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ENHANCING CARDIAC REHABILITATION: PROMOTING PSYCHOLOGICAL WELL-BEING ACROSS DIVERSE CARDIAC CONDITIONS THROUGH MINDFULNESS-BASED INTERVENTIONS

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Following a cardiac event, especially among patients with diverse cardiac conditions such as myocardial infarction (MI), cardiac arrest, congestive heart failure (CHF), and those who have undergone coronary angioplasty and stenting, many individuals experience heightened levels of depression and anxiety, up to 15 times higher than the general population (Foldes-Busque et al., 2021). Survivors of myocardial infarction (MI) grapple with physical, emotional, and psychological consequences, impacting their quality of life and instilling fear of future cardiovascular events (Foldes-Busque et al., 2021). Following a cardiac arrest, patients often experience a range of physical, cognitive, and emotional sequelae, including fatigue, memory impairment, anxiety, and depression (Sawyer et al., 2020). Following cardiac events, which can impair the heart's pumping ability and contribute to congestive heart failure (CHF), individuals often experience significant mood disturbances, such as anxiety, depression, and stress, as they navigate the challenges of symptom management and cope with uncertainties about their future health (Olano-Lizarraga et al., 2021). This paper aims to synthesize the current evidence regarding the effectiveness of mindfulness-based interventions (MBIs) in reducing stress, enhancing emotional well-being, and improving the quality of life for patients recovering from diverse cardiac events. Additionally, the paper addresses research gaps and offers perspectives on the sustained impact, best implementation practices, and underlying protocols of MBIs in cardiac care.

Health Burden of Cardiac Disease

Cardiovascular diseases (CVD), including MI, continue to be a leading cause of morbidity and mortality worldwide, placing a substantial burden on individuals, families, and society (American Heart Association [AHA], 2023). In 2019, approximately 17.9 million individuals worldwide lost their lives to CVD, accounting for 32% of all global deaths (World Health Organization, 2021). Among these deaths, 85% were attributed to heart attacks and

strokes (World Health Organization, 2021). In 2020, CVD remained the leading cause of death in the United States, resulting in 928,741 fatalities (AHA, 2023). In 2020, coronary artery disease (CAD) emerged as the primary cause (41.2%) of CVD-related deaths, followed by stroke (17.3%), other CVD (16.8%), high blood pressure (12.9%), heart failure (9.2%), and diseases of the arteries (2.6%) (AHA, 2023).

Additionally, CAD stands as a prominent cause of MI and imposes a substantial financial burden on patients throughout their recovery. This burden is intricately tied to the escalating healthcare costs associated with atherosclerotic cardiovascular disease (ASCVD), further exacerbating the economic impact of CAD (Khera et al., 2020). Current projections indicate that ASCVD expenditures will increase from $126 billion in 2015 to $309 billion in 2035, with total costs, including indirect productivity losses, rising from $322 billion to $509 billion (Khera et al., 2020). Patients with CAD face rising treatment expenses as their financial responsibility increasingly shifts to them through high deductibles, co-pays, and coinsurance (Khera et al., 2020). This phenomenon has given rise to "financial toxicity" in healthcare, leading to barriers to accessing necessary medical care, reduced quality of life, and difficult tradeoffs between healthcare expenses and other essential needs (Khera et al., 2020).

After a cardiac event, individuals who survive face a variety of difficulties, dealing with physical, emotional, and psychological repercussions such as a diminished quality of life, increased levels of anxiety and depression, and an ongoing fear of potential future cardiovascular incidents (Foldes Busque et al., 2021). The physical and emotional recovery process can be challenging, requiring long-term lifestyle modifications and ongoing medical management. Anxiety disorders, particularly generalized anxiety disorder (GAD) and panic disorder (PD), are highly prevalent among patients with CAD, with rates up to 15 times higher than the general population (Foldes-Busque et al., 2021). In patients with CAD, the presence of

these disorders is linked to an increased risk of major cardiac events, greater disability, higher psychological distress, and reduced quality of life (Foldes-Busque et al., 2021).

Evolution of Mindfulness-Based Interventions

Structured and dynamic contemplative practices have emerged, collectively known as MBIs, designed to cultivate present-moment awareness and foster non-judgmental acceptance of one's experiences. Rooted in ancient Buddhist meditation traditions, notably Vipassana and Zen, the evolution of MBIs has been shaped by seminal developments such as the Mindfulness-Based Stress Reduction (MBSR) program, pioneered by Jon Kabat-Zinn in the late 1970s (Webber et al., 2020). This transformative journey from traditional meditation practices to evidence-based contemporary approaches highlights the adaptability and versatility of MBIs.

The core components of many structured MBIs vary in duration, with programs like Mindfulness-Based Stress Reduction (MBSR) and Mindfulness-Based Cognitive Therapy (MBCT) typically spanning 8 weeks, though other interventions may range from 1 week to 6 weeks, and include practices promoting mindfulness and stress reduction (Zhang et al., 2021). These programs typically incorporate guided mindfulness meditation, mindful movement practices like yoga, and group discussions aimed at encouraging participants to integrate mindfulness into their daily lives (Zhang et al, 2021). MBSR is one specific and well studied structured MBI initially developed to address stress and pain in clinical settings, but has seen diversification into various programs catering to specific needs. MBSR is an 8 week program designed to alleviate stress and enhance overall well-being through the teaching of mindfulness meditation (Zhang et al., 2021). MBCT integrates mindfulness practices with cognitive therapy, particularly targeting the prevention of depression recurrence (Zhang et al., 2021). Acceptance and Commitment Therapy (ACT) merges mindfulness with behavioral principles, aiming to improve psychological flexibility and enhance mental health outcomes (Zhang et al., 2021). While these listed MBIs represent some of the more prevalent interventions, the field's evolution has unveiled a diverse array of MBIs catering to an expanding range of therapeutic needs (Zhang

et al., 2021). MBIs show effectiveness in treating various mental, physical, and social health conditions across diverse populations, including depression, anxiety, stress, addiction, and pain (Zhang et al, 2021).

The current state of literature on the topic demonstrates the efficacy of MBIs in reducing symptoms of stress, anxiety, and depression in both groups, providing valuable tools for enhancing mental well-being (Zhang et al, 2021). The adaptability of these practices positions them as accessible and inclusive resources for promoting mental resilience and well-being across various contexts, including education, workplaces, and digital platforms (Smart et. al., 2021). Thus, the evolution of MBIs reflects a comprehensive and evidence-based approach to mental health, offering valuable tools for individuals navigating diverse health challenges and proactively promoting mental well-being in both clinical and non-clinical populations (Smart et. al., 2021).

Mental Health Disorders Following Cardiac Events

Following a cardiac event, the emergence of anxiety and depression presents immediate challenges to recovery and has enduring implications for overall well-being (Murphy et al., 2020). These mental health disorders hinder physical healing, impede medication adherence, and obstruct essential lifestyle changes necessary for recuperation (Murphy et al., 2020). Additionally, anxiety not only interferes with engagement in vital cardiac rehabilitation programs, but also contributes to a delayed path to holistic recovery (Foldes-Busque et al., 2021). The impact extends beyond the psychological domain, exacerbating cardiac symptoms, elevating the risk of complications, and playing a role in an unfavorable prognosis (Locke et al., 2015).

Mental health disorders following cardiac events represent a significant and often overlooked aspect of the complex recovery process for individuals who have experienced a cardiac event. The trauma associated with such life-threatening events can manifest in various psychological challenges, impacting survivors' mental well-being. The heightened stress and anxiety during and after cardiac events contribute to the development of conditions such as

depression, anxiety disorders, and post-traumatic stress disorder (PTSD) (Sawyer et al., 2020).

These mental health disorders can substantially impede the recovery trajectory, influencing both the physical and emotional aspects of survivors' lives (Sawyer et al., 2020). Depression, for instance, may contribute to decreased motivation, hindering engagement in rehabilitation efforts crucial for optimizing physical recovery (Rao et al., 2019). Anxiety can heighten apprehension and fear, potentially impacting adherence to medication regimens and lifestyle modifications (Rao et al., 2019). Additionally, PTSD symptoms may be triggered by reminders of cardiac events, leading to increased physiological stress responses that could negatively affect cardiovascular health (Sawyer et al., 2020). Recognizing and addressing mental health disorders as integral components of the recovery journey after cardiac events is paramount. Implementing comprehensive, patient-centered care that incorporates mental health support alongside physical rehabilitation is essential for fostering holistic recovery and improving the overall quality of life for survivors and their families (Sawyer et al., 2020).

Mental Health Treatment in Cardiac Care

Pharmaceutical interventions typically constitute the primary course of treatment for individuals presenting with symptoms of anxiety or depression following a cardiac event. Deciding to start antidepressant therapy for patients after a heart event is a complex process involving a careful balance of potential benefits and risks (Fernandes et al., 2021). According to a systematic review and meta analysis conducted in 2021 by Fernandes and colleagues, treating depression in this population, often with selective serotonin reuptake inhibitors (SSRI) medications like sertraline and fluoxetine, could improve mood, overall quality of life, and potentially decrease the risk of additional heart-related events by up to 44% (Fernandes et al., 2021). Additionally, addressing depression was found to boost patients' adherence to medical advice and lifestyle changes (Fernandes et al., 2021). However, the use of antidepressants in post

cardiac patients is controversial. Some literature expresses concerns about possible side effects and interactions with other medications, highlighting the need for personalized treatment decisions (Fernandes et al., 2021). It is crucial to consider factors such as the severity of depression, existing medical conditions, and potential interactions with other drugs when making these treatment decisions.

An alternative non-pharmaceutical option for alleviating anxiety and depression in individuals recovering from a cardiac event is MBIs. Unlike traditional pharmacological approaches, MBIs focus on cultivating mindfulness through meditation and awareness techniques. Studies, such as Hodge et al. in 2023, demonstrate the general effectiveness of MBSR, showing it to be noninferior to medication like escitalopram in treating anxiety disorders. However, MBSR is well-tolerated, associated with fewer adverse events, and provides comparable effectiveness, making it a viable treatment option (Hodge, 2023). Encouraging individuals to be present in the moment, these non-invasive methods promote emotional resilience and stress reduction, aligning with a comprehensive approach to cardiac rehabilitation.

To optimize recovery and address associated challenges comprehensively, integrating interventions catering to both mental and physical well-being is crucial. One impactful approach involves integrating mindfulness programs into cardiac rehabilitation, as highlighted by a review completed by Kubzansky and colleagues (2018). The researchers highlighted findings from structured programs, combining mindfulness meditation, body awareness, and yoga, that demonstrated positive effects on the well-being and cardiac outcomes of individuals recovering from a myocardial infarction (MI). The incorporation of MBIs into comprehensive cardiac rehabilitation programs, which typically include exercise training, education, and counseling, synthesizes potential benefits and contributes valuable insights to evidence-based practices in cardiac care, ultimately enhancing patient outcomes.

In the realm of psychotherapeutic approaches, Cognitive-Behavioral Therapy (CBT) is a goal-oriented method focusing on identifying and changing negative thought patterns to alleviate emotional distress and modify behaviors. However, MBCT has emerged as a promising approach for alleviating anxiety, depression, and overall psychological distress in cardiac patients. By infusing mindfulness practices, such as present-moment awareness, meditation, and breathing exercises into a tailored cognitive therapy framework, MBCT effectively addresses the distinct challenges confronted by individuals navigating cardiovascular disease (Szczepanowski et al., 2022). This holistic approach empowers patients to cope with the psychological aspects of their condition, enhancing overall well-being. Alleviating symptoms of anxiety and depression among cardiac patients, MBCT holds potential to enhance overall mental well-being. The focus on mindful attention and cognitive restructuring in MBCT may contribute to improved coping mechanisms, reduced ruminations, and increased emotional regulation, ultimately enhancing the patient's ability to navigate the psychosocial complexities associated with cardiovascular health (Szczepanowski et al., 2022). Adopting a comprehensive approach that acknowledges the interconnectedness of mental and physical well-being is imperative to mitigate the physical, emotional, and financial costs of adverse cardiac events in the population who have cardiac disease and are recovering cardiac events..

Literature Review

A review of literature was conducted using prominent databases inclusive of: Google Scholar, PubMed, ScienceDirect, MEDLINE, CINAHL, JSTOR, and Fogler Library, employing a strategic keyword search focused on depression and anxiety, with a particular emphasis on cardiac conditions. The guiding PICOT question was: *In adults undergoing cardiac rehabilitation for diverse cardiac conditions, do Mindfulness-Based Interventions (MBIs)*

enhance mental health and overall well-being compared to standard care or alternative interventions within a six-month to one-year timeframe? Exclusion criteria were applied judiciously, considering factors such as limited sample sizes, methodological inconsistencies, and limited study duration. Search results yielded 18 recent meta-analyses, systematic reviews, and research studies published after 2013. Eleven relevant articles were identified for synthesis, primarily focusing on patients diagnosed with various cardiovascular conditions, such as coronary artery disease (CAD), myocardial infarction (MI), and heart failure (HF).

Objective Measures of Cardiovascular Effects

Anxiety, Depression, and Blood Pressure in Cardiovascular Disease

The meta-analysis conducted by Scott-Sheldon et al., 2019 systematically investigated the effects of MBIs on both psychological and physiological outcomes in adults diagnosed with CVD or MI. The meta analysis included 16 studies with a total sample size of 1,476 individuals who either had CVD or experienced a cardiac event. The authors implemented a rigorous search strategy, spanning well-established electronic bibliographic databases such as PubMed, PsycINFO, and Cochrane Library, and complemented their search by reviewing reference lists, funded research databases, clinical trials databases, and relevant journals. Inclusion criteria involved studies evaluating MBIs, incorporating a comparison condition, and assessing psychological (e.g., anxiety, depression) or physiological (e.g., systolic or diastolic blood pressure) outcomes.

The statistical outcomes revealed significant improvement in psychological outcomes for participants who received MBIs compared to controls, with effect sizes (d+s) ranging from 0.49 to 0.64, indicating both practical and statistical significance. In terms of physiological outcomes, participants receiving MBIs exhibited greater improvements in systolic blood pressure (BP) with

an effect size (d+) of 0.89 (95% CI = 0.26, 1.51), signifying both practical and statistical significance. For diastolic BP, there was no significant between-group difference (d+ = 0.07, 95% CI = −0.47, 0.60), Notably, no significant differences were found on any psychological or physiological outcomes among the five studies assessing delayed post intervention assessments. Due to the limited number of effect sizes (<10) for each outcome, formal tests such as f*unnel plot asymmetry* and *trim and fill* to examine publication bias could not be conducted. These statistical findings contribute to the nuanced understanding of the impact of MBIs on psychological and physiological measures in adults with cardiovascular disease.

Heart Failure Population

A feasibility study, conducted by Norman and colleagues (2018), addressed the potential benefits of MBIs in stable but symptomatic congestive heart failure (CHF) patients. Originally planned as a randomized controlled trial (RCT), the study faced recruitment challenges, leading to adaptation as a feasibility study. Enrolling 50 participants from a Gothenburg heart failure clinic (MBI, n=22; control, n=18) between 2010 and 2013, the MBI, conducted by a trained heart failure Registered Nurse specialist, comprised an 8-week program rooted in MBSR and MBCT. Primary outcomes, measured using the Fatigue Severity Scale (FSS), indicated a significant reduction in self-reported fatigue in the MBI group compared to the control group (p = .023). Secondary outcomes, including sleep quality, New York Heart Association Functional Classification (NYHA) classification, and functional capacity (6MWT), also showed promising results with significant reductions in unsteadiness/dizziness (p = .041) and breathlessness/tiredness (p = .019) in the MBI group. The study of MBIs for patients with heart failure yielded promising results in reducing self-reported fatigue, unsteadiness/dizziness, and

breathlessness/tiredness. The findings suggest that MBI could be a valuable complementary approach, but further research is warranted to build conclusive evidence.

Biopsychosocial Objective Measures

In their research study, Nijjar and colleagues (2019) conducted an 8-week randomized trial to explore the effects of MBSR on key psychological and cardiovascular parameters during the pivotal first year of recovery for cardiac patients eligible for cardiac rehabilitation. Notably, this study also systematically analyzed objective measurements of psychological well-being, providing a comprehensive evaluation of the intervention's impact on both subjective and quantifiable aspects of patients' mental health. A noteworthy milestone emerged at the 3-month follow-up where participants immersed in MBSR showcased statistically significant advancements in both depression, as measured by Patient Health Questionnaire-9 (PHQ-9) with a *p-value* of .01, and anxiety, assessed using the State-Trait Anxiety Inventory (STAI) and the Beck Depression Inventory (BDI) with a *p-value* of .04, compared to the control group.

The study by Nijjar and colleagues in 2019 is noteworthy in the field of cardiac rehabilitation, focusing on the potential benefits of MBSR. The research highlights improvements in psychological well-being, particularly reductions in depression and anxiety scores. These findings suggest an intricate relationship between mental health and cardiovascular recovery, prompting further reflection on the interconnectedness of psychological and physiological aspects during the initial year of cardiac rehabilitation. Beyond the realm of mental health, the MBSR group exhibited improvements in blood pressure, biomarkers (Lipids, Hemoglobin A1c, C-Reactive Protein) and 24-hour Holter monitoring at three and nine months post-randomization. The objective measurements in the experimental group demonstrated greater improvement or mitigated worsening disease compared to the control group at the same follow-up interval. This dual efficacy, addressing both psychological well-being and cardiovascular risk factors, accentuates the holistic potential of MBSR in fostering comprehensive recovery among

cardiac patients. Such findings contribute significantly to understanding the multifaceted benefits that mindfulness-based interventions can offer in the critical phase of cardiac rehabilitation.

Cardiac Rehabilitation with MBSR

A single-center randomized controlled study by Wu and colleagues (2023) investigated the impact of combining MBSR with early cardiac rehabilitation (CR) on patients with acute myocardial infarction (AMI) assisted with an intra-aortic balloon pump (IABP). The study enrolled 100 AMI patients, randomly assigning them to either a CR control group or an MBSR intervention group. The MBSR intervention, performed twice a day until IABP removal, resulted in significantly lower anxiety and depression scores ($p = < .001$; $p = < .001$*)* compared to the CR control group. Moreover, patients in the MBSR group exhibited improved mood states, reduced IABP-related complications, and a more significant enhancement in left ventricular ejection fraction (LVEF). The findings suggest that MBSR when combined with early CR may effectively alleviate negative mood states, reduce complications associated with IABP, and enhance cardiac function in AMI patients receiving IABP assistance. The study underscores the potential benefits of integrating MBIs into cardiac care for improved psychological and cardiac outcomes.

Reperfusion Population

In a retrospective study, Gu et al. (2023) conducted a comprehensive investigation into the efficacy of MBSR as an adjunctive intervention for patients post-AMI following successful primary percutaneous coronary intervention (PPCI). This study enrolled 122 participants over three years. The inclusion criteria encompassed AMI patients who underwent successful PPCI, and the exclusion criteria were meticulously defined to ensure a specific focus on the target population. The MBSR intervention, delivered to a group of 61 participants, adhered to a standardized protocol involving 8 weekly sessions, each lasting two and a half hours, with an

additional 6 hour practice day in the sixth week. To ensure compliance, participants were assigned formal homework exercises, including mindfulness meditation, breathing practices, and gentle yoga. Compliance was monitored through a telephone-based system, with weekly calls for progress reporting.

The authors' assessment included a spectrum of outcome measures. Hemodynamic parameters, such as heart rate, systolic and diastolic blood pressure, and mean arterial blood pressure, were measured using impedance cardiography. Psychosocial characteristics were evaluated through standardized scales, including the Hospital Anxiety and Depression Scale (HADS), Perceived Stress Scale (PSS), and Perceived Social Support Scale (PSSS). Health-related quality of life (HRQoL) was assessed using the 7-item Seattle Angina Questionnaire (SAQ-7), encompassing domains such as physical limitation, angina frequency, and overall quality of life. Clinical endpoints, specifically major adverse cardiovascular events (MACE), were defined and monitored during the 3-month follow-up, encompassing heart failure requiring hospitalization, recurrent MI, repeat revascularization, and cardiac death.

Significant improvements were observed in the MBSR group's blood pressure regulation, with lower systolic and diastolic blood pressure, as well as mean arterial blood pressure (MABP), compared to the control group at various follow-up points. Specifically, the systolic blood pressure (SBP) was lower at the last follow-up ($p = .005$), diastolic blood pressure (DBP) was lower at the second follow-up ($p = .018$) and at the last follow-up ($p < .001$), and MABP was lower at the second follow-up ($p = .003$) and at the last follow-up ($p < .001$). Psychosocial well-being in the MBSR group saw marked enhancements, evidenced by lower anxiety and perceived stress scores and higher perceived social support at post-intervention, 1 month, and 3 months, compared to pre-intervention.

Health-related quality of life (HRQoL), assessed through the SAQ-7, demonstrated consistent improvements in physical limitation, angina frequency, and overall HRQoL in the MBSR group post-intervention and throughout the 3-month follow-up. Importantly, the MBSR intervention resulted in a statistically significant reduction in major adverse cardiovascular events (MACE), with the control group experiencing a notably higher total MACE rate (26.23%) compared to the MBSR group (9.84%) during the 3-month follow-up. These statistically significant outcomes collectively underscore the multifaceted benefits of MBSR in post-AMI patients, spanning physiological, psychosocial, and clinical domains.

Objective Measurements of Psychological Well-Being

Improved Quality of Life

In the pilot study conducted by Yusof et al. (2020), the authors directed their attention to evaluating the effectiveness of a Holistic Cardiac Rehabilitation (HCR) program tailored for post-angioplasty patients experiencing coronary heart disease (CHD). The research involved a total of 16 male participants, with eight assigned to the intervention group undergoing the HCR program and the remaining eight to the control group undergoing the Standard Cardiac Rehabilitation (SCR) program. The participants were between 30 and 70 years old and selected through convenience sampling. The study duration spanned one month. The HCR program, developed through modified Delphi techniques with the input of 16 expert panels, encompassed psychoeducation, physical exercise, mindfulness breathing, and relaxation therapy utilizing Quranic verses.

To assess the outcomes, the researchers employed the Hospital Anxiety Depression Scale (HADS) questionnaires, a well-established tool validated in Malay language with specified sensitivity and specificity thresholds. Serum cortisol levels were also measured as a physiological indicator. A paired t-test analysis revealed significant reductions in anxiety levels within the HCR group, decreasing from 11.88 to 5.63 (p = .02), and a concurrent reduction in

serum cortisol levels from 233.13 to 188.00. The SCR group, although experiencing some reduction in anxiety from 11.12 to 9.00, did not show similar statistically significant changes. Furthermore, the independent t-test comparisons after interventions demonstrated that the HCR group exhibited significantly lower anxiety levels (mean difference of 3.38) and serum cortisol levels (mean difference of 93.25) compared to the SCR group. These findings strongly suggest that the HCR program, with its emphasis on mindfulness and relaxation techniques, has a notable positive impact on reducing anxiety and improving physiological markers in post-angioplasty CHD patients.

This research was conducted over 1 month and employed a comparative study design, providing valuable insights into the potential benefits of mindfulness-based interventions, such as the HCR program, in enhancing outcomes for cardiac patients. The statistically significant reductions in anxiety levels and cortisol levels within the HCR group compared to the SCR group underscore the potential of MBSR techniques in improving psychological and physiological outcomes in cardiac rehabilitation. Elevated cortisol levels in patients recovering from heart attacks may impact inflammation, cardiovascular health, metabolism, and psychological well-being, influencing the overall recovery and risk of complications.

Impact on Self-Efficacy and Quality of Life

Alsubaie et al. (2020) compared Mindfulness Based Cognitive Therapy and Heart and Living Mindfully (MBCT-HeLM), MBSR, and treatment as usual (TAU) for individuals with comorbid depression and cardiovascular disorders in a feasibility study The study included 74 participants (mean age 64.8 years, 58% male, 94% white British or Irish) recruited through primary care, specialized services, and community distribution. Feasibility indicators, including recruitment, retention, and adherence, showed positive results for more broad future study. Despite challenges in recruitment strategies, MBCT-HeLM demonstrated acceptability and

feasibility. The study did not establish statistical effectiveness but provided valuable insights for future definitive trials.

In a study conducted by Jalali et al. (2019), 8-session MBSR was employed to evaluate its impact on the quality of life and self-efficacy of patients with cardiovascular disease. The researchers aimed to explore the potential benefits of MBSR in improving the well-being of affected individuals. In this study, the researchers utilized two psychometrically sound instruments to measure self-efficacy and quality of life between the experimental and control groups. The Sherer et al. General Self-Efficacy Scale, comprising 17 items with established reliability ($\alpha = .86$), and the 36-item Short Form Survey (SF-36), a comprehensive tool assessing various health concepts, demonstrated a reliability with a Cronbach's alpha coefficient of .82. . Before the intervention (pre-test), no significant differences were found in the mean scores of self-efficacy and quality of life between the experimental and control groups. However, after implementing the MBSR program, both the post-test and the 3-month follow-up assessments revealed significant differences in self-efficacy and quality of life between the two groups ($p < .01$).

Specifically, within the experimental group, participants exhibited improvements in self-efficacy and quality of life. The mean self-efficacy score increased from the pretest score of 48.20 ± 4.10 to the post-test score of 60.80 ± 5.91 in the experimental group, showcasing a notable improvement, and this improvement was sustained at the three-month follow-up. Similarly, the mean quality of life score showed improvement, rising from 101.10 ± 9.13 on pre-test to 103.80 ± 9.35 at post-test, with further enhancement observed during the follow-up assessment. The study advances comprehension of how MBSR positively impacts psychological well-being, particularly in the realm of self-efficacy.

Qualitative Studies

Exploring Insights of Cardiac Patients During MBSR

In a qualitative study conducted by Lundgren et al. (2018), the authors aimed to explore the experiences of cardiac patients participating in an 8-week MBSR program. The objective was to enhance understanding of the impact of MBSR on the psychological well-being of cardiac patients, specifically examining challenges, coping strategies, and changes in concentration, relaxation, and distraction management. The study focused on analyzing diary entries from patients (n = 12) with depressive symptoms who had participated in theMBSR course following a recent coronary event.

The data revealed both challenges and rewards throughout mindfulness training. Participants reported experiencing distressing moments as well as positive experiences. Notably, subjective improvements were observed in concentration, relaxation, coping with distractions, and overall well-being. The patient's subjective data suggests that MBSR promotes well-being by strengthening the mind-body connection, fostering acceptance of the cardiac condition, and reducing fears about the future. Despite initial challenges, participants reported improvements in concentration, relaxation, and overall well-being. Additionally, the intervention empowered patients by boosting their self-efficacy and engagement in self-care behaviors, suggesting its importance in supporting cardiac patients' psychological well-being.

However, the study's limitations, including its narrow geographical scope and Western-centric focus, restrict the generalizability of the findings and compromise randomization. This limits the ability to draw broad conclusions applicable across diverse populations and settings.

Meta-Analyses with MBSR Variables

Positive Psychological Well-Being and Cardiovascular Health

In the meta-analysis conducted in 2013 by Bolier et al., researchers systematically examined the intricate interrelations between positive psychological well-being and cardiovascular health. This comprehensive meta-analysis, involving 6,139 participants across 39 randomized trials explored the effects of positive psychological interventions. These

interventions extended beyond MBSR and encompassed various mindfulness interventions, acknowledging the wide-ranging differences among them. The findings revealed that positive psychological interventions, including MBSR, were associated with substantial and statistically significant effects on well-being (SMD: .34; $p < .001$) and depression (SMD: .23; $p < .001$). These outcomes highlight the potential of mindfulness interventions, within the broader context of positive psychological strategies, to positively impact both psychological well-being and depressive symptoms in the realm of cardiovascular health.

Remarkably, these positive outcomes endured, with effects persisting at 3- or 6-month follow-ups. The authors concluded that the interconnections between psychological well-being and cardiovascular conditions can be influenced through various pathways, including biological, behavioral, and psychosocial factors. Promising avenues for enhancing psychological well-being at the individual level involve interventions such as mindfulness-based programs and positive psychological approaches. The study primarily focused on MBSR as one of the key MBIs. While MBSR was a central focus, the study also mentioned other mindfulness-related interventions, such as MBCT, tai chi, yoga, and meditation. These interventions were discussed in the context of promoting psychological well-being and supporting cardiovascular health. However, the specific details about the number of articles in the analysis that used MBSR as the intervention were not provided in the study.

MBIs for Physical and Psychological Well-Being in Cardiovascular Diseases

A meta-analysis conducted by Marino et al. (2021), investigating impact of MBIs for physical and psychological wellbeing in cardiovascular diseases, observed no statistical significant differences in pre-test scores between the experimental and control groups, indicating comparable baseline conditions. However, the findings demonstrated a significant positive impact of the intervention on self-efficacy and quality of life in the experimental group at both

post-test and three months later. The higher mean scores in self-efficacy (60.80 ± 5.91) and quality of life (103.80 ± 9.35) compared to the control group (self-efficacy: 60.40 ± 7.03, quality of life: 101.10 ± 9.13) align with the broader evidence supporting the efficacy of mindfulness interventions. This meta-analysis highlights the potential of MBIs in fostering positive psychological and well-being outcomes over an extended period, emphasizing the relevance of incorporating mindfulness approaches into healthcare strategies for cardiovascular patients.

Overall, MBIs can positively impact the psychological well-being of cardiac patients, by reducing stress, alleviating symptoms of anxiety and depression, improving emotional regulation, and fostering a greater sense of mindfulness and self-awareness. These psychological benefits contribute to a more positive mental state and can also have a ripple effect on physical well being and overall quality of life during the recovery process.

Synthesis of Findings

Upon synthesizing the findings of the reviewed literature, it becomes evident that MBIs significantly contribute to enhancing mental health and overall well-being among adults undergoing cardiac rehabilitation. The body of research examining MBIs has provided valuable insights into their efficacy as evidence-informed treatment approaches for individuals following cardiac events. Through a comprehensive review of ten relevant articles spanning various authors over eleven years, including studies by Alsubaie et al. (2020), Bolier et al. (2013), Gu et al. (2023), Jalali et al. (2019), Lundgren et al. (2018), Marino et al. (2021), Norman et al. (2018), Nijjar et al. (2019), Scott-Sheldon et al. (2019), Wu et al. (2023), and Yusof et al. (2020), the combined findings highlight the statistically significant impact of MBIs on both the physical and mental well-being of patients recovering with various cardiac conditions.

The reviewed studies encompass a range of MBIs, including MBSR, MBCT, and variations thereof, each demonstrating promising outcomes in improving psychological resilience and quality of life among cardiac patients. For example, Scott-Sheldon et al. (2019)

conducted a meta-analysis involving 16 studies with a substantial sample size, revealing significant improvements in psychological outcomes for participants who received MBIs compared to controls.

Positive psychology approaches, integrated alongside MBIs, offer complementary strategies to cultivate strengths, positive emotions, and psychological well-being, augmenting stress reduction and coping mechanisms promoted by MBIs. This is exemplified in the feasibility study by Norman et al. (2018), which addressed the potential benefits of MBIs in congestive heart failure (CHF) patients, demonstrating significant reductions in self-reported fatigue and improvements in sleep quality, New York Heart Association Functional Classification (NYHA) classification, and functional capacity among participants in the MBI group.

Regarding the necessity of the classic 8-session MBSR format, the findings suggest that while this traditional format has demonstrated efficacy, shorter or adapted versions of MBIs may also yield positive outcomes. Studies employing variations of MBSR or briefer interventions still reported significant improvements in fatigue, anxiety, and overall well-being among cardiac patients. In their study, Wu et al. (2023) explored the effects of combining MBSR with early cardiac rehabilitation for patients with acute MI. They found that patients in the MBSR group had notably lower anxiety and depression scores compared to those in the control group. The MBSR intervention in this study was conducted twice daily until the removal of the intra-aortic balloon pump (IABP), which usually took place within 5-7 days.

The amalgamation of these findings corroborates the efficacy of MBIs in ameliorating mental health and overall well-being among adult cardiac rehabilitation patients. The array of interventions, encompassing diverse formats and durations, underscores the necessity for personalized approaches to foster patient engagement and optimize outcomes. While the conventional 8-session MBSR regimen has demonstrated effectiveness, abbreviated MBI sessions may suffice, highlighting the flexibility and adaptability of mindfulness-based modalities in cardiac care. An emergent consideration from this synthesis is the potential synergistic impact of integrating MBIs with traditional cardiac rehabilitation regimens. Despite

the evidence endorsing the efficacy of MBIs in enhancing mental health outcomes among cardiac patients, there exists an opportunity to explore the incremental benefits of embedding mindfulness practices within existing rehabilitation protocols. This integration could offer patients a comprehensive recovery framework addressing both physical and psychological dimensions of health.

Furthermore, the incorporation of MBIs may bolster patient engagement and adherence by equipping individuals with practical coping mechanisms to manage stress, anxiety, and depression—a common concern during the rehabilitation phase. This integrated approach aligns with the biopsychosocial healthcare model, acknowledging the interplay of biological, psychological, and social determinants in shaping health outcomes. Consequently, future research and clinical endeavors should contemplate the potential advantages of amalgamating MBIs with traditional cardiac rehabilitation strategies to enhance patient care and long-term prognosis.

Implications for the Family Nurse Practitioner

Gaining recognition for their therapeutic efficacy in promoting good physical and mental health, MBIs have become increasingly acknowledged and integrated (Choudhary, 2023). Grounded in mindfulness principles, MBIs have been integrated into various therapeutic approaches (Choudhary, 2023). Specific programs such as MBSR targets stress reduction, MBCT combines mindfulness with cognitive therapy for conditions like depression, and ACT emphasizes accepting thoughts and feelings while promoting psychological flexibility. Collectively, these MBIs provide a versatile toolkit to enhance well-being, manage stress, and cultivate positive mental health. Understanding mindfulness as a state where individuals become more aware of their present experiences without judgment, these interventions hold promise for individuals seeking support during their rehabilitation.

In the realm of mental health challenges and emotional concerns, Western societies

increasingly embrace MBIs as accepted methods (Bhattacharya & Hoffman, 2023). These therapeutic approaches are rooted in ancient Buddhist traditions highlighting the holistic nature of mindfulness, addressing the interconnectedness of mental and physical well-being. Committed to holistic care and psychosocial interventions, family nurse practitioners (FNP) can play a pivotal role in advocating for and integrating MBIs into comprehensive cardiac rehabilitation programs.

Equipped with a deep understanding of MBIs, FNPs are poised to drive evidence-based innovation in cardiac care. Recognizing the efficacy of MBIs, particularly MBSR, as non pharmacological interventions for anxiety and depression in post-cardiac event patients, FNPs are uniquely positioned to champion their integration into comprehensive care plans. By collaborating closely with cardiac rehabilitation teams, FNPs can advocate for the incorporation of MBIs, citing specific resources and offering tangible examples of their implementation. This strategic alignment with holistic approaches not only underscores the importance of mental well-being but also underscores the FNPs' commitment to enhancing patient outcomes through a multifaceted approach. The key takeaway for the reader lies in the empowerment of FNPs to leverage their knowledge and expertise to effect positive change in cardiac care, bridging the gap between evidence-based practice and patient-centered care.

Cultural competence and person-centered care are emphasized in implementing MBIs, recognizing the diversity of patient populations. FNPs can strategically integrate MBI principles, incorporating mindfulness, meditation, and yoga techniques to address anxiety and depression among cardiac patients in the post-event phase. This proactive approach aligns with FNPs' commitment to comprehensive patient care and contributes to enhancing outcomes and overall quality of life for post-cardiac event patients.

Moreover, FNPs can engage in research exploring the long-term effects and optimal integration of MBIs in cardiac care, further contributing to evidence-based practice. By embracing MBIs, FNPs become instrumental in promoting mental health and well-being in a non-pharmaceutical manner, offering a holistic and patient-centered approach to post-cardiac event care.

Policy Implications

Health Systems Policy

The integration of MBIs in patients with cardiac disease and recovering from cardiac events holds several policy implications. Policymakers and healthcare leaders should consider endorsing and promoting the incorporation of MBIs, including MBSR, into comprehensive cardiac rehabilitation programs as part of standard care protocols. This could involve developing guidelines that highlight the evidence-based benefits of MBIs, ensuring their availability and accessibility to cardiac patients across healthcare settings. Reimbursement policies and insurance coverage may need adjustments to include MBIs, such as MBSR, as reimbursable interventions, acknowledging their positive impact on psychological well-being, stress reduction, and overall cardiac outcomes.

In addition to policy considerations surrounding reimbursement and integration, it's crucial for policymakers to prioritize ongoing monitoring and evaluation of the effectiveness of MBIs within cardiac rehabilitation programs. This involves establishing mechanisms for collecting data on patient outcomes, adherence to MBI protocols, and overall program efficacy. Regular assessment and feedback loops can inform adjustments to implementation strategies, ensure quality control, and drive continuous improvement in the delivery of MBIs within cardiac care settings. Furthermore, policymakers could explore collaborations with healthcare institutions to implement training programs for healthcare professionals, ensuring they are equipped to deliver MBIs effectively. Advocacy for policies that recognize the value of holistic, patient-centered approaches would contribute to a more comprehensive and effective healthcare

strategy for individuals recuperating from cardiac events.

Public Policy

Studies like ones conducted by Gawande and colleagues (2019) on Mindfulness Training for Primary Care (MTPC) contribute to a growing body of research supporting the integration of mindfulness into primary care. This initiative aligns with the broader landscape of successful studies that have explored the feasibility and efficacy of MBIs within healthcare systems. Notable examples include research demonstrating the positive impact of mindfulness on mental health, chronic disease management, and overall well-being. The accumulating evidence from these studies reinforces the importance of ongoing research, policy discussions, and implementation strategies to further integrate mindfulness into mainstream healthcare practices.

Perseverance in research and legislative initiatives aligns with the original secular intent of MBIs, specifically MBSR, as introduced by Dr. Jon Kabat-Zinn in 1979. Over the years, these interventions have transcended their initial medical focus and expanded to foster mental well-being in the broader population. The recognized biological links between stress reduction and improved physical and mental well-being underscore the imperative of integrating MBIs into comprehensive healthcare strategies. Ongoing research, coupled with the observed positive outcomes, cements MBIs as valuable tools for enhancing patient care and fostering mental well-being, demonstrating their efficacy even as legislative support for their growth remains in development.

According to Murray (2023), within the current landscape of research and funding devoted to supporting MBIs in patient care, Professor Blair T. Johnson and collaborators from Brown University are actively conducting a comprehensive 5-year meta-analysis to assess the efficacy of MBSR. This research initiative aims to provide a thorough evaluation of MBSR's effectiveness, differentiating itself from prior studies in the field. An intriguing aspect of this research lies in the potential influence on insurance coverage for mindfulness programs. The landscape is shifting, with insurance companies increasingly covering alternative therapies such as acupuncture. Professor Johnson envisions that robust research supporting the health benefits

of MBSR could be instrumental in expanding insurance coverage for intensive mindfulness programs, thereby enhancing accessibility for a broader patient demographic. The notion of framing mindfulness as an "alternative" is challenged by its centuries of success, and the integration of mindfulness into insurance coverage has transformative potential.

Future Research

Further research on MBIs, encompassing various interventions like MBSR, in patients with cardiac disease and recovering from post-cardiac events could explore several areas to deepen our understanding and refine clinical applications. Long-term follow-up studies with larger and diverse samples would provide insights into the sustained effects of MBIs on psychological well-being, cardiac outcomes, and overall quality of life. Additionally, investigations into specific interventions like MBCT-HeLM and MBSR, as highlighted by Alsubaie et al. (2020) and Jalali et al. (2019) respectively, offer avenues for exploring the feasibility and effectiveness of tailored mindfulness programs in improving self-efficacy, quality of life, and overall well-being among cardiac patients. Furthermore, Bolier et al.'s (2013) meta-analysis underscores the broader positive impact of mindfulness interventions on well-being and depression in cardiovascular health, suggesting avenues for further research into the mechanisms underlying these effects and the potential for integrating mindfulness into comprehensive healthcare strategies.

Future research endeavors should focus on identifying potential moderators and mediators of treatment effects, such as demographic factors, comorbidities, and adherence to intervention protocols. Collaborative research initiatives involving interdisciplinary teams can further advance our understanding of the mechanisms underlying the therapeutic effects of mindfulness and inform the development of tailored interventions that address the unique needs of cardiac patients. By expanding the scope of research to include innovative approaches and diverse patient populations, future studies can contribute to the evidence base supporting the integration of MBIs into mainstream healthcare practices and policy frameworks. Additionally, longitudinal studies with robust methodology and rigorous outcome measures can provide

valuable insights into the long-term sustainability and scalability of MBIs in improving cardiac health outcomes.

Conclusion

The literature reviewed in this paper aligns with the guiding PICOT question, which sought to evaluate the efficacy of MBIs in improving mental health and overall well-being among adults undergoing cardiac rehabilitation for various cardiac conditions within a 6-month to 1-year duration. The focus of the paper was to evaluate the impact of MBIs compared to standard care or alternative interventions on psychological resilience, quality of life, and cardiac health outcomes in this specific population. The reviewed literature, spanning over an 11-year period and comprising various studies including meta-analyses and feasibility studies, demonstrates the potential of MBIs, such as MBSR and MBCT, in improving psychological resilience, quality of life, and cardiac health outcomes among patients with cardiac disease and/or recovering from cardiac events. MBIs, whether in traditional 8-session formats or adapted versions, have shown efficacy in reducing anxiety, depression, and fatigue, while also improving sleep quality and functional capacity among cardiac patients. Moreover, the integration of positive psychology approaches alongside MBIs offers complementary strategies to augment stress reduction and coping mechanisms, further enhancing the overall effectiveness of interventions.

Implications for healthcare providers, particularly FNPs, are substantial. Equipped with knowledge and expertise in MBIs, FNPs can play a pivotal role in advocating for and integrating these evidence-based interventions into comprehensive cardiac rehabilitation programs. By collaborating closely with cardiac rehabilitation teams and advocating for policy changes to endorse the incorporation of MBIs, FNPs can contribute to enhancing patient care and long-term prognosis. Policy implications revolve around endorsing the integration of MBIs into standard cardiac rehabilitation protocols, ensuring their availability, accessibility, and reimbursement within healthcare systems. Policymakers should prioritize ongoing awareness and evaluation of MBIs' effectiveness, along with implementing training programs for healthcare professionals to

deliver these interventions effectively. Overall, embracing MBIs and advocating for their integration into mainstream healthcare practices and policy frameworks can foster holistic and patient-centered approaches to cardiac care, ultimately improving outcomes and quality of life for patients.

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