught to value power and rationality, while women are encouraged to develop emotional sensitivity (Azale et al., 2018). Overall, positive outcomes of death obsession may include growth, new learning, increased life meaning, and a pursuit of authentic living. On the other hand, despite death being a normal and universal experience, it can pose significant mental health challenges (Moreton et al., 2023).

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Thus, the indirect effect of death obsession on defense mechanisms among heart failure patients is understandable. Data collection in this study was based on self-reported questionnaires, which may introduce biases such as judgment errors or misinterpretation of instructions. Additionally, confounding variables such as subcultural influences, socio-economic conditions, and family cultural backgrounds were not controlled. Moreover, the sample was limited to heart failure patients in Kish Island; thus, caution should be exercised when generalizing the results to other populations. It is recommended that future research utilize complementary methods such as interviews and observations, culturally adapted questionnaires, and broader sampling across diverse social settings.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants. Ethical considerations in this study were that participation was entirely optional.

Transparency of Data

By the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contribute to this study.

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