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## Gender differences in the disability (functional limitations) associated with cardiovascular disease: a general population study

KM Scott, PhD<sup>1</sup> and SCD Collings, FRANZCP, PhD<sup>2</sup>

Department of Psychological Medicine, University of Otago, Dunedin, New Zealand

<sup>2</sup>Social Psychiatry & Population Mental Health Research Unit, University of Otago Wellington, New Zealand

### Abstract

**Background**—Although it is widely believed that women with heart disease have poorer adjustment than men, the term ‘adjustment’ has typically been narrowly defined as depression. Gender differences in adjustment more broadly defined to encompass functional limitations in addition to depression have seldom been investigated, especially in general population samples with an adequate number of women.

**Methods**—A nationally representative general population survey of 7434 New Zealanders (618 with cardiovascular disease: CVD; 335 women, 283 men). DSM-IV mental disorders were measured with the Composite International Diagnostic Interview (CIDI 3.0). Health-related disability (functional limitations) was measured using the World Mental Health-World Health Organization Disability Adjustment Schedule (WHODAS-II). CVD was ascertained by self-report of a physician’s diagnosis of heart disease, heart attack or stroke.

**Results**—In age-adjusted analyses, **cardiovascular disease** was associated with significant functional limitations in a range of disability domains in both men and women, but there were no gender differences in the degree of disability.

**Conclusion**—In this general population sample, men and women with CVD reported similar degrees of disability, despite women’s higher prevalence of depression. This does not support earlier conclusions that women with heart disease cope less well than men.

### Keywords

cardiovascular; depression; disability; gender differences

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<sup>1</sup>Author for correspondence: Kate M Scott, Associate Professor, Department of Psychological Medicine, University of Otago, PO Box 913, Dunedin, New Zealand, Tel 64 3 4740999 ext 7369, Fax 64 3 4747934, kate.scott@otago.ac.nz.

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## Introduction

Despite the fact that heart disease is a leading cause of death among adult women in developed countries, women with heart disease have been under-researched until recently.<sup>1-4</sup> This is a significant omission given evidence that women with heart disease have poorer prognosis even after controlling for the average age difference between men and women with heart disease.<sup>1-4</sup> Some of that poorer prognosis has been attributed to women's greater disease severity and medical comorbidity at diagnosis, and some of it to women's higher rate of depression and poorer adjustment to heart disease.<sup>3-6</sup>

That women with CVD typically tend to have higher depression prevalence is not in dispute, but we would suggest that the issue of adjustment is less clear-cut. Many of the studies in this area use the term 'psychosocial adjustment' and equate this with depression or psychological distress. Since it is clear that women with heart disease have higher rates of depression than men, just as women in the general population do, this makes it inevitable that they will be found to have poorer adjustment. Equating depression with adjustment is problematic, both because it is unclear that the depression being measured in clinical samples is actually a response to the illness,<sup>7</sup> and because the concept of adjustment to illness encompasses not only emotional equilibrium but also coping and functional limitations.<sup>8</sup> In their review of adjustment in women with heart disease Brezinka and Kittel<sup>5</sup> conclude that women cope less well than men, but that conclusion was strongly influenced by the several studies finding higher rates of depression in women with CVD. We note too that most prior research on this topic has been conducted in clinical samples and this has not allowed an investigation of functional limitations in those with heart disease compared to a general population sample without heart disease. This is important because it allows any gender differences in CVD-associated disability to be disentangled from the frequently observed female excess in disability in the general population.<sup>9</sup>

The New Zealand Mental Health Survey is a general population survey of DSM-IV mental disorders that also measured health-related disability (primarily functional limitations) in multiple domains and ascertained the presence of chronic physical conditions. Earlier analyses on this dataset confirmed that mental disorders, depression in particular, were significantly associated with functional disability.<sup>10</sup> Women in this population sample also displayed higher depression prevalence than men,<sup>11</sup> as expected. This dataset therefore provides an opportunity to investigate the possibility of gender differences in the association between disability and CVD independently of known gender differences in depression, and known associations between depression and disability. It also offers a rare opportunity to investigate these differences in a community dwelling sample with heart disease in comparison with the general population without heart disease.

Our objective in this paper was therefore to investigate whether there were gender differences in the disability associated with CVD, and if so, whether these were explained by gender differences in depression, in other psychiatric disorders, other physical illnesses, or socioeconomic factors.

## Methods

### Survey Sample

The New Zealand Mental Health Survey 2003/4 was a nationally representative household survey involving face-to face interviews with 12,992 adults aged 16 and over. Interviews were conducted by professional lay interviewers from October 2003 to December 2004 with a response rate of 73.3%. Written informed consent was obtained from all participants and ethics review and approval was obtained from the 14 New Zealand regional ethics

committees. Internal sub-sampling was used to reduce respondent burden by dividing the interview into two parts. Part 1 included the core diagnostic assessment of mood disorders, alcohol use disorders and most of the anxiety disorders. Part 2 included the remainder of mental disorders and additional information relevant to a wide range of survey aims, including assessment of disability and chronic physical conditions. All respondents completed Part 1. All Part 1 respondents who met criteria for any mental disorder and a probability sample of other respondents were administered Part 2. The Part 2 respondents (n=7,435), used in this study, were weighted by the inverse of their probability of selection for Part 2 of the interview to adjust for differential sampling. A more detailed description of the survey methods is provided elsewhere.<sup>12-13</sup>

## Measures

Mental Disorders were assessed with the World Mental Health-Composite International Diagnostic Interview (WMH-CIDI), now the CIDI 3.0.<sup>14</sup> This structured interview ascertains lifetime prevalence of disorder (disorder occurring at any age up to the age at interview) plus recency of episodes or symptoms, from which 12 month prevalence is derived. All disorders were assessed using the definitions and criteria of the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV).<sup>15</sup> The 12 month mental disorders included in this paper were *major depressive disorder* and two disorder groups: *any anxiety disorder* (panic disorder, agoraphobia, specific phobia, social phobia, obsessive compulsive disorder, post-traumatic stress disorder, generalized anxiety disorder) and *any substance use disorder* (alcohol abuse and dependence, drug abuse and dependence). CIDI organic exclusion rules were imposed for diagnoses of major depressive disorder and panic disorder.

Disability (Functional Limitations) was assessed with the World Mental Health (WMH) Surveys version of the World Health Organization Disability Adjustment Scale (WHODAS-II)<sup>16</sup> administered to all Part 2 participants. The WHODAS-II is based on a conceptual model of disability that synthesizes the medical and social models of disability: the International Classification of Functioning, Disability and Health (ICF).<sup>17</sup> The WMH WHODAS-II asks about *health-related* disability in the past 30 days in five domains:

- Role impairment (*Role*): four items measuring the number of days the participant was completely unable to work or carry out their normal activities, or had to cut back on the amount or quality of activity, or had to apply extreme effort to perform at their usual level.
- Getting along with others (*Social*): five items measuring difficulties in starting and maintaining conversation, dealing with unknown people, forming and maintaining friendships, controlling emotions around people.
- Understanding and communicating (*Cognitive*): four items recording difficulties with concentration, understanding, memory or learning.
- Self-care (*Self-care*): three items recording difficulties with washing the body, getting dressed, staying by oneself for a few days.
- Getting around (*Mobility*): three items measuring difficulties with standing for at least 30 minutes, moving around inside the house and walking distances of about one kilometre.

All domains were scored on a 0–100 scale with higher scores representing greater disability. The Role score was calculated as follows:  $[(1.0 * \text{days out of role} + 0.5 * \text{days cut down} + 0.25 * \text{days cut back on quality} + 0.25 * \text{days it took extreme effort})/30] * 100$ . The remaining four domains were scored using a formula that weighted the number of days the individual

reported disability out of the past 30 by the severity of disability reported in a given domain. These four domains differed from the Role domain in that they were prefaced by a filter question about whether there was a time in the past 30 days when health-related problems caused difficulties with domain-specific activities.

Because this was a general population sample spanning those aged 16 and over, all domain score distributions were heavily skewed with the majority of the population scoring zero. The proportion scoring zero varied by domain, but was substantially higher for the four domains with the filter question. In this study, the dependent variable of disability was a binary variable with the presence of functional limitations on any given domain indicated by the presence of a non-zero score.

Sociodemographic correlates included age at interview, self-identified ethnicity (Maori, Pacific, Other), educational qualifications and equivalized household income. Educational qualifications were assessed using the 2001 census questions about school and post-school qualifications. A modification of the revised Jensen equivalence scale for household income<sup>18</sup> was used account for the number of adults and children in the household.

Chronic physical conditions were assessed using a checklist adapted from the US Health Interview Schedule. Respondents were asked: “Have you ever had...arthritis or rheumatism; chronic back or neck problems; frequent or severe headaches; any other chronic pain; seasonal allergies like hay fever; a stroke; a heart attack”. They were then asked: “Did a doctor or other health professional ever tell you that you had... heart disease; high blood pressure; asthma; tuberculosis; any other chronic lung disease (like COPD or emphysema); diabetes or high blood sugar; an ulcer in the stomach or intestine; HIV infection or AIDs; epilepsy or seizures; cancer”. In this study, the category of **cardiovascular disease (CVD)** includes those who endorsed the questions about heart disease, stroke and/or heart attack, because the psychosocial risk factors and consequences are very similar across the broad category of CVD.

## Statistical Analysis

Estimates were weighted to take into account the probability of selection; to adjust for intentional oversampling of Maori and Pacific peoples; to adjust for non-response; and to post-stratify by age, sex and ethnicity to the 2001 census population. Cross-tabulations were used to determine the sociodemographic profiles of respondents with CVD and the percents with mental disorders and other chronic physical conditions. Logistic regression models were developed for each disability domain to estimate the odds of disability among men and women with, relative to those without CVD. We examined whether there were interactions between gender and CVD in the association with disability for each domain. None of these interactions were significant but we show the results stratified by gender since our primary focus was on gender. All regression models adjusted for age. As no gender differences in disability were found, adjustments for further covariates were not undertaken.

Taylor series linearization<sup>19</sup> was used to approximate the variance of estimates using SUDAAN 9.0.1<sup>20</sup> to adjust for the complex sampling design. Associations are considered statistically significant at  $p < 0.05$ .

## Results

### Sociodemographic and morbidity profile of women and men with CVD

The descriptive sociodemographic and morbidity profiles for women and men with CVD are shown in Table 1. Women with CVD are on average older, less well educated, poorer, and more likely to be without a marital partner. Women are also more likely to experience other

medical morbidities (specifically: respiratory conditions, high blood pressure, chronic pain and other chronic physical conditions), and depressive and anxiety disorders. These findings are very consistent with those of other studies<sup>4, 6, 21</sup>, suggesting that this is a fairly typical sample of people with CVD living in the community.

In this sample of people with CVD, 6% of the women and 1.2% of the men met the criteria for major depressive disorder in the past 12 months. These prevalences, which are for a sample with an average age of 63 (women) and 60 (men), can be compared with the age-specific prevalences for the total New Zealand population, which are: 9.9% for 16-24 years (12.0% for women, 7.8% for men); 7.6% for 25-44 years (9.1% for women, 5.9% for men); 5.8 % for 45-64 years (7.7% for women, 3.9% for men) and 1.8 % for 65 years and older (2.6% for women; 0.8% for men)<sup>11</sup>. This suggests that the depression prevalences we observe for this subsample of people with CVD are somewhat higher for women than those observed in the general population, but this observation is based on a small sample.

### **Gender patterns in disability (functional limitations) associated with CVD**

Both women and men with CVD reported significant functional limitations compared to people in the general population without CVD (Table 2), but there were no significant gender differences in the degree of disability reported, in any domain. CVD was associated with significant disability in all five disability domains for both genders, with the one exception being self care for men which showed elevated odds of disability, but not significantly so.

## **Discussion**

In this general population study of women and men with cardiovascular disease living in the community we replicated prior findings that women with cardiovascular disease (CVD) tend to be older, less well educated, poorer, more likely to be widowed and with greater medical and psychiatric comorbidity. In age adjusted analyses however, we found that although CVD was associated with significant functional limitations in almost all disability domains for both genders, women with CVD were no more likely to report functional limitations than men with CVD. This is despite the fact that the women with CVD in this sample had substantially higher prevalence of depression than the men with CVD.

Our finding of no gender difference in CVD-associated disability contrasts with earlier conclusions<sup>5</sup> that women with CVD adjust less well than men, if we consider a broader definition of adjustment to include functional limitations as well as emotional distress. At the least, these findings support our suggestion that gender differences in disability and in depression need to be investigated separately. Our study results do not alter the clinical reality that the female CVD patient is typically older, with greater morbidity and a number of socioeconomic disadvantages. Nonetheless, the absence of gender difference in functional limitations we found, despite the higher rate of depression among women, may be a useful corrective to the prevailing view that female patients with heart disease cope poorly.

These findings should be considered in the context of the study limitations. A key limitation is the self-report nature of the measure of CVD, although because methodological studies have found that self reported heart disease corresponds highly to objective measures,<sup>22-23</sup> it seems unlikely that misclassification could have exerted a significant influence on these results. A further limitation is that this community sample consists of individuals with varying degrees of time elapsed since the CVD diagnosis and it is possible that there is a survival bias operating such that older, more disabled women may have been more likely to die (contributing to the lack of gender differences in disability). It is impossible to know whether this is the case, but we note one factor that argues against a pronounced survival

bias is the much higher prevalence of depression in the women with CVD, since depression is thought to be one of the factors contributing to their greater risk of mortality.

**Conclusion.** In a general population sample from New Zealand we found that women and men with cardiovascular disease experience significant functional limitations in a range of spheres, but there were no gender differences in degree of disability, despite a higher prevalence of depression in women. This supports a need for future research on gender differences in adjustment to illness to broaden the definition of adjustment to include functional as well as emotional status, and counters earlier conclusions that women with heart disease cope poorly.

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**Table 1**  
**Demographic, socioeconomic and morbidity profiles of women and men with cardiovascular disease.**

	Women with CVD	Men with CVD
	<b>N=335</b>	<b>N=283</b>
Age: average (median)	63.6 (66)	60.7 (62)
ethnicity % (SE)		
Maori	9.45 (1.79)	9.90 (2.11)
Pacific	2.47 (0.82)	3.08 (0.67)
Other	88.09 (1.99)	87.02 (2.26)
<b>Educational qualifications % (SE)</b>		
None	37.89 (4.66)	36.61 (4.48)
School or post-school	36.57 (4.57)	33.22 (4.19)
Both school and post-school	25.54 (3.98)	30.17 (3.78)
<b>Equalised household income % (SE)</b>		
Under half of median (lowest quartile)	33.70 (4.38)	22.84 (3.84)
Half median to median	44.82 (4.71)	41.58 (4.35)
Median to 1.5 times median	10.36 (2.24)	15.82 (3.19)
1.5 times median and over (highest quartile)	11.12 (2.83)	19.76 (3.60)
<b>Marital Status %</b>		
Married	48.71 (4.77)	62.60 (4.53)
Separated	3.79 (1.67)	9.06 (3.18)
Divorced	9.55 (2.50)	8.03 (2.76)
Widowed	29.13 (4.23)	12.99 (7.32)
Never married	8.81 (2.27)	7.32 (1.78)
<b>BMI: mean (SE)</b>	28.3 (0.39)	28.9 (0.33)
<b>Physical conditions %</b>		
Respiratory disease	26.08 (3.95)	15.05 (2.76)
Diabetes	14.80 (3.44)	22.96 (3.72)



	Women with CVD N=335	Men with CVD N=283
High blood pressure	48.29 (4.48)	40.63 (4.24)
Cancer	20.24 (3.83)	20.97 (3.85)
Chronic pain	71.64 (3.97)	56.88 (4.40)
Other	28.89 (4.20)	18.13 (3.06)
<b>Mental disorders %</b>		
12 month major depressive disorder	6.00 (1.32)	1.16 (0.39)
Lifetime major depressive disorder	14.15 (1.99)	8.57 (1.54)
12 month anxiety disorder (any)	15.35 (2.04)	9.40 (1.75)
Lifetime anxiety disorder (any)	27.42 (3.45)	18.87 (2.54)
12 month substance use disorder	0.48 (0.26)	0.78 (0.40)
Lifetime substance use disorder	2.37 (0.60)	12.92 (2.09)

**Table 2**  
**Age-adjusted odds<sup>1</sup> of reporting disability (non-zero score) in each WMH-WHODAS-II disability domain, among women and men with cardiovascular disease.**

WMH-WHODAS-II disability domain	Women (n=335)	Men (n=283)
	<b>OR</b> (95% CI)	<b>OR</b> (95% CI)
<b>Role</b>	<b>1.89</b> (1.29-2.77)	<b>2.40</b> (1.61-3.58)
<b>Mobility</b>	<b>2.09</b> (1.38-3.17)	<b>2.10</b> (1.36-3.24)
<b>Social</b>	<b>2.47</b> (1.32-4.61)	<b>1.88</b> (1.00-3.55)
<b>Self care</b>	<b>2.83</b> (1.51-5.32)	<b>1.58</b> (0.77-3.23)
<b>Cognitive</b>	<b>2.14</b> (1.35-3.39)	<b>2.06</b> (1.27-3.34)

<sup>1</sup>Odds of disability among women and men with cardiovascular disease, relative to women and men without cardiovascular disease. **All odds ratios are bolded for clarity.**