Predicting Sexual Activity in Individual with Heart Failure: The Role of Metabolic Equivalents, Age, Mental Health Status, and Partner Communication

Piriyakorn Rawangban , Tiraporn Junda * , Bualuang Sumdaengrit

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Article

Predicting Sexual Activity in Individual with Heart Failure: The Role of Metabolic Equivalents, Age, Mental Health Status, and Partner Communication

Piriykorn Rawangban, Tiraporn Junda * and Bualuang Sumdaengrit

Faculty of Medicine Ramathibodi hospital, Mahidol University, BKK 10400 Thailand

* Correspondence: tiraporn.jun@mahidol.ac.th; Tel.: +662-201-0694

Abstract

Background/Objectives: Sexual activity (SA) in heart failure (HF) is frequently impaired by physiological, psychological, and relational factors, often overlooked despite its impact on sexual life. This study identified predictors of SA in HF patients, specifically metabolic equivalents (METs), age, mental health, and partner communication. **Methods**: A cross-sectional study involved 144 married Thai patients with congestive HF from two tertiary hospitals. Participants completed questionnaires on demographics, METs (Duke Activity Status Index), mental health (DASS-21), and partner communication (Dyadic Sexual Communication Scale). Binary logistic regression analyzed the predictive value of these variables on SA. **Results**: Most participants reported some SA, but often with decreased frequency and duration, and a lack of professional guidance. Significant predictors of SA included lower METs (OR = 0.362), depression (OR = 0.002), and effective partner communication (OR = 1.156). Age, anxiety, and stress were not significant predictors. **Conclusions**: The study concludes that lower METs and depression and enhanced partner communication are associated with reduced SA in HF patients. These findings emphasize integrating physical, psychological, and relational assessments into HF care. Routine evaluation of METs, depression, and partner communication should be incorporated into clinical protocols to facilitate targeted interventions and educational support for patients' sexual well-being.

Keywords: heart failure; sexual activity; metabolic equivalents; mental health status; partner communication; aging

1. Introduction

HF constitutes a considerable global health challenge within the continuum of cardiovascular disorders, impacting an estimated 64 million individuals across the globe [1]. Patients with HF in Asia tend to be marginally younger than their European and American counterparts, mirroring the overall younger population demographics prevalent in these regions [2]. In Thailand, the rate of inpatient admissions attributable to HF is 19% and is increasing [2]. HF manifests with clinical symptoms and signs resulting from maladaptive remodeling, which compromises both the reception and ejection of blood. This results in left ventricular hypertrophy and diminished elasticity, leading to inadequate oxygen supply, dyspnea, fatigue, and reduced exercise capacity [3,4]. These complications profoundly influence functional capacity, including SA [5]. This influence is ascribed to the underlying pathology of the disease, the various treatment modalities employed, and the overall severity of the condition [6], alongside psychological factors such as anxiety and depression [7], in addition to social dimensions, which encompass aspects of sexual communication [5].

SA is often compromised in individuals suffering from HF because of the underlying pathophysiological mechanisms of the condition and its associated therapeutic interventions [6]. Patients commonly express experiences of diminished sexual efficacy, reduced levels of pleasure and satisfaction, a decline in libido, and a lower frequency of sexual interactions [4]. Moreover, there is

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widespread apprehension regarding the exacerbation of symptoms during sexual engagement, such as dyspnea and apnea, which is further intensified by concerns related to potential mortality [8]. Additionally, the adverse effects of specific HF pharmacotherapies on sexual performance [9–12] require patients to adjust their SA in consideration of their cardiac health [12].

Extensive literature supports advancing age as a significant contributor to cardiovascular disease, primarily due to age-related molecular alterations that diminish cardiac reserve capacity [13]. Age is positively associated with erectile dysfunction in men [14,15], and in women, the menopausal with aging—can adversely affect sexual function 16. Furthermore, older adults are at increased risk of cardiovascular disease, a condition exacerbated by physiological changes such as hormonal fluctuations and vascular deterioration associated with aging [17,18]. METs, a standardized measure of physical exertion, have emerged as crucial predictors of sexual function in cardiac patients [19]. Specifically, individuals with HF and a VO_2 max (maximal oxygen consumption) below 10 mL/kg/min (approximately 2.8 METs) show marked impairment in sexual function [4,19]. Mental health issues—including stress, anxiety, and depression—are highly prevalent in individuals with HF and cardiovascular diseases and often surpass the rates reported in the general population [7,20–25]. These psychological conditions significantly contribute to sexual dysfunction: anxiety has been linked to erectile difficulties in men [26] and diminished sexual desire or arousal in women [27], thereby decreasing the likelihood of sexual resumption for both patients and their partners [6]. Depression is similarly implicated, often correlating with reduced SA due to its detrimental impact on desire, arousal, and relational intimacy [6,26,28]. Moreover, effective dyadic sexual communication has been shown to play a pivotal role in maintaining SA among HF patients [5]. High-quality communication within close relationships enables candid discussions about sexual needs and boundaries, promoting mutual understanding and enhancing sexual satisfaction [29].

Sexual health concerns remain substantially underreported in Thailand and similar sociocultural contexts, primarily due to deep-rooted cultural sensitivities and significant communication barriers [30]. Many patients feel reluctant to discuss sexual issues with either their partners or healthcare providers, often constrained by cultural norms and stigmas that discourage open dialog on intimate matters [6,12]. Companying this issue, healthcare professionals frequently receive inadequate training and education on addressing sexual health, limiting their ability to provide practical guidance and support [31]. In Thailand specifically, research focusing on SA among HF patients is scarce [5], presenting a critical gap in nursing knowledge and impeding the delivery of comprehensive, culturally responsive care. This study, therefore, seeks to explore the factors influencing SA in Thai patients with HF, addressing a vital yet overlooked component of holistic health within a culturally nuanced healthcare framework.

2. Materials and Methods

2.1. Study Design

The present investigation employed a descriptive and predictive cross-sectional study design. The adherence to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines checklist enhanced the methodological rigor of the observational studies.

2.2. Participants and Setting

This study utilized purposive sampling to recruit HF patients from two tertiary hospitals in Bangkok. Inclusion criteria were: age ≥ 18 years, NYHA functional classes I or II, peripheral oxygen saturation ≥ 95%, married status, and written and spoken Thai. For participants aged ≥ 60 years, cognitive impairment was assessed using the Thai 6-Item Cognitive Impairment Test (6-CIT) [32], requiring a score of ≤ 7. Exclusion criteria included: treatment with specialized cardiac devices (e.g., pacemakers, VADs) or transplantation; pre-existing medical conditions compromising sexual function (e.g., cerebrovascular disease, spinal cord injury, end-stage renal disease, cancer); diagnosed

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psychiatric disorders (e.g., schizophrenia, depressive disorders); HF diagnosis less than six months prior; or acute symptomatic exacerbations at enrollment.

2.3. Sample Size Calculation

The sample size for this study was calculated via standard assumptions for logistic regression analysis [33]. The formula $N \geq 30p$ is applied, where N represents the required sample size and p denotes the number of independent variables (in this study, $p = 4$). On the basis of this formula, a minimum of 120 participants was deemed necessary to ensure adequate statistical power. To mitigate the risk of attrition and incomplete data, the target sample size was increased by 20%, resulting in a final sample of 144 participants, thereby enhancing the reliability and robustness of the findings.

2.4. Research Instruments

The research utilized a two-part instrument set comprising screening and data collection tools: 1) screening instruments and 2) data collection instruments.

2.4.1. Part 1 Screening Instruments

The 6-item Cognitive Impairment Test (6-CIT) developed by Brooke and Bullock in 1999 [34] and translated into Thai by Suparb Aree-Ue and Phichpraorn Youngcharoen in 2020 [32]. This tool assesses cognitive domains such as orientation, attention, and memory, specifically in individuals aged over 60. Scores range from 0-28, with a cutoff score of ≤ 7 indicating no cognitive impairment. The 6-CIT shows strong diagnostic validity for dementia screening ($r = -0.91$, 78.57% sensitivity, 100% specificity). The Thai version has also been validated, showing a moderate negative correlation with both the Mini-Cog and the original English 6-CIT ($rs = -0.42$, $p < 0.001$) and good test–retest reliability ($rs = 0.64$, $p < 0.001$), confirming its suitability for cognitive screening in the Thai elderly population.

2.4.2. Part 2: Data Collection Instruments

A personal data record form for patients with HF was developed by researchers on the basis of a comprehensive review of the relevant literature. This instrument is structured into two sections:

1. Section 1: This section includes 11 items: gender, age, religion, education level, income, body weight and height, smoking behavior, comorbidities, symptoms experienced in the previous two weeks, engagement in SA with a partner, and whether healthcare providers received information regarding safe SA.

Item 10 in Section 1 served as the criterion variable for SA. This item asked "After being diagnosed with HF, did you continue to have sexual activities with your partner?" with response options: 1) No/abstain from sexual activities after diagnosis, 2) continue sexual activities but with reduced frequency/duration, and 3) continue sexual activities as usual. For analytical purposes, these responses were recoded into two categories: (1) the abstaining and unchanged activity group and (2) the group reporting reduced frequency and duration, facilitating dichotomous analysis of SA patterns postdiagnosis.

2. Section 2: completed by the researcher used medical records and included 6 items: comorbidity, duration of HF, left ventricular ejection fraction (LVEF), NYHA functional classification, HF medications, and other prescribed drugs.

2.4.3. Duke Activity Status Index (DASI) for Metabolic Equivalents

The DASI, initially developed by Hlatky and colleagues in 1989 [35], is a widely used self-report tool for functional capacity, significantly correlated with VO_2 max ($r = -0.58$, $p < 0.001$). Thai version, adapted by Namponklang and colleagues in 2004 [36], demonstrates strong content validity (80%) and internal consistency ($\alpha = 0.80$). This culturally tailored tool categorizes activities into ten graded levels with weighted scores 1.75-8.00, convertible to METs. In this study reliability $\alpha = 0.77$.

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2.4.4. Depression Anxiety Stress Scale-21 (DASS-21) for Mental Health Status

The DASS-21 is a 21-item self-report instrument assessing depression, anxiety, and stress based on weekly experiences. Originally developed by Lovibond and Lovibond in 1995 [37] and culturally adapted for Thai populations, it uses a 4-point Likert scale ranging from 0 (did not apply to me at all) to 3 (applied to me very much or most of the time), with higher scores indicating greater distress. The DASS-21 demonstrates excellent internal consistency, with Cronbach's alpha values of 0.91 for the depression subscale, 0.84 for anxiety, and 0.90 for stress.

2.4.5. Dyadic Sexual Communication Scale (DSC) for Partner Communication

The DSC developed by Catania in 2011 [38], is a self-report instrument assessing sexual communication quality in partnerships [39]. Scores 13-78 reflect communication effectiveness. The original DSC exhibits strong psychometric properties, including good internal consistency ($\alpha = 0.87$). Its Thai adaptation demonstrates similar robustness ($\alpha = 0.76$, validity coefficient = 0.96) [29]. In this study, the DSC's overall reliability was confirmed $\alpha = 0.86$.

2.5. Data Collection

Ethical approval and institutional permissions were secured before recruitment. Data collection occurred from August to October 2024. Eligible heart failure patients from two Bangkok tertiary hospitals were identified via medical records, adhering to inclusion and exclusion criteria, with older adults undergoing 6-CIT cognitive screening. Consenting participants completed self-administered questionnaires include Personal Data Record, DASI, DASS-21, and DSC in approximately 30 minutes. Accommodations for visual impairment ensured inclusivity. Data were then reviewed for completeness.

2.6. Data Analysis

Data accuracy was meticulously verified before analysis, which was conducted via the Statistical Package for the Social Sciences (SPSS) for Windows, Version 29, under a licensed agreement with Mahidol University.

Descriptive statistics summarized participants' demographic and clinical characteristics, including frequencies, percentages, ranges, means, modes, and standard deviations. Additionally, to evaluate the primary study variables, mean scores, standard deviations, and the percentage of average scores relative to the maximum possible scores were calculated for age, METs, mental health status, and partner communication levels among participants with HF.

Binary logistic regression analysis was conducted via the enter method to assess the predictive capacity of four independent variables—age, METs, mental health status, and partner communication for the presence of SA among HF patients. Before performing the regression, preliminary assumption testing was carried out to ensure that the data met the requirements for logistic regression analysis.

3. Results

The participants ranged in age from 35-79 years, with a mean age of 61.47 years (SD = 8.87). The majority of the cohort were male (75%), and among the female participants, 81.4% were postmenopausal. Most participants identified as Buddhist (93.1%). A significant portion of the cohort (89.6%) reported maintaining SA with their partners, although many noted a reduction in frequency or duration. Despite this, a striking majority (96.5%) reported never having received any information on safe SA from healthcare providers, and 40.3% expressed a desire for more guidance on the topic. Additional details of participants' personal information can be found in Table 1.

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Table 1. Descriptive data of personal information of participants (n = 144).

Personal information	Range	Mean	S.D.	Frequency (N)	Percentage
Age groups (Years)	35 - 79	61.47	8.87	144	
18 – 60 years				60	41.7
60+ years				84	58.3
Age (Years) by gender					
Male	35-79	61.34	9.12	101	
Female	40-77	61.79	8.34	43	
Gender					
Male				101	70.1
Female				43	29.9
Menopause (in females)				43	
Menopause				35	81.4
Premenopausal				8	18.6
Religious					
Buddhism				134	93.1
Islam				8	5.6
Christianity				2	1.4
SA with a partner					
Reduced for the duration and frequency of SA				129	89.6
Regular for the duration/frequency of SA				15	10.4
Receiving information from healthcare professionals about safe SA.					
Never receiving				139	96.5
Desire information				58	40.3
Do not desire information				81	56.3
Previously received information from healthcare personnel				5	3.5
Medications affecting SA				4	2.8
The appropriate frequency and duration of SA				1	0.7

As summarized in Table 2, the clinical profile of the 144 HF patients revealed hypertension as the most prevalent comorbidity (52.1%). Other comorbid conditions were reported, but none of the participants presented with anemia. The most commonly experienced symptom within the cohort was body aches, reported by 50.0% of the participants. With respect to HF classification, HFrEF phenotype was the most common, representing 35.2% of cases. Most participants (46.4%) had been living with HF for two to five years, with NYHA functional class I, indicating mild symptoms. Beta-blockers were the most frequently prescribed medications for HF management and were used by 81.3% of the cohort. VO_2 max values ranged from 19.58 to 34.63 mL/kg/min, with a mean of 28.42 (SD = 5.49), reflecting varying exercise tolerance levels across the participants.

Table 2. Descriptive data of health information of participants (n = 144).

Health information	Range	Mean	S.D.	Frequency (N)	Percentage
Comorbidities					
Hypertension				75	52.1
Dyslipidemia				72	50.0
Diabetes				68	47.2
Coronary artery disease				50	34.7

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Cardiomyopathy				39	27.1
Cardiac arrhythmia				37	25.7
Valvular heart disease				26	18.1
Chronic kidney disease stage I-IV				22	15.3
Gout				12	8.3
Respiratory disease				7	4.9
Benign Prostatic Hyperplasia				5	3.5
Thyroid disease				3	2.1
Myocarditis				2	1.4
No comorbidity				4	2.8
Symptom burden in HF					
Musculoskeletal pain				72	50.0
Sleep disturbances				51	35.4
Fatigue				46	31.9
Constipation				36	25
Dyspnea				35	24.3
Poor appetite				18	12.5
Nausea and vomiting				14	9.7
Weight loss				12	8.3
No symptom				27	18.8
Duration of HF category (year)					
HF> 6-12 months				35	25.4
HF> 1-2 years	1-30	3.58	3.94	25	18.1
HF> 2-5 years				64	46.4
HF> 5 years				14	10.1
HF category by LVEF (%)					
HFrEF				50	35.2
HFim/mEF				45	31.7
HFpEF				38	26.8
No reports				11	6.3
VO_2 max	19.58 - 34.63	28.42	5.49		
NYHA classification					
NYHA I				105	72.9
NYHA II				39	27.1
Treatment for HF*					
Beta-Blocker				117	81.3
Diuretic				95	66.0
ACEi				32	22.2
ARB				20	13.9
Digoxin/ Digitalis				3	2.1
No medication for HF				10	7.0
Other Treatment					
Sleeping pills				21	14.7
PDE-5 inhibitors				1	0.7

HF indicated HF; rEF, reduced ejection fraction; im/mEF, improved/ mildly reduced ejection fraction; pEF, preserved ejection fraction; NYHA, New York Heart Association; ACEi, angiotensin converting enzyme inhibitor; ARB, angiotensin receptor blockers; VO_2 max, maximal oxygen consumption; PDE-5, Phosphodiesterase type 5. (*) Participants can be prescribed more than one drug concurrently.

As detailed in Table 3, METs scores of HF patients ranged from 2.95-9.89, with a mean of 8.12 (SD = 1.57), indicating moderate physical activity capacity. In terms of mental health status, the mean scores were anxiety = 1.50 (SD = 1.99; range 0–13), stress = 2.09 (SD = 2.43; range 0–11), and depression = 0.76 (SD = 1.36; range 0–10), suggesting relatively low average psychological distress across the

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sample. The mean score for partner communication, as assessed by the DSC, was 40.81 (SD = 7.00), with scores ranging from 28 to 66, indicating moderate levels of sexual communication within relationships. For binary logistic regression analysis, variables were categorized as shown in Table 4: age was dichotomized into two groups, and mental health status variables were classified as either present or absent on the basis of established clinical cutoff scores. In terms of SA patterns, no participants reported complete abstinence from SA following their HF diagnosis.

Table 3. Mean score of METs, mental health status including anxiety; stress; depression, and partner communication (N = 144).

Variables	Range		Mean	SD	Median
	Possible range	Actual range			
METs	2.74 - 9.89	5.59 - 9.89	8.12	1.57	8.91
Mental Health Status					
Anxiety	0 - 21	0 - 13	1.50	1.99	1.0
Stress	0 - 21	0 - 11	2.09	2.42	1.0
Depression	0 - 21	0 - 10	0.76	1.36	0.0
Partner Communication	13 - 78	28 - 66	40.81	7.00	40.0

Table 4. Number of participants categorized by age and mental health status for sexual activity (N = 144).

Variables	N (%)	Duration/Frequency of SA	
		Decreased	As usual
Age (by years)			
18-60 years	60 (41.67)	52 (36.11)	8 (5.56)
More than 60 years	84 (58.33)	77 (53.47)	7 (4.86)
Mental Health Status			
Anxiety			
Not sense	124 (86.10)	113 (78.47)	11 (7.64)
Sense	20 (13.90)	16 (11.11)	4 (2.78)
Stress			
Not sense	135 (93.75)	122 (84.72)	13 (9.03)
Sense	9 (6.25)	7 (4.86)	2 (1.39)
Depression			
Not sense	141 (97.92)	128 (88.89)	13 (9.03)
Sense	3 (2.08)	1 (0.69)	2 (1.39)

Table 5 demonstrates the binary logistic regression analysis results, which determined the study variables could explain 35.2% of the variance in SA outcomes, as indicated by the Nagelkerke R^2 value of .352 and achieved a 91.7% correct prediction rate, indicating strong model performance. The Hosmer–Lemeshow test yielded a nonsignificant result ($\chi^2 = 12.261$, $p = .140$), confirming that the model adequately fit the data. After all the variables were adjusted, three predictors were found to significantly influence the likelihood of decreased SA: METs, depression, and partner communication. These findings indicate that lower physical capacity, greater depressive symptoms, and better sexual communication are significantly associated with decreased SA. However, in the case of partner communication, the interpretation may suggest nuanced relational dynamics warranting further exploration. In contrast, age, anxiety, and stress were not statistically significant predictors of changes in SA.

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Table 5. Binary Logistic regression analysis among age, METs, mental health status, and partner communication for sexual activities of HF (N = 144).

Predictors	*B*	S.E.	Wald	df	Sig	Exp(B)	95% C.I. for Exp(B) Lower	Upper
Age (by years)								
18-60 years				Ref.				
More than 60 years	0.290	0.628	0.213	1	0.644	1.336	0.390	4.573
METs	1.015	0.382	7.069	1	0.008	0.362	0.172	0.766
Mental Health Status								
Anxiety								
Not sense				Ref.				
Sense	1.374	0.958	2.056	1	0.152	0.253	0.039	1.656
Stress								
Not sense				Ref.				
Sense	1.237	1.754	0.498	1	0.481	3.447	0.111	107.248
Depression								
Not sense	0			Ref.				
Sense	6.247	2.249	7.715	1	0.005	0.002	0.000	0.159
Partner communication	0.145	0.067	4.669	1	0.031	1.156	1.014	1.319
Constant	4.186	3.830	1.195	1	0.274	65.753		
Nagelkerke R^2 = 0.352, -2LL = 69.149, *Hosmer & Lemeshow Test*: Chi-square = 12.261; Sig = 0.140								

4. Discussion

This study investigated predictors of SA in HF patients, classifying them by changes in SA frequency and duration. A majority (89.60%) reported continued, but diminished, SA. This likely reflects advanced age and multiple comorbidities, consistent with prior research on cardiovascular populations [13,14,17]. Cultural factors also likely contributed, as the predominantly Buddhist Thai participants may internalize beliefs that frame illness and aging as reasons for sexual abstinence, often associating sexual expression in older or ill individuals with embarrassment or deviation from socially accepted behavior of sick roles [40]. Alarmingly, 96.5% of the participants reported never receiving guidance from healthcare professionals on safe sexual practices, and 40.3% expressed a desire for such information, underscoring a significant educational gap that may perpetuate fear and uncertainty regarding the resumption of SA [4]. Structured, culturally attuned interventions are urgently needed to help patients, and their partners make informed, autonomous decisions about their sexual lives, primarily since SA encompasses more than intercourse. In chronic illness settings, maintaining these noncoital aspects of sexuality can be just as important as physical sexual performance, serving as meaningful alternatives that preserve relational intimacy while respecting physical limitations. This underscores the importance of reframing sexual health within a broader, more inclusive context when counseling HF patients and their partners.

Partner communication was the most influential predictor of decreased SA. This seemingly counterintuitive finding likely indicates that increased communication arises from couples navigating sexual difficulties due to HF or its treatment [5,6]. Open dialogue facilitates joint redefinition of sexual norms and collaborative decision-making around concerns [5,29]. While fostering closeness, it can also lead to mutual decisions to limit SA when faced with discomfort, fear of symptom exacerbation, or distress [41]. Communication thus becomes a tool for adaptive behaviors aligned with evolving health realities [42].

The findings must be interpreted within the unique Thai sociocultural context, where prevailing Buddhism (93.10%) and cultural conservatism significantly impede open discussions about sex [30]. Thai collectivist norms, influenced by family roles, gender expectations, and religious values, often discourage direct conversations about sexuality, especially among older adults or those with chronic

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illness [39]. This likely limits open communication regarding sexual initiation, adaptation, and satisfaction, contrasting with individualistic Western cultures [43]. Consequently, intimacy may be expressed through noncoital behaviors like hugging or emotional closeness, which are culturally acceptable and less physically demanding for HF patients [44]. The observed association between increased partner communication and decreased SA may reflect this cultural framework. The DSC focused on coital communication [38], might not capture noncoital intimacy expressions. This could explain why improved communication didn't predict increased SA, unlike in other studies. For instance, Dongpho and Ua-Kit (2014) found a positive association between sexual communication and SA in a younger cohort with more professional guidance [5], possibly supporting more positive and proactive sexual communication.

METs emerged as the second most significant predictor of decreased SA in HF patients, indicating that greater physical capacity correlates with maintained sexual engagement. The sample's mean METs score (6.49 ± 1.65) exceeded the estimated 5.25 METs required for SA [35]., consistent with literature classifying SA as 2-6 METs depending on intensity [46] or 3-5 METs [4]. A systematic review by Oliva-Lozano and colleagues (2022) estimated SA at 6 METs [47], reinforcing its physiological demands. METs, which reflect the body's oxygen consumption and cardiovascular efficiency, are indirect indicators of a patient's ability to perform physical tasks, including SA [48]. Therefore, higher METs values not only indicate better cardiovascular fitness but also align with greater confidence and safety in engaging in sexual intimacy, potentially mitigating fears of symptom exacerbation or cardiac events during coitus [28]. These findings emphasize the clinical utility of assessing functional capacity via METs in HF management to enhance patients' ability and willingness to maintain sexual relationships.

Mornar and colleagues (2018) emphasized that heart disease patients can safely engage in SA when their condition is stable and well managed, particularly those with METs ≥ 3–5 and no significant cardiovascular compromise [49]. This aligns with the findings of the present study, as the sample demonstrated relatively high average METs and primarily belonged to NYHA functional classes I and II, indicating mild symptomatology and minimal interference with daily activities. These patients are typically more physically capable and more confident in resuming SA. Obieglo and colleagues (2017) reported that individuals in NYHA I and II exhibit heightened illness awareness, which may increase their acceptance of their diagnosis and facilitate the maintenance of sexual intimacy [50].

Depression, a component of mental health, significantly predicted decreased SA in this study, though the observed inverse association was unexpected: depressed participants showed 0.002-fold lower odds of reporting decreased SA compared to nondepressed individuals. This contrasts sharply with extensive literature demonstrating depression's typical impairment of sexual functioning. For instance, Dongpho and Ua-Kit (2014) noted HF limitations contribute to depression, negatively affecting sexual desire [5]. Similarly, Hoekstra and colleagues (2012) and Stein and colleagues (2016) reported depressive symptoms in HF patients linked to sexual dysfunction and decreased quality of life [28,51]. Liu and colleagues (2018) even described a bidirectional link between depression and erectile dysfunction [26]. Conversely, Curtis (2015) suggested SA might be a protective factor against depression, particularly in chronic illness [52]. The anomalous finding here is likely due to the disproportionately small number of depressed patients (n = 3) versus nondepressed (n = 141), potentially skewing statistical significance. Importantly, 88.89% of nondepressed participants still reported reduced SA, supporting the multifactorial nature of SA decline in HF. Consequently, the limited sample size of the depressed group restricts interpretability, necessitating cautious interpretation and further investigation. Age was not a statistically significant predictor of decreased SA in this study, despite previous associations with diminished sexual function due to hormonal changes and comorbidities [13,14,17]. These findings suggest that age alone may not fully explain SA variations in HF patients when functional capacity and partner dynamics are considered. Categorizing participants into two age groups (18–60 and >60 years) showed no statistically significant difference in predicting decreased SA, even though age-related sexual dysfunction is well-

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documented in cardiovascular populations [6,18,53], and postmenopausal women often experience increased sexual difficulties [12]. While literature indicates older cardiovascular patients experience more pronounced declines in SA frequency and satisfaction due to disease progression [10,54], this study found high prevalence of decreased SA across both groups (86.87% for ≤60; 91.67% for >60). This supports McCabe and colleagues (2016), who suggest sexual function can remain stable in older adults with preserved psychological and relational health, challenging assumptions of inherent age-related sexual decline [55]. The limited proportion of participants under 50 years (13.19%), typically associated with greater sexual interest, suggests that HF and its comorbidities may override age as a primary determinant of SA.

Anxiety and stress were not significant predictors of decreased SA in this HF participants. While common in HF patients due to fear of symptom exacerbation [56] and known to affect cardiovascular health [57], their impact on SA here was statistically insignificant. Despite existing research linking mental health to sexual well-being in cardiovascular populations [20,58], the low prevalence of anxiety (13.90%) and stress (6.25%) among participants, and even lower rates of co-occurring reduced SA (11.11% and 4.86% respectively), likely limited statistical power. The limited predictive power of anxiety and stress on sexual activity (SA) may be due to the mixed-gender sample, obscuring gender-specific fears. For instance, over 25% of female heart failure (HF) patients fear symptom exacerbation or death during SA, elevating anxiety [12]. This study's broad mental health assessment, not focusing on sexuality-specific concerns [37], likely masked these targeted associations, emphasizing the need for nuanced psychological distress assessment in future research.

Additionally, recent research by Yurkiw and Johnson (2021) suggests that higher stress levels can paradoxically correlate with enhanced coping strategies within couples, leading to stronger sexual communication and emotional support [59]. In the context of the present study, where all participants were married and demonstrated relatively high levels of dyadic sexual communication, it is plausible that effective partner coping and mutual understanding served as buffers against the adverse effects of stress on SA. This dynamic may have reduced the statistical visibility of stress as a standalone predictor. Therefore, while stress is often implicated in sexual dysfunction, particularly in cardiovascular disease populations, the presence of strong relational coping mechanisms may mitigate its impact, as observed in this sample. These findings suggest the need for future research to assess the interaction between gender, relational dynamics, and clinically specific forms of psychological distress more precisely to fully elucidate their roles in the sexual well-being of HF patients.

5. Conclusions

This study revealed that a substantial proportion of HF patients experience reduced SA frequency and/or duration. METs, depression, and partner communication were significant predictors, collectively explaining 35.2% of SA variance. These findings emphasize the multidimensionality of sexual health in HF, underscoring the need for nursing practices to integrate sexual health assessments into routine care. Emphasis should be placed on promoting functional capacity (METs), evaluating psychosocial well-being (especially depression), and fostering open sexual communication. Clinical guidelines supporting comprehensive sexual counseling are crucial, addressing physical, emotional, and relational concerns. Interventions should include tailored physical activity programs, mental health screening with referrals, and couple-based education to maintain intimacy and quality of life while respecting cultural sensitivities.

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