

EXPLORING STRESS AND COPING STRATEGIES IN TYPE 2 DIABETES MELLITUS WITH CORONARY ARTERY DISEASE PATIENTS: A FOCUSED ASSESSMENT

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Abstract

Background: Long-term stress and inadequate coping mechanisms are widely recognized as important psychosocial factors in the advancement of non-communicable diseases, such as Type 2 diabetes mellitus (T2DM) and Coronary artery disease (CAD) (Riise *et al.*, 2025). **Objectives:** This study examines perceived stress, coping strategies, and the predictive role of age, gender, and occupation in individuals with T2DM and CAD. **Methods:** A total of 100 patients with both T2DM and CAD participated in this cross-sectional study via purposive sampling. Stress and coping were measured using the Perceived Stress Scale (PSS-10) and Brief COPE Questionnaire. Analyses included descriptive statistics, t-tests, Pearson's correlation, regression, and cluster analysis. **Results:** Over 78% reported moderate to high stress, with significant differences by gender ($p = 0.003$) and occupation ($p = 0.021$). Stress was positively correlated with maladaptive coping ($r = 0.678, p < 0.01$) and negatively with adaptive coping ($r = -0.523, p < 0.01$). Cluster analysis revealed three groups Adaptive, Maladaptive, and Mixed Copers each comprising about one-third of participants. **Conclusion:** Coping styles and demographic factors significantly predict stress levels in individuals with T2DM and CAD. The findings support the value of psychosocial assessments and interventions to reduce stress and promote adaptive coping in chronic disease management.

Keywords: Coping Strategies; Coronary Artery Disease (CAD); Mental Health; Psychological Interventions; Stress; Type 2 Diabetes Mellitus (T2DM)

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Introduction

Diabetes mellitus (DM), a significant global health concern due to its increasing prevalence, is a chronic metabolic disorder characterized by persistent hyperglycemia, insulin resistance, and relative insulin deficiency (Bommer *et al.*, 2018). It is classified into two types: Type I, caused by autoimmune destruction of pancreatic β -cells, and Type II, a complex chronic disease involving progressive loss of insulin secretion often accompanied by peripheral insulin resistance (Tegegne *et al.*, 2024).

Type 2 diabetes mellitus (T2DM) mostly occurs together with coronary artery disease (CAD) (Madhavan, 2017) and continues to have negative effects on the patients' health. CAD results from atherosclerosis or blockage by plaque, which reduces the size of or obstructs the coronary arteries. The important risk factors for CAD are hypertension, diabetes, cigarette smoking, and renal dysfunction. These two conditions are the most prevalent chronic diseases and critical global health problems that contribute significantly to morbidity and mortality worldwide (Airhihenbuwa *et al.*, 2021).

In addition to their physical health consequences, these long-term diseases significantly affect the psychological condition of patients and increase the burden of stress. Chronic stress has been implicated in the pathophysiology of T2DM and CAD, influencing hormonal regulation, immune responses, and health behaviours (Maresova *et al.*, 2019). Activation of the hypothalamic-pituitary-adrenal (HPA) axis under stress leads to increased cortisol levels, which exacerbate insulin resistance and dyslipidemia. Furthermore, high levels of stress are linked to poor treatment adherence, inappropriate lifestyle choices, and a lack of motivation for proper management of these chronic ailments (Pizga *et al.*, 2022). Hence, it is important to understand the type of coping strategy that these patients use to cope with stress.

Coping strategies play a central role in how individuals manage stress. Adaptive strategies such as problem-solving and seeking social support are associated with better health outcomes, while maladaptive strategies—such as avoidance and denial—are linked to advancement in diseases (Muhlestein *et al.*, 2014). In T2DM and CAD patients, coping strategies can directly influence a patient's capacity to manage blood glucose levels, adhere to dietary recommendations, and cardiovascular medications (Arnold *et al.*, 2020).

While previous studies have explored the psychological effects of T2DM and CAD

individually, only a few have examined the combined burden of both conditions. Although limited empirical research has investigated how the dual management of these chronic illnesses affects perceived stress and coping behaviours (Ivanivna *et al.*, 2024), this study aims to fill that gap by assessing stress levels and identifying the coping strategies among individuals diagnosed with both T2DM and CAD. By doing so, it seeks to inform clinical interventions that address not only physical but also psychosocial aspects of chronic disease management.

Materials and Methods

Study Design

This study used a cross-sectional, quantitative study design to evaluate the relationship between stress and coping strategies in patients diagnosed with T2DM and CAD. The design was employed to collect information simultaneously for the purpose of analysing trends and relationships among demographic and psychological parameters.

Sample Size and Participants

The study included 100 patients who were diagnosed with both T2DM and CAD at a tertiary care hospital. The participants were selected via purposive sampling on the basis of their availability and willingness to participate. The inclusion criteria comprised adults diagnosed with both conditions for at least six months, aged 25-90 years (a range selected to capture both early-onset and older adult cases, as these age groups are most clinically relevant to T2DM and CAD), and able to comprehend the survey in English or the local language. Individuals with diagnosed psychiatric conditions or cognitive impairments were excluded to ensure reliability in self-reporting.

Data Collection Tools

Perceived Stress Scale (PSS)

The Perceived Stress Scale (PSS), a standardized instrument by Cohen *et al.* (1983), was utilized to assess the stress levels of the participants. This scale has demonstrated excellent psychometric properties. The Cronbach's alpha ranged from 0.74 to 0.91, indicating high internal consistency. The scale was validated for significant correlations with various psychological measures, such as indices of depression and anxiety, ensuring its construct validity.

Brief COPE Questionnaire

The Brief COPE Questionnaire by Carver *et al.* (1997) was used to evaluate adaptive and maladaptive strategies of coping among participants. This questionnaire yielded Cronbach's alpha values ranging from 0.72 to 0.92 across different subscales of coping, ensuring good internal consistency. The tool has also shown high convergent and discriminant validity.

Procedure

After obtaining ethical approval from the Institutional Ethics Committee (No.960/2023/IEC/ACSMCH Dt. 17/11/2023), participants were approached in the clinical setting and informed consent was obtained. The questionnaires were administered individually in a quiet setting to ensure privacy and minimize distractions. The average completion time was 20-30 min.

Data Analysis

Data analysis was performed using IBM SPSS Statistics 23. Descriptive statistics, such as mean, standard deviation, and frequency distribution were used to summarize the demographic details. Inferential statistical tests, such as Pearson's correlation coefficient, were used to explore the relationships between stress levels and coping strategies. Independent samples *t*-tests and one-way ANOVA were used to compare stress levels across various demographic groups, which included age, gender, and employment. Multiple linear regression analysis was conducted to further understand the predictors of perceived stress using stress as the dependent variable and demographic variables (gender, occupation, and age) and coping strategy scores as independent variables. Cluster analysis was also performed to classify participants into varying coping profiles based on the strategies used. All statistical tests were performed at a significance level of $p < 0.05$.

Results

Among the 100 patients who participated in this study, 52% were female and 48% were male. 55% of the participants were aged between 46 and 65 years, 23% were aged between 25 and 45 years, and 22% were aged between 66 and 90 years. Professional/Administrative workers constituted 34% of the participants, followed by Skilled Manual Labour Workers (23%), Technical or Support Staff (22%), and Clerical/Service Sector Workers (21%) (Table 1).

Table 1. Descriptive statistics of the demographic variables

Demographic Variable	Groups	%
Gender	Male	48
	Female	52
Age (Years)	25-45	23
	46-65	55
	66-90	22
Occupation	Professional/Administrative	34
	Skilled Manual Labour	23
	Technical or Support Staff	22
	Clerical/Service Sector	21

Table 2. Descriptive statistics of prevalence of stress and coping strategy

Variable	Groups	%
Stress Level	Low	22
	Moderate	58
	High	20
Coping Strategy Level	Adaptive	28
	Mal-adaptive	72

Table 3. Pearson's correlation analysis of stress and coping strategies

Variable	N	Correlation Coefficient (r)
Stress & Adaptive coping	100	-0.523**
Stress & Mal Adaptive coping	100	0.678**

** - significant at <0.001 level

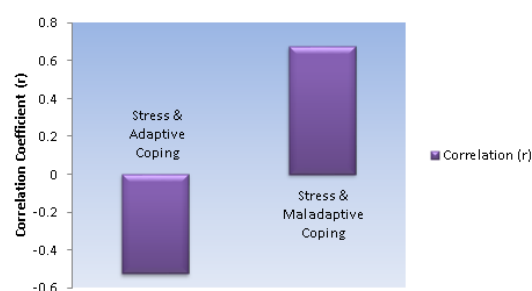


Figure 1. Stress and Coping Style Correlations

The majority of patients reported a moderate level of stress (58%), whereas 22% reported a high level and 20% reported a low level of stress (as defined by standard PSS-10 scoring thresholds). However, 72% of all the patients utilized maladaptive coping techniques to address their stress (Table 2).

The Pearson's correlation analysis revealed that stress was strongly positively correlated with maladaptive coping strategies ($r = 0.678$, $p < 0.01$) and significantly negatively correlated with adaptive coping strategies ($r = -0.523$, $p < 0.01$) (Table 3 and Figure 1).

Several adaptive coping strategy subdimensions, except religion, instrumental support, and humour, were significantly negatively correlated ($p < 0.01$) with stress. On the other hand, stress was strongly positively correlated with all maladaptive strategy sub-dimensions (Table 4 and Figure 2).

Table 4. Pearson's correlation analysis of stress and sub dimensions of coping strategies

Coping Strategy	r	p-value
Religion	-0.12 (NS)	0.210
Active Coping	-0.38**	<0.01
Planning	-0.33**	<0.01
Acceptance	-0.28*	<0.01
Positive Reframing	-0.40**	<0.01
Instrumental Support	-0.15 (NS)	0.130
Emotional Support	-0.19*	<0.05
Humour	-0.10 (NS)	0.295
Self-distraction	0.22*	<0.05
Self-blame	0.58**	<0.01
Venting	0.31**	<0.01
Behavioural	0.36**	<0.01
Disengagement		
Denial	0.41**	<0.01
Substance Use	0.29**	<0.01

* - significant at < 0.05 level, ** - significant at < 0.01 level, NS – Not Significant

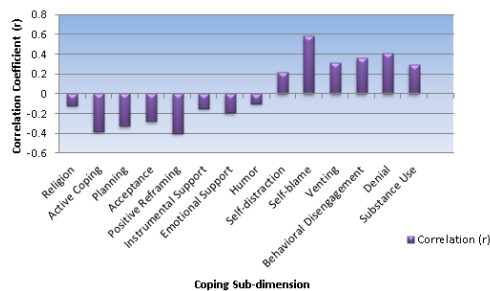


Figure 2. Stress and coping sub-dimension correlations

Stress levels significantly vary across different age groups ($p = 0.045$), occupations ($p = 0.021$), and genders ($p = 0.003$). Individuals using adaptive coping strategies had significantly lower stress levels than those relying on maladaptive coping strategies ($p < 0.01$). Maladaptive coping strategies differed significantly across age ($p = 0.029$), occupation ($p = 0.015$), and gender ($p = 0.005$) (Table 5).

Stress levels are significantly explained by age ($p = 0.002$), gender ($p = 0.006$), and occupation ($p = 0.009$). Unlike maladaptive coping, which was a significant positive predictor of stress ($p < 0.001$),

Table 5. Inferential statistical tests (ANOVA and independent t-test)

ANOVA	F-value	p-value
Stress & Age	3.21	0.045*
Stress & Occupation	4.75	0.021*
Adaptive Coping & Age	2.89	0.062 (NS)
Adaptive Coping & Occupation	3.67	0.038*
Maladaptive Coping & Age	4.12	0.029*
Maladaptive Coping & Occupation	5.43	0.015*
Independent sample t-test	t-value	p-value
Stress & Gender	2.89	0.003**
Adaptive Coping & Gender	4.23	0.01**
Maladaptive Coping & Gender	3.78	0.005**

* - significant at < 0.05 level, ** - significant at < 0.01 level

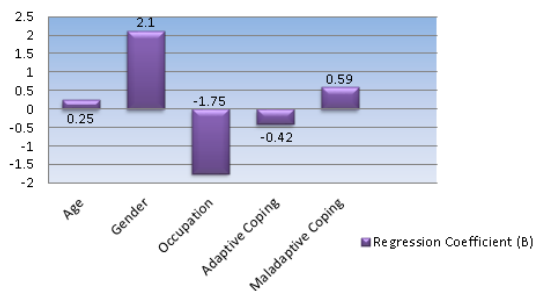


Figure 3. Regression coefficient (β)

Table 6. Multiple regression analysis of the effect of stress on demographic variables and coping strategy

Predictor	B (Coef.)	SE	t-value	p-value	95% CI (Lower, Upper)
Age	0.25	0.08	3.12	0.002**	(0.09, 0.41)
Gender	2.10	0.75	2.80	0.006**	(0.62, 3.58)
Occupation	-1.75	0.65	-2.69	0.009**	(-3.03, -0.47)
Adaptive Coping	-0.42	0.12	-3.50	0.001***	(-0.66, -0.18)
Maladaptive Coping	0.59	0.14	4.21	0.001***	(0.31, 0.87)
Intercept	45.8	4.3	10.65	0.001***	(37.3, 54.3)

** - significant at < 0.01 level, *** - significant at < 0.001 level

adaptive coping was a significant negative predictor of stress ($p = .001$). These findings indicate that older individuals, women, and individuals in specific occupations experience increased levels of stress (Table 6 and Figure 3).

Behavioural disengagement ($B = 0.35$, $p = 0.002$), drug use ($B = 0.39$, $p = 0.002$), self-blame ($B = 0.42$, $p < 0.001$), venting ($B = 0.30$, $p = 0.003$), and denial ($B = 0.25$, $p = 0.014$) were the strongest significant positive predictors of stress. Conversely, positive reframing ($B = -0.22$, $p = 0.030$) and active coping ($B = -0.28$, $p = 0.012$) emerged as significant negative predictors, which points to their role in stress reduction (Table 7 and Figure 4).

Discussion

The relationship between coping strategies and stress is well-established, and our findings are consistent with those of previous studies.

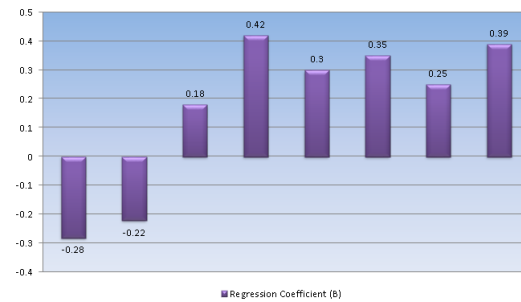


Figure 4. Regression coefficient (β) for sub-dimensions

The Pearson's correlation analyses revealed a significant overall correlation between stress and coping strategies, showing a strong negative correlation with adaptive coping and a strong positive correlation with maladaptive coping strategies. Stress is usually lower in those who use adaptive coping strategies such as Planning, Active

Table 7. Multiple regression analysis of stress on subdimensions of coping strategy

Predictor	B (Coef.)	SE	t-value	p-value	95% CI (Lower, Upper)
(Intercept)	18.40	1.05	17.62	0.001***	(15.84, 19.86)
Active Coping	-0.28	0.11	-2.55	0.012**	(-0.50, -0.06)
Positive Reframing	-0.22	0.10	-2.20	0.030*	(-0.42, -0.02)
Self-Distraction	+0.18	0.09	2.00	0.048*	(0.002, 0.36)
Self-Blame	+0.42	0.11	3.82	0.001***	(0.20, 0.64)
Venting	+0.30	0.10	3.00	0.003**	(0.10, 0.50)
Behavioural Disengagement	+0.35	0.11	3.18	0.002**	(0.13, 0.57)
Denial	+0.25	0.10	2.50	0.014**	(0.05, 0.45)
Substance Use	+0.39	0.12	3.25	0.002**	(0.15, 0.63)

* - significant at < 0.05 level, ** - significant at < 0.01 level, *** - significant at < 0.001 level

Note: Predictors with non-significant p -values (e.g., Religion, Planning, Acceptance, Instrumental Support, Emotional Support, and Humour) have been excluded to improve interpretability and model clarity.

Table 8. Cluster analysis of coping strategy profiles

Coping Strategy	Cluster 1: Adaptive Copers	Cluster 2: Maladaptive Copers	Cluster 3: Mixed Copers
Religion	0.65	-0.21	0.12
Active Coping	1.05	-0.58	0.30
Planning	0.91	-0.49	0.22
Acceptance	0.72	-0.35	0.10
Positive Reframing	0.88	-0.61	0.19
Instrumental Support	0.75	-0.22	0.15
Emotional Support	0.68	-0.44	0.25
Humour	0.40	-0.13	0.05
Self-distraction	-0.10	0.40	0.30
Self-blame	-0.45	1.12	0.55
Venting	-0.28	0.89	0.40
Behavioural Disengagement	-0.51	1.01	0.32
Denial	-0.42	0.95	0.50
Substance Use	-0.30	0.78	0.35

Cluster 1 (Adaptive Copers) - Individuals in this cluster exhibited higher scores on adaptive strategies and lower scores on maladaptive strategies.

Cluster 2 (Maladaptive Copers) - Individuals in this cluster exhibited higher scores on maladaptive strategies and lower scores on adaptive strategies.

Cluster 3 (Mixed Copers) - Individuals in this cluster demonstrated moderate engagement in both adaptive and maladaptive coping strategies.

coping, and Positive Reframing. These findings support previous studies showing that adaptive coping reduces stress and enhances psychological outcomes (Holton *et al.*, 2016; Smith *et al.*, 2016; Kohn *et al.*, 2023; Gruber and Biocina, 2024). Conversely, the strong positive correlations with maladaptive coping strategies, such as Self-blame indicate that increased stress often leads individuals behave in a manner that results in short-term escape but leads to long-term difficulties such as feelings of powerlessness and increased emotional distress (Grünenwald *et al.*, 2022).

The results also revealed complex interrelations between gender, occupation, age, and coping strategies, highlighting the complexity of stress psychology. It is evident that stress is strongly associated with age and highlights the increasing burden of stress, which is likely caused by life experiences (Garavand *et al.*, 2024). Importantly, the differences in stress levels vary with gender. Men might be more likely to use maladaptive coping strategies such as Substance Use and venting (Holton *et al.*, 2016; Alosaimi *et al.*, 2018), whereas studies indicate that despite facing hurdles such as work-family conflicts, women use more adaptive coping mechanisms (Aazami *et al.*, 2015). This complexity is an illustration of how gender expectations and social and cultural norms affect stress management among both men and women. Another significant factor influencing stress levels is occupation. Increased job demands and insufficient resources are linked with increased levels of stress and burnout, according to the job demands-resources theory (Irawanto *et al.*, 2015). For example, jobs with high responsibility and low control can make individuals feel more stressed (Özer *et al.*, 2022). Occupational stress can be minimized in environments that promote adaptive coping, often through clear job responsibilities and supportive management practices (Sharma, 2023).

The regression outcomes also parallel empirically validated psychological models of ineffective coping and confirm that individual indulgence in maladaptive coping significantly augments stress (Chaaya *et al.*, 2025). The model shows that patients utilizing adaptive coping strategies like Positive Reframing and Active Coping were associated with less psychological distress. On the other hand, stress was significantly positively predicted by maladaptive strategies such as engaging in Substance Use, Self-blame, Denial, Venting, and Behavioural Disengagement. These results also underscore the complexity of coping and suggest that the interplay of multiple coping strategies could dilute their individual effects, emphasizing the need for a comprehensive approach in coping skill interventions (Holton *et al.*, 2016).

Thus, it is important to determine which combination of coping strategies is most effective at reducing stress.

The three clusters within which the subjects were grouped for this study Adaptive Copers, Maladaptive Copers, and Mixed Copers are indicative of the diversity of the coping mechanisms and how they equate to dealing with stress as well as to psychological adjustment. Adaptive Copers, who employed adaptive coping strategies, generally tend to feel less psychologically distressed and have greater overall well-being (Roohafza *et al.*, 2016; Reyes-García *et al.*, 2018). Maladaptive Copers, on the other hand, reported greater use of Alcohol and Drugs, Behaviour Disengagement, Denial, and Self-blaming. These negative coping mechanisms might have discouraged people from managing their stressors properly, which in most cases can lead to worsening mental and physical diseases, especially in long-term conditions like Type 2 diabetes mellitus (T2DM) (Roohafza *et al.*, 2016; Reyes-García *et al.*, 2018). The necessity for intervention that redirects those who struggle with these maladaptive coping mechanisms into healthier ones is also corroborated by these findings (Harun *et al.*, 2025). Mixed Copers indicate the need for particular psychoeducation to lead toward the reduction of maladaptive coping and the increase of adaptive coping activities (Compas *et al.*, 2017).

This study concludes that individuals who experience high stress levels might show worse glycemic control, which increases their vulnerability to adverse cardiovascular outcomes. Given these findings, it is necessary to implement interventions based on coping strategies to mitigate long-term health risks associated with stress (Richer *et al.*, 2025).

Conclusions

This study revealed a significant relationship between stress levels and coping strategies in patients with T2DM and CAD. These findings suggest that stress is a main contributor to the poor management of these conditions, whereas maladaptive coping strategies and a mixture of adaptive and maladaptive Coping strategies worsen their impact. On the other hand, adaptive coping strategies, such as Active Coping and Positive Reframing, play a key role in reducing stress and improving health outcomes. Additionally, age, gender-based differences, occupational roles, and the need for structured psychological interventions were observed, highlighting the need for a holistic approach to coping with stress. Policymakers and healthcare providers should consider integrating

mental health screenings into chronic disease management guidelines. Healthcare systems may benefit from developing patient education programs, and personalized strategies for coping with routine individual care for patients with chronic diseases. Additionally, they should consider investing in staff training for psychosocial care. Future research should focus on conducting longitudinal studies to analyse the long-term effects of stress-reduction interventions and to assess how digital health technologies support healthy coping strategies. An integrated strategy to improve the health outcomes of patients with T2DM and CAD can be formulated with the assistance of the identification of psychological and physiological factors.

Limitations and Future Research Directions

Although this study provides valuable new information concerning the interaction of stress levels and coping styles among patients with coronary artery disease (CAD) and type 2 diabetes mellitus (T2DM), several limitations must be acknowledged.

- It is difficult to draw conclusions concerning the causal connection between stress and coping variables, given that the research is cross-sectional. The data captures only one time frame, which may not reflect dynamic changes in psychological responses to long-time illnesses.
- Second, the use of self-reported measures may have generated response bias through the reporting of coping mechanisms and stress levels or the underreporting of them as socially desirable or because they were deficient in self-knowledge.
- Furthermore, a smaller group of samples was selected through purposive sampling from a particular clinical and geographic location with language inclusion criteria, which limits the generalizability of the results to other populations. However, this approach was required considering feasibility, accuracy, budget constraints, and clinical accessibility.
- Significant psychological and clinical variables that potentially have a major effect on stress levels and coping strategies, e.g., illness duration, compliance with medication, mental comorbidities (e.g., depression or anxiety), and social support systems, were not included due to data unavailability.
- Future studies should move beyond such constraints by using longitudinal designs to follow the change in stress and coping over time as a consequence of intervention or illness progression, and to have a control group for deeper understanding.

- In addition, research should investigate the degree to which various psychological therapies, e.g., cognitive-behavioural therapy or mindfulness training, are effective at reducing stress and enhancing health outcomes.

- Stress-coping dynamics would be better clarified within a biopsychosocial context, such as lifestyle choices, glycemic control strategies, psychiatric comorbid conditions, and social health determinants.

- Second, qualitative research can provide a better understanding of how patients experience stress and how contexts shape coping responses.

- Finally, larger multicenter trials can improve the representativeness of findings and aid in the formation of intervention models that can be used across most cultures and contexts.

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