

Original Article

# Impact of percutaneous coronary intervention on the mental wellbeing and quality of life of patients with coronary artery disease.

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## Abstract

**Background:** Coronary artery disease (CAD) is a major global health concern, straining healthcare systems. Coronary angioplasty (PCI) with stenting, a common CAD treatment, effectively alleviates angina symptoms, enhances myocardial perfusion, and prevents major cardiac events. However, PCI's influence on patients' mental health and overall wellbeing requires investigation. This study explores PCI's impact on CAD patients' mental health and wellbeing.

**Methodology:** This research utilized a prospective cohort design to investigate health-related quality of life and mental wellbeing in patients with CAD undergoing PCI. 100 CAD patients scheduled for elective PCI were recruited from a cardiac center. Health-related quality of life and mental wellbeing was assessed at three-time points, pre-procedure (baseline), 1 month, and 6 months post-PCI. Validated instruments were used to measure these outcomes.

**Results:** The results showed significant improvements in psychological outcomes following PCI. Participants experienced a significant decrease in depression scores from baseline (M = 16.2, SD = 4.3) to 1 month (M = 12.8, SD = 3.9,  $p < 0.001$ ) and 6 months (M = 11.6, SD = 4.1,  $p < 0.001$ ) post-PCI. Similarly, anxiety scores significantly decreased from baseline (M = 34.7, SD = 6.1) to 1 month (M = 29.8, SD = 5.5,  $p < 0.001$ ) and 6 months (M = 28.2, SD = 5.8,  $p < 0.001$ ) post-PCI. Quality of life scores significantly improved from baseline (M = 65.4, SD = 8.7) to 1 month (M = 73.2, SD = 7.5,  $p < 0.001$ ) and 6 months (M = 76.5, SD = 7.2,  $p < 0.001$ ) post-PCI. Psychological wellbeing scores also significantly increased from baseline (M = 52.1, SD = 9.2) to 1 month (M = 57.8, SD = 8.4,  $p < 0.001$ ) and 6 months (M = 60.3, SD = 8.1,  $p < 0.001$ ) post-PCI.

**Conclusion:** Angioplasty, or PCI, has a significant positive impact on the mental health and wellbeing of patients with CAD, as evidenced by improvements in depression, anxiety, quality of life, and psychological wellbeing.

## Keywords

Angioplasty, Percutaneous Coronary Intervention, Mental Health, Quality of Life.



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## Introduction

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Coronary artery disease (CAD) is a leading cause of morbidity and mortality worldwide, affecting millions of individuals<sup>1</sup>. It is characterized by the narrowing or blockage of coronary arteries, leading to reduced blood flow to the heart muscle<sup>2</sup>. CAD is associated with various physical symptoms and limitations, such as chest pain, shortness of breath, and decreased functional capacity. However, the impact of CAD extends beyond the physical realm and can significantly affect individuals' mental health and overall wellbeing<sup>3</sup>.

While medical interventions, such as angioplasty (also known as percutaneous coronary intervention or PCI), are commonly used to treat CAD and improve cardiac function, their impact on mental health outcomes is not fully understood. PCI, a minimally invasive procedure, involves the inflation of a small balloon within the blocked artery to widen it and restore blood flow<sup>4</sup>. Although PCI primarily focuses on improving the physical health of CAD patients, it may also have important implications for their mental health and wellbeing<sup>4,5</sup>.

Health-related quality of life and mental wellbeing are crucial in assessing the overall impact of CAD and its treatments<sup>6</sup>. CAD not only affects physical health but also has significant implications for mental health, including increased risk of depression, anxiety, and decreased quality of life<sup>7,8</sup>. Furthermore, psychological distress has been linked to adverse cardiac outcomes and mortality rates in CAD patients<sup>8,9</sup>.

While studies have examined the impact of PCI on physical health outcomes, less attention has been given to its effects on mental health and wellbeing. Understanding the impact of PCI on mental health outcomes is crucial as it may influence patients' adherence to treatment, overall satisfaction, and long-term prognosis<sup>10</sup>. Understanding the relationship between PCI and mental health outcomes is crucial for providing comprehensive care to CAD patients. By identifying the potential impact of PCI on mental health, healthcare professionals can tailor interventions to address

the holistic needs of patients, ensuring their overall wellbeing and optimizing treatment outcomes<sup>11</sup>.

Therefore, this study aims to investigate the impact of PCI on health-related quality of life and mental wellbeing in patients with CAD. By assessing these outcomes at 1 month and 6 months post-procedure, the study seeks to provide insights into PCI's short-term and medium-term effects on patients' overall wellbeing. Additionally, the study explores the association between health-related quality of life and mental wellbeing in this population.

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## Methodology

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This research utilized a prospective cohort design to investigate health-related quality of life and mental wellbeing in patients with CAD undergoing PCI. A total of 100 CAD patients scheduled for elective PCI were recruited from a cardiac center. Patients aged between 18 to 70 years, diagnosed with CAD, and scheduled for an elective angioplasty were included. Patients with severe cognitive impairment or pre-existing mental health conditions and with a history of previous angioplasty were excluded from the study. Patients with significant comorbidities that could confound the results (e.g., end-stage renal disease, severe heart failure) were also excluded. Ethical approvals were obtained from the relevant institutional review board and ethics committee before the commencement of the study. Informed consent was obtained from all participants, ensuring their understanding of the study objectives, procedures, and confidentiality of data.

Health-related quality of life and mental wellbeing were assessed at three-time points: pre-procedure (baseline), 1 month post-PCI, and 6 months post-PCI. Validated instruments were used to measure these outcomes. To assess the depression, the Beck Depression Inventory (BDI) was used. The State-Trait Anxiety Inventory-STAI will be used for anxiety screening. Higher scores indicate a greater level of anxiety. It consists of 20 items on a 4-point Likert scale (1 for "almost never" to 4 for "almost always"). The Short Form Health Survey (SF-36) was administered to assess overall health-related

quality of life. The SF-36 consists of eight subscales: physical functioning, role limitations due to physical health, bodily pain, general health perceptions, vitality, social functioning, role limitations due to emotional problems, and mental health. The Psychological Wellbeing Scale (PWS) was used to assess the psychological well-being of the study participants. Follow-up assessments were conducted at 1 month and 6 months after angioplasty. The same psychological outcome measures used in the pre-procedure assessment will be administered.

Data was analyzed using the statistical software SPSS version 21.0. Descriptive statistics were used to summarize the demographic and clinical characteristics of the participants. Pre- and post-procedure scores for each psychological outcome were compared using a Paired Sample t-test to

determine significant changes. Repeated measures and one-way analysis of variance performed changes in health-related quality of life and mental wellbeing over time.

## Results

A total of 100 participants were included in the study, with 60% male and 40% female participants. The mean age of the participants was 58 years (SD = 7.2). The majority of participants (80%) had a diagnosis of CAD and were scheduled for elective PCI.

Table 1 shows the changes in the psychological outcomes. The results are represented through mean scores and standard deviations for each psychological outcome measure at baseline, 1 month, and 6 months post-PCI.

**Table 1: Changes in Psychological Outcomes.**

Psychological Outcome	Baseline Mean±SD	1 Month Mean±SD	6 Months Mean±SD
<b>Depression (BDI)</b>	16.2±4.3	12.8±3.9	11.6±4.1
<b>Anxiety (STAI)</b>	34.7±6.1	29.8±5.5	28.2±5.8
<b>Quality of Life (SF-36)</b>	65.4±8.7	73.2±7.5	76.5±7.2
<b>Psychological Wellbeing</b>	52.1±9.2	57.8±8.4	60.3±8.1

**Depression:** The mean depression score at baseline was 16.2 (SD = 4.3). At 1-month post-PCI, there was a significant decrease in depression scores (mean = 12.8, SD = 3.9;  $t(99) = 4.57$ ,  $p < 0.001$ ). This improvement in depression scores was further maintained at the 6-month follow-up (mean = 11.6, SD = 4.1;  $t(99) = 5.92$ ,  $p < 0.001$ ) (Table 1).

**Anxiety:** At baseline, the mean anxiety score was 34.7 (SD = 6.1). Following angioplasty, there was a significant reduction in anxiety scores at both the 1-month (mean = 29.8, SD = 5.5;  $t(99) = 6.12$ ,  $p < 0.001$ ) and 6-month (mean = 28.2, SD = 5.8;  $t(99) = 7.23$ ,  $p < 0.001$ ) follow-up assessments.

**Quality of Life:** Participants reported a significant improvement in overall quality of life scores from baseline (mean = 65.4, SD = 8.7) to 1-month post-PCI (mean = 73.2, SD = 7.5;  $t(99) = -7.62$ ,  $p < 0.001$ ). This improvement was sustained at the 6-month follow-up (mean = 76.5, SD = 7.2;  $t(99) = -9.78$ ,  $p < 0.001$ ).

**Psychological Wellbeing:** Psychological wellbeing scores showed a significant increase from baseline (mean = 52.1, SD = 9.2) to 1-month post-angioplasty (mean = 57.8, SD = 8.4;  $t(99) = -6.98$ ,  $p < 0.001$ ). This positive change was further maintained at the 6-month.

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## Discussion

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The present study aimed to investigate the impact of PCI on the mental health and wellbeing of patients with coronary artery disease (CAD). The results of this study indicate that patients with coronary artery disease undergoing percutaneous coronary intervention experience significant improvements in health-related quality of life and mental wellbeing. The observed improvements in physical functioning role limitations due to physical health, vitality, and social functioning suggest that PCI contributes to enhanced functional capacity and overall wellbeing. The significant improvement in mental wellbeing reflects positive changes in positive affect, life satisfaction, self-esteem, and psychological functioning<sup>12</sup>.

The observed decrease in depression scores at 1 month and 6 months post-PCI indicates a positive effect on the participants' emotional wellbeing. This improvement may be attributed to the relief of symptoms associated with CAD, such as chest pain and restricted physical activity, resulting in a reduction in depressive symptoms<sup>13</sup>. Additionally, the successful revascularization of coronary arteries through PCI may alleviate concerns about the risk of future cardiac events, contributing to the overall reduction in depressive symptoms<sup>14</sup>.

Similarly, a significant reduction in anxiety scores was observed at both follow-up time points. The alleviation of anxiety can be attributed to the successful treatment of CAD, leading to decreased worry about cardiac-related complications and improved confidence in one's health. Moreover, the physical recovery and restoration of functional capacity after angioplasty may also contribute to reduced anxiety levels among patients<sup>15</sup>.

The improvements in quality-of-life scores at 1 month and 6 months post-PCI suggest that the procedure positively impacts patients' overall wellbeing. PCI not only addresses the physical symptoms associated with CAD but also improves the individuals' ability to engage in daily activities, resulting in enhanced quality of life. The significant increase in psychological wellbeing scores further supports this notion, indicating an overall

improvement in the participants' psychological state and subjective perception of their overall wellbeing<sup>14,16</sup>.

These findings align with previous research demonstrating the positive impact of revascularization procedures, such as PCI, on mental health outcomes in CAD patients. By relieving symptoms, improving cardiac function, and enhancing quality of life, PCI offers patients a renewed sense of physical and psychological wellbeing<sup>11</sup>.

It is important to note that other factors, such as post-procedure medication adherence, lifestyle modifications, and social support networks may also influence the observed improvements in psychological outcomes. Additionally, the placebo effect and the natural recovery process following a medical intervention may contribute to the reported improvements in psychological outcomes<sup>17</sup>.

The significance of this study lies in its potential to improve the overall care and outcomes of CAD patients. By examining the impact of PCI on mental health outcomes, the study will provide valuable insights into the holistic effects of the procedure and its potential to enhance the mental wellbeing of patients. Understanding the relationship between PCI and mental health outcomes has several implications for clinical practice. Firstly, it can inform healthcare professionals about the potential psychological benefits of angioplasty, allowing them to address the mental health needs of patients alongside their physical recovery. By recognizing the psychological impact of CAD and its treatment, healthcare providers can implement appropriate interventions, such as counseling or support services, to optimize patient outcomes and enhance their overall wellbeing.

While the results are promising, there are certain limitations to consider. Firstly, this study only included patients without pre-existing mental health disorders, potentially limiting the generalizability of the findings to a broader population. Secondly, the absence of a control

group restricts our ability to determine the specific contribution of angioplasty to the observed changes in mental health outcomes. Future studies should incorporate control groups and long-term follow-up assessments to further examine the sustained effects of PCI on mental health and wellbeing.

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## Conclusion

Angioplasty has a significant positive impact on the mental health and wellbeing of patients with CAD, as evidenced by improvements in depression, anxiety, quality of life, and psychological wellbeing. The results of this study indicate that patients with coronary artery disease undergoing percutaneous coronary intervention experience significant improvements in health-related quality of life and mental wellbeing. The observed improvements in physical functioning role limitations due to physical health, vitality, and social functioning suggest that PCI contributes to enhanced functional capacity and overall wellbeing. The significant improvement in mental wellbeing reflects positive changes in positive affect, life satisfaction, self-esteem, and psychological functioning. The findings of this study are consistent with previous research demonstrating the positive impact of PCI on health-related quality of life and mental health outcomes. The relief of CAD symptoms, improved cardiac function, and restored physical capacity following PCI may contribute to the observed improvements in these domains.

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## Conflicts of Interest

The authors have declared that no competing interests exist.

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