

# research update



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## Cardiovascular Reactivity: How it Relates to Stress About Exercising

For some people, the thought of doing even a single bout of exercise can be nerve-racking. They might have little experience or bad past experiences with exercise, so they view exercise as a stressful activity.

This might be especially true if they've suffered some type of health problem. For example, imagine that you've had a heart attack, and now a doctor wants to send you to rehabilitation and get you exercising. You haven't exercised in many years, you aren't sure about your heart, and the thought of getting on a treadmill and pushing yourself is a little frightening.

### CARDIOVASCULAR REACTIVITY (CVR)

Many people experience "normal" increases in blood pressure (BP) and heart rate (HR) when they feel stressed. This response is sometimes known as cardiovascular reactivity (CVR).

In some people, CVR is exaggerated. Mental stress, like the stress some people feel when they anticipate an exercise session, can lead to rapid and large increases in BP (Rozanski, Blumenthal, & Kaplan, 1999).

Exaggerated CVR puts extra strain on the cardiovascular system and may adversely affect health, for example by increasing risk of cardiac morbidity and mortality. Among heart patients, CVR has been linked to poorer recovery from heart disease and increased chance of having another heart attack (Krantz et al., 1999; Strike & Steptoe, 2003).

Because CVR may be a concern for both symptomatic and asymptomatic populations at risk for heart disease, it's important to explore factors that are related to CVR.

### ANTICIPATION OF EXERCISE AND CVR

Some people perceive exercise tests as threatening and stressful, because these tests are evaluative and physically challenging. Thus, measuring people's HRs and BPs before they take an exercise test is a way of examining their CVR response to mental stress.

We examined:

- how patients entering cardiac rehabilitation responded to the anticipation of an exercise test, and
- how social and psychological factors might influence their responses to the anticipation of exercise (Fraser, Rodgers, & Daub, in press).

### WHAT WE FOUND

We measured patients' HRs and BPs at rest and then while standing on the treadmill just before their exercise test (anticipation of exercise). From rest to anticipation of exercise, HR increased by an average of six beats per minute for women and seven beats per minute for men. Systolic BP (SBP) increased by an average of 22 mmHg for women and 19 mmHg for men, while diastolic BP increased four and six mmHg for women and men respectively.

We also examined if social support or exercise self-efficacy might help reduce CVR. Social support refers to feeling like one belongs to a group or has someone to talk to about problems. People with low social support might feel

more anxious because they feel alone or have no one to talk to about their concerns. Exercise self-efficacy refers to a person's confidence about exercising (Rodgers & Sullivan, 2001). We might expect that people who are more confident that they can exercise will experience less CVR.

In women, having emotional and belonging social support were related to smaller increases in HR. Similarly, women with higher self-efficacy for exercise experienced smaller CVR responses.

In men, belonging social support was associated with lower SBP changes. Similar to the women, men with greater confidence for exercise had smaller CVR responses to the exercise test.

### PRACTICAL IMPLICATIONS FOR YOU

Anticipation of an exercise test resulted in large increases in CVR parameters among both men and women. It's useful to be aware of these increases in HR and BP prior to an exercise test for at least two reasons.

First, large increases in HR and BP before exercise might help you identify individuals who are vulnerable to the effects of mental stress. For example, individuals with heart problems and vulnerability to stress might be at increased risk of having another heart event if they encounter a stressful situation in their daily lives (Krantz, Kop, Santiago, & Gottdiener, 1996).

Second, it's possible that stress related to anticipating exercise might influence the results of exercise tests. For example, previous studies have found that HR and BP increases associated with mental stress add to increases associated with exercise (Roth, Bachtler, & Fillingim, 1990; Siconolfi, Garber, Baptist, Cooper, & Carleton, 1984).

So, observed increases in HR and BP during exercise tests might be exaggerated, leading to lower fitness scores (Fraser, Rodgers, Murray, & Daub, 2007). And because the results of exercise tests are often used for exercise prescription, this could lead to inaccurate prescriptions.

It's also useful to be aware of how psychosocial factors relate to CVR responses. People reporting low social support may be more likely to experience exaggerated CVR when anticipating exercise, while having social support seems to reduce increases in BP. So, for example, if patients come to cardiac rehabilitation showing large CVR, integrating these patients into cardiac rehabilitation so that they feel part of a group might be helpful.

Of particular importance for HR was exercise self-efficacy. For both men and women, more confidence to exercise was related to smaller HR increases. So, helping people feel more confident that they can exercise might reduce their stress associated with the exercise test.

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