

Anxiety and Fear of Exercise in Cardiopulmonary Rehabilitation

PATIENT AND PRACTITIONER PERSPECTIVES

Samantha G. Farris, PhD; Ana M. Abrantes, PhD; Dale S. Bond, PhD; Loren M. Stabile, MS; Wen-Chih Wu, MD, MPH

Purpose: One unexplored mechanism for poor outcomes in cardiovascular and pulmonary rehabilitation (CVPR) is fear about aerobic exercise. Patients in CVPR may tend to avoid aerobic exercise because of the fear of physical sensations associated with exertion. This study examined fear about exercise in patients enrolled in outpatient CVPR and practitioner beliefs and behaviors related to fear associated with exercise.

Methods: Survey data were collected from patients ($n = 117$) enrolled in cardiac rehabilitation ($n = 69$) and pulmonary rehabilitation ($n = 48$) and practitioners ($n = 16$) who were exercise physiologists and nurses working in CVPR.

Results: Fears about exercise and avoidance behaviors were common among patients. In pulmonary rehabilitation, fears and avoidance of exercise were correlated with higher levels of anxiety and depression (r values = 0.27-0.54), lower forced expiratory volume in the first second of expiration/forced vital capacity (r values = -0.13 to -0.39), lower health-related quality of life (r values = -0.13 to -0.62), and stronger beliefs about utility of anxiety treatment (r values = 0.21-0.36). In cardiac rehabilitation, fears about exercise were correlated with higher levels of anxiety (r values = 0.19-0.38), lower mental health quality of life (r values = -0.25 to -0.27), and stronger beliefs about utility of anxiety treatment (r values = 0.30-0.40), and avoidance of exercise was correlated with lower exercise tolerance and poorer physical health quality of life (r values = -0.22 to -0.24). Practitioners estimated that an average of $47 \pm 20\%$ of patients experience fear associated with exercise and reported low feelings of preparedness to address patient anxiety and fear.

Conclusions: It may be beneficial to provide practitioners with skills to recognize and address anxiety and fear in their patients as it relates to exercise.

Key Words: anxiety • avoidance • cognitive behavior therapy • exercise

Author Affiliations: Department of Psychology, Rutgers, The State University of New Jersey, Piscataway, New Jersey (Dr Farris); Departments of Psychiatry and Human Behavior (Drs Abrantes and Bond) and Medicine (Dr Wu), Alpert Medical School of Brown University, Providence, Rhode Island; Behavioral Medicine and Addictions Research Unit, Butler Hospital, Providence, Rhode Island (Dr Abrantes); Weight Control and Diabetes Research Center (Dr Bond) and Center for Cardiac Fitness (Ms Stabile and Dr Wu), The Miriam Hospital, Providence, Rhode Island; Lifespan Cardiovascular Institute, Providence, Rhode Island (Dr Wu); and Department of Cardiology, Providence VA Medical Center, Providence, Rhode Island (Dr Wu).

The authors declare no conflicts of interest.

Supplemental digital content is available for this article. Direct URL citations appear in the printed text and are provided in the HTML and PDF versions of this article on the journal's Web site (www.jcrpjournal.com).

Correspondence: Samantha G. Farris, PhD, Department of Psychology, Rutgers University, 53 Avenue East, Piscataway NJ 08854 (samantha.farris@rutgers.edu). Copyright © 2019 Wolters Kluwer Health, Inc. All rights reserved.

DOI: 10.1097/HCR.0000000000000401

Cardiovascular and pulmonary rehabilitation (CVPR) is critical for reducing morbidity, mortality, and disability from cardiovascular and pulmonary disease—the first and third leading causes of death in the United States.¹ Structured and supervised aerobic exercise is an essential component of CVPR.^{2,3} However, low adherence and dropout in CVPR are common.⁴⁻⁶

One unexplored mechanism for poor outcomes in CVPR is anxiety and fear associated with aerobic exercise. Anxiety symptoms and disorders are associated with poor disease outcomes and increased mortality in patients with cardiovascular and pulmonary disease.^{7,8} Anxiety reflects a heterogeneous set of symptoms characterized by fearful thoughts, arousal, and behavioral avoidance. Among patients in CVPR, fear about aerobic exercise may be prominent due to the presence of physical disease states that can amplify uncertainty about bodily sensations,⁹ which may promote avoidance of situations and activities that elicit physical sensations such as aerobic exercise, or termination of exercise at the first sign of discomfort (eg, dyspnea). These experiences may also influence CVPR practitioner perspectives on the best treatment options for these patients. Indeed, cognitive-behavioral therapy (CBT) for addressing anxiety and fear in patients with cardiopulmonary disease can be challenging, given the significant overlap in cardiac and pulmonary symptoms and symptoms of anxiety.^{10,11} Therefore, increased scholarly attention to nuanced aspects of patient fears and practitioner understanding of such fears has the potential to bolster treatment development efforts. We examined fear about exercise and avoidance behaviors in patients enrolled in outpatient CVPR, as well as practitioner beliefs and behaviors related to patient anxiety and fear about exercise.

METHODS

PARTICIPANTS

Data were collected from patients and practitioners at The Miriam Hospital Center for Cardiac Fitness, a large outpatient CVPR program. Practitioners ($n = 16$) included exercise physiologists and nurses working in CVPR. Patients ($n = 117$) were enrolled in cardiac rehabilitation (CR, $n = 69$) and pulmonary rehabilitation (PR, $n = 48$). This research and a waiver of informed consent were approved by the institutional review board, given that all data were collected as part of routine clinic practices.

PROCEDURES

Demographic, psychosocial, and medical information was collected at CVPR admission following the American Association of Cardiovascular and Pulmonary Rehabilitation guidelines. Some patients also completed an additional survey of fear of exercise and treatment beliefs during a single treatment session regardless of their current treatment week.

The patients who completed the survey were those who were enrolled in CVPR and attended during the time when this survey was being tested. The average week of treatment was 4.7 ± 3.5 (mode = 1). No patients declined this assessment. The practitioner survey was completed by staff members during a staff team meeting as part of program evaluation and development efforts. All practitioners completed the survey. Items were rated on scale from 0 (none/very little) to 4 (very much).

MEASURES

Fear About Exercise

Five questions were used to assess patient fear and avoidance of exercise based on the extent to which they agree with each item: belief that something might suddenly happen physically during exercise, not being able to breathe properly during exercise, fear that a cardiac event will occur during exercise, low exercise confidence, and related avoidance behaviors (ie, slowing down/stopping exercise when feeling physical discomfort, avoiding exercise when alone because it is medically unsafe). The same 5 items were completed by the practitioners. Practitioners were asked to rate each item on the basis of the extent to which they believe their patients experience it. For descriptive purposes, responses ≥ 1 were coded as a positive endorsement of the identified fear; continuous ratings were otherwise utilized for analyses. Practitioners also reported the percentage of patients in CVPR who have anxiety/fear about exercise.

Clinical Parameters

Demographic factors, admission diagnosis, and clinical parameters from admission were extracted from the clinic medical database. Anxiety and depression symptoms were assessed with the Generalized Anxiety Disorder-7¹² and Patient Health Questionnaire-9.¹³ Health-related quality of life was assessed with the Chronic Respiratory Disease Questionnaire,¹⁴ which taps impairment related to dyspnea, fatigue, emotional functioning, and mastery (ie, feeling of control over disease) for patients in PR, and the Rand 36-Item Short Form Survey,¹⁵ which taps impairments in quality of life related to physical health and mental health for patients in CR. Lung functioning (forced expiratory volume in the first second of expiration [FEV₁] and forced expiratory volume in the first second of expiration/forced vital capacity [FEV₁/FVC]) was assessed in patients attending PR using standard spirometry evaluation. Metabolic equivalents were estimated from a treadmill exercise test at admission as an index of exercise tolerance for patients attending CR.

Patient Interest in Treatment

The patients were asked to rate the extent to which they believe it would be beneficial to address anxiety/fear about exercise during CVPR. For descriptive purposes, responses ≥ 1 were coded as a positive endorsement; continuous ratings were otherwise utilized for analyses.

Practitioner Treatment Ratings

The practitioners were asked to rate how important they believe it is to address patient anxiety/fear about exercise during CVPR, how prepared they are to address patient anxiety/fear about exercise, and their interest in receiving training to address patient fear/anxiety about exercise.

The practitioners were also provided a brief case scenario that described a hypothetical patient in CVPR and were asked to indicate how they would respond. The scenario read as follows:

Imagine that you have been working with a patient for several sessions now. You know he/she is anxious,

particularly about exercise. Today, the patient is hesitant to push herself/himself during aerobic exercise. Medically, there are no contraindications for continuing. Your patient says, "I don't think I can keep going. I feel too scared. My heart is racing."

Response options included 6 different "safety" or fear-reducing strategies and 4 strategies consistent with CBT for anxiety.^{10,11} The practitioners were instructed to mark all responses they would use.

RESULTS

PATIENT EXPERIENCES

Sample demographic and clinical parameters are presented in Table 1 for the full sample and separately for patients enrolled in CR and PR. Patient reported fears of exercise and treatment beliefs are also presented in Table 1. Approximately half of the patients reported at least some degree of fear about exercise and subsequent avoidance behaviors, and two-thirds of patients indicated that it would be beneficial to address fear/anxiety about exercise in CVPR.

Correlational results between fear of exercise and clinical characteristics are presented in Supplemental Digital Content 1, available at: <http://links.lww.com/JCRP/A99>. Briefly, in patients attending PR, stronger fears and more frequent exercise avoidance were associated with more severe anxiety and depressive symptoms, lower health-related quality of life, poorer lung functioning indexed by forced expiratory volume in the first second of expiration/forced expiratory volume, and stronger beliefs about the usefulness of specialized anxiety treatment in PR. In patients attending CR, stronger fears about having a cardiac event and concern that something might physically happen suddenly during exercise were associated with more severe anxiety, lower mental health-related quality of life, and stronger beliefs that specialized anxiety treatment would be beneficial in CR. Stopping or slowing during exercise when feeling bodily sensations was correlated with lower physical health-related quality of life. Avoidance of exercise when alone due to medical concerns was associated with lower exercise tolerance and stronger beliefs about the beneficial nature of specialized anxiety treatment in CR.

PRACTITIONER BELIEFS AND BEHAVIORS

Practitioners had an average of 13.2 ± 9.9 yr of work experience in CVPR and reported working with an average of 15 ± 6 patients/d. The majority of practitioners (94%) reported no prior training in the assessment or treatment of anxiety. One clinician reported training obtained through continuing education credits. The practitioners estimated that an average of $47 \pm 20\%$ patients attending CVPR experience anxiety and fear about exercise. The practitioners reported high importance for addressing anxiety/fear about exercise during CVPR (3.8 ± 0.4). However, on average, the practitioners reported lower ratings of feeling prepared to address patient anxiety/fear (2.6 ± 0.8) and had "much" interest in additional training to address anxiety/fear in their patients (3.0 ± 0.6).

Practitioner ratings of patient specific exercise fears and responses to the hypothetical patient scenario are presented in Table 2. In response to the hypothetical case scenario, the practitioners used significantly fewer CBT strategies than fear-reducing strategies in response to the hypothetical situation ($t_{15} = -3.74$; $P = .002$). On average, the practitioners reported that they would use an average of $74 \pm 28\%$ of the listed "safety" or fear-reducing behaviors in response

Table 1

Patient Characteristics

Demographics	Total (n = 117)	CR (n = 69)	PR (n = 48)	χ^2 or <i>t</i>
Sex, female, n (%)	41 (35)	22 (32)	19 (40)	0.74
Age, yr	67.2 ± 11.0	65.5 ± 10.9	69.3 ± 10.8	1.84
Admission diagnoses, n (%)				
Coronary artery bypass grafting	20 (12)	20 (30)	...	...
ST-elevation myocardial infarction	14 (12)	14 (20)	...	...
Non-ST-elevation myocardial infarction	13 (11)	13 (18)	...	...
Percutaneous coronary intervention	9 (8)	9 (13)	...	...
Valve replacement/repair	7 (6)	7 (10)	...	...
Heart failure	4 (3)	4 (6)	...	...
Cardiomyopathy	1 (1)	1 (1)	...	...
Angina	1 (1)	1 (1)	...	...
Chronic obstructive pulmonary disease	25 (21)	...	25 (52)	...
Idiopathic pulmonary fibrosis	5 (4)	...	5 (10)	...
Pulmonary hypertension	5 (4)	...	5 (10)	...
Asthma	4 (3)	...	4 (8)	...
Interstitial lung disease	3 (3)	...	3 (6)	...
Emphysema	3 (3)	...	3 (6)	...
Bronchiectasis	2 (3)	...	2 (4)	...
Lung cancer	1 (2)	...	1 (2)	...
Clinical parameters				
Anxiety severity (GAD-7)	5.1 ± 5.0	4.5 ± 4.5	6.0 ± 5.6	1.55
Depression severity (PHQ-9)	6.1 ± 5.3	5.0 ± 4.7	7.9 ± 5.6	3.02 ^a
Exercise tolerance (METs)	...	5.8 ± 2.6	...	...
SF-36 Physical Health	...	36.5 ± 9.7	...	...
SF-36 Mental Health	...	47.6 ± 11.8	...	...
FEV ₁	...	...	57.2 ± 22.2	...
FEV ₁ /FVC	...	...	0.57 ± 0.17	...
CRQ-Dyspnea	...	...	3.4 ± 1.1	...
CRQ-Fatigue	...	...	3.6 ± 1.1	...
CRQ-Emotional	...	...	4.4 ± 1.3	...
CRQ-Mastery	...	...	4.3 ± 1.0	...
Fear of exercise				
Not being able to breathe	1.0 ± 1.2	0.8 ± 1.1	1.2 ± 1.2	2.06 ^b
n (%) Any endorsement	60 (51)	29 (42)	31 (65)	5.76 ^b
Having a cardiac event	0.7 ± 0.9	0.8 ± 1.0	0.6 ± 0.8	-1.24
n (%) Any endorsement	49 (42)	31 (45)	18 (38)	0.64
Something physically might happen	0.6 ± 0.9	0.6 ± 0.8	0.7 ± 1.1	0.62
n (%) Any endorsement	47 (40)	29 (42)	18 (38)	0.24
Stopping/slowing due to bodily sensations	1.6 ± 1.3	1.4 ± 1.2	1.7 ± 1.3	1.15
n (%) Any endorsement	85 (73)	50 (72)	35 (73)	0.01
Avoid when alone because it is not safe	0.6 ± 0.9	0.4 ± 0.8	0.8 ± 1.0	2.06 ^b
n (%) Any endorsement	38 (32)	16 (23)	22 (46)	6.62 ^a
Treatment beliefs				
Beneficial to address fears of exercise in CVPR	2.1 ± 1.5	2.2 ± 1.6	2.0 ± 1.4	-0.66
n (%) Any endorsement	90 (77)	52 (75)	38 (79)	0.23

Abbreviations: CR, cardiac rehabilitation; CRQ, Chronic Respiratory Disease Questionnaire; CVPR, cardiovascular and pulmonary rehabilitation; FEV₁, forced expiratory volume in the first second of expiration; FVC, forced vital capacity; GAD-7, Generalized Anxiety Disorder-7; METs, metabolic equivalents; PHQ-9, Patient Health Questionnaire-9; PR, pulmonary rehabilitation; SF-36, Rand 36-item short form survey.

^a*P* < .01.

^b*P* < .05.

to the hypothetical situation, which was equivalent to 4.4 ± 1.0 fear-reducing strategies. In contrast, the practitioners used an average of 44 ± 28% of the listed CBT strategies for addressing anxiety, which was equivalent to 1.8 ± 1.1 strategies.

DISCUSSION

Nearly 40% to 50% of the patients attending CVPR reported anxiety and fear about exercise and 68% of the

patients reported that treatment for anxiety and fears about exercise would be a beneficial addition to CVPR. Moreover, fears about exercise were associated with poorer clinical presentation at CVPR admission. Evaluating fears and avoidance of exercise in patients attending CVPR is challenging.¹¹ On the one hand, hypervigilance to bodily cues during exercise and avoidance may be reasonable under certain circumstances for patients based on their medical histories and exercise prescription; on the other hand, avoidance of health-promoting behaviors such as aerobic

Table 2

Practitioner Responses to Hypothetical Scenario

Patient Fear of Exercise	Rating ^a	Any ^b
Not being able to breathe	2.1 ± 0.7	16 (100)
Having a cardiac event	2.0 ± 0.5	16 (100)
Something physically might happen	2.1 ± 0.6	16 (100)
Stopping/slowing due to bodily sensations	2.0 ± 0.9	15 (94)
Avoid when alone because it is not safe	2.2 ± 0.9	16 (100)

Practitioner Responses to Hypothetical Scenario		
Fear-Reducing/Safety Behavior, %	Yes	No
Recheck patient HR/ECG	94	6
Provide HR/ECG feedback to the patient	100	0
Reassure the patient of safety	88	12
Have the patient stop exercise	19	84
Decrease exercise intensity	62	38
Stay with the patient for comfort	82	19

CBT Skills for Anxiety, %		
	Yes	No
Validate patient concerns	82	19
Remind the patient of prior success with exercise	44	56
Encourage the patient to continue	38	62
Remind the patient that anxiety is "just a feeling"	12	88

Abbreviations: CBT, cognitive-behavioral therapy; ECG, electrocardiogram; HR, heart rate.

^aData are presented as mean ± SD.

^bData are presented as n (%).

exercise can undermine rehabilitation. Findings suggest that fear and avoidance of exercise may be influenced by both psychological distress and functional limitations. Specifically, in patients attending PR, fears and avoidance of exercise when alone and stopping/slowing exercise were correlated with more severe anxiety and depression symptoms and poorer functioning related to emotional health and disease mastery, which suggests that emotional distress may be related to exercise avoidance. However, exercise avoidance was also correlated with poorer lung functioning and poorer functioning due to dyspnea, which suggests that avoidance behaviors may also be related to the presence of prominent disease symptoms. Similarly, in patients attending CR, exercise avoidance was related to lower exercise tolerance and poorer physical health-related quality of life but not anxiety or depression symptoms, suggesting that such avoidance may be less strongly related to emotional distress and more so based on reasonable functional limitations in these patients. Cognitive-behavioral treatment models of anxiety and cardiopulmonary disease highlight the importance of considering individual variability in specific patient fears, situations that activate such fears, and the medical accuracy of these fears when evaluating the function (and appropriateness) of certain avoidance behaviors.^{10,11}

Practitioners working with CVPR estimated that 47 ± 20% of their patients had fears about exercise. Practitioners reported high importance for addressing anxiety and fear about exercise in CVPR; however, nearly all practitioners reported no prior experience in the assessment and treatment of anxiety. We presented practitioners with a hypothetical patient with anxiety who was expressing fear about continuing exercise during a CVPR session. Reasonable first steps would include checking for medical contraindications for continued exercise. In this hypothetical scenario, we informed clinicians that there were no medical contraindications for exercise. Despite this information,

the practitioners commonly reported that they would use safety-checking behaviors with the hypothetical patient (eg, recheck electrocardiogram). From a CBT perspective, these behaviors could be functionally servicing as fear-reducing strategies, given that they are providing reassurance to a patient and might unintentionally maintain patient anxiety and fear about exercise. This indeed may be a prototypical example of how anxiety can serve as a false alarm for danger and, if reinforced by practitioners, may result in sustained anxiety and fear in subsequent situations. In the absence of significant clinical contraindications, the practitioners may consider utilizing CBT strategies such as (a) psychoeducation regarding anxiety and its role in exercise avoidance; (b) exercise as an opportunity of interoceptive exposure (ie, exposure to bodily sensations that contribute to fears); and (c) mindful awareness of bodily states without judgment during exercise. Assessment of anxiety (particularly about exercise) is recommended during CVPR so that practitioners can understand the specific expression of patient symptoms and tailor safety action plans and monitoring practices.

Overall, these findings suggest that it may be beneficial to provide practitioners with skills to recognize and address anxiety and fear in their patients as it relates to exercise. Patients enrolled in CVPR may benefit from psychoeducation about anxiety and the role of avoidance in maintaining anxiety, disease-specific psychoeducation including exercise limits, true warning signs for medical risk, and guidelines for distinguishing between normal and catastrophic fear and worry about bodily sensations.^{10,11}

ACKNOWLEDGMENT

This research was supported by a grant from the National Heart, Lung, and Blood Institute (T32-HL076134-11; PI: Wing).

REFERENCES

1. Yoon PW, Bastian B, Anderson RN, Collins JL, Jaffe HW, Centers for Disease Control and Prevention (CDC). Potentially preventable deaths from the five leading causes of death—United States, 2008–2010. *MMWR Morb Mortal Wkly Rep*. 2014;63(17):369–374.
2. Anderson L, Thompson DR, Oldridge N, et al. Exercise-based cardiac rehabilitation for coronary heart disease. In: Taylor RS, ed. *Cochrane Database of Systematic Reviews*. Chichester, England: John Wiley & Sons, Ltd; 2016:CD001800.
3. Spruit MA, Singh SJ, Garvey C, et al. An official American Thoracic Society/European Respiratory Society statement: key concepts and advances in pulmonary rehabilitation. *Am J Respir Crit Care Med*. 2013;188(8):e13–e64.
4. Pack QR, Squires RW, Lopez-Jimenez F, et al. The current and potential capacity for cardiac rehabilitation utilization in the United States. *J Cardiopulm Rehabil Prev*. 2014;34(5):318–326.
5. Fang J, Ayala C, Luncheon C, Ritchey M, Loustalot F. Use of outpatient cardiac rehabilitation among heart attack survivors—20 States and the District of Columbia, 2013 and four states, 2015. *MMWR Morb Mortal Wkly Rep*. 2017;66(33):869–873.
6. Fischer MJ, Scharloo M, Abbink JJ, et al. Drop-out and attendance in pulmonary rehabilitation: the role of clinical and psychosocial variables. *Respir Med*. 2009;103(10):1564–1571.
7. Eisner MD, Blanc PD, Yelin EH, et al. Influence of anxiety on health outcomes in COPD. *Thorax*. 2010;65(3):229–234.
8. Tully PJ, Cosh SM, Baumeister H. The anxious heart in whose mind? A systematic review and meta-regression of factors associated with anxiety disorder diagnosis, treatment and morbidity risk in coronary heart disease. *J Psychosom Res*. 2014;77(6):439–448.
9. Eifert GH. Cardiophobia: a paradigmatic behavioural model of heart-focused anxiety and non-anginal chest pain. *Behav Res Ther*. 1992;30(4):329–345.

10. Barrera TL, Grubbs KM, Kunik ME, Teng EJ. A review of cognitive behavioral therapy for panic disorder in patients with chronic obstructive pulmonary disease: the rationale for interoceptive exposure. *J Clin Psychol Med Settings*. 2014;21:144-154.
11. Tully PJ, Sardinha A, Nardi AE. A new CBT model of panic attack treatment in comorbid heart diseases (PATCHD): how to calm an anxious heart and mind. *Cog Behav Pract*. 2017;24(3):329-341.
12. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med*. 2001;16(9):606-613.
13. Spitzer RL, Kroenke K, Williams JB, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med*. 2006;166(10):1092-1097.
14. Williams JE, Singh SJ, Sewell L, Guyatt GH, Morgan MD. Development of a self-reported Chronic Respiratory Questionnaire (CRQ-SR). *Thorax*. 2001;56(12):954-959.
15. McHorney CA, Ware JE Jr, Raczek AE. The MOS 36-Item Short-Form Health Survey (SF-36): II. Psychometric and clinical tests of validity in measuring physical and mental health constructs. *Med Care*. 1993;31(3):247-263.