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Gender differences in psychological impairment after a coronary incident

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Abstract

The goal of this study was to determine in 231 coronary patients (109 men, 122 women) which variables of psychological impairment were most discriminating between the sexes at 5 weeks, 4 months, and 18 months after a coronary incident, and whether using absolute scores or clinical levels of psychological impairment might have an impact on the results. Hierarchical logistic regression analyses were performed both for absolute scores and clinical levels.

Using absolute scores, women seemed more impaired than men at every measurement. However, comparing clinical levels of psychological impairment yielded a more differentiated picture. While more women than men reached clinical levels on some variables of psychological impairment (vital exhaustion, social inhibition, and anxiety), more men than women displayed clinical levels on other variables (agoraphobia, depression, and hostility). In contrast to previous research, women did not show consistently higher levels of psychological impairment than men after a coronary incident. It should be noted, however, that these previous studies did not make use of gender-specific norms to assess psychological impairment.

Keywords: Coronary heart disease; Gender differences; Psychological impairment; Women; Gender-specific norms

1. Introduction

Women seem to be at greater risk of psychological impairment after a coronary incident than men (Brezinka & Kittel, 1996). They are reported to experience more psychosomatic and functional complaints (Lavie & Milani, 1995; Wiklund et al., 1993), more sleeping disturbances (Wiklund et al., 1993), more anxiety (Conn, Taylor & Abele, 1991; Guiry, Conroy, Hickey & Mulcahy, 1987; McHugh Schuster & Waldron, 1991; Stern, Pascale & Ackermann, 1977; Wiklund

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et al., 1993), more depression (Conn et al., 1991; Guiry et al., 1987; Stern et al., 1977) and lower overall quality of life than men (Lavie & Milani, 1995) immediately following and up to 5 years after the coronary incident (Wiklund, Herlitz & Hjalmarson, 1989). This holds not only for female coronary patients in general, but also for those enrolled in cardiac rehabilitation programmes (Deshotels, Planchock, Dech & Prevost, 1995; Lavie & Milani, 1995; Santoro Loose & Fernhall, 1995).

One way of comparing psychological impairment between the sexes is to use *absolute scores* on measures of emotional distress, treating the sample as a total group. An alternative method is to use *clinical levels* and to divide the sample into two subgroups, one clinical, the other nonclinical, separated by a cut-off score. The reason to focus on clinical levels is that especially patients who report high levels of impairment should qualify for interventions. This is also the reason why this method is often used to assess coronary risk factors (Barrett-Connor, Khaw & Wingard, 1987; Eaker, Packard & Thom, 1989). Two recent studies evaluating rehabilitation after a myocardial infarction also used clinical levels of anxiety and depression to assess psychological impairment (Frasure-Smith et al., 1997; Jones & West, 1996).

Another issue worthy of consideration is the use of instruments with or without gender-specific norms. Many previous studies on psychological adjustment to a coronary incident used instruments without gender-specific norms (Ayanian, Guadagnoli & Cleary, 1995; Conn et al., 1991; Deshotels et al., 1995; Guiry et al., 1987; Lavie & Milani, 1995; Stern et al., 1977; Wiklund et al., 1993), which may lead to an important bias, since women generally score higher on questionnaires measuring depression, anxiety, or other affective disorders (Grossman & Wood, 1993; Hunt, McEwen & McKenna, 1984; Ross & Bird, 1994). In this study, instruments both with and without gender-specific norms were used.

The goal of this study was to determine which variables of psychological impairment are most discriminating between the sexes at three measurement points (5 weeks, 4 months and 18 months after a coronary incident) and whether the use of absolute scores to assess psychological impairment has a different impact on the results than the use of clinical levels. Moreover, we were interested in whether results obtained with instruments with gender-specific norms were remarkably different than those without. On the grounds of the literature cited above, women were expected to score higher on psychological impairment at every measurement point.

2. Method

The qualifying diagnosis for entrance into the study was myocardial infarction (MI), coronary artery bypass grafting (CABG), coronary angioplasty (PTCA), or combinations of these. Data were collected on 231 patients (109 men and 122 women) younger than 70 years of age recruited from three centres where cardiac rehabilitation after a coronary incident was given as part of standard care. Experienced clinical psychologists interviewed patients at approximately 5 weeks after the coronary incident (first measurement), at 4 months after the incident (second measurement), and at approximately 18 months after the incident (third measurement). Between the first and the second measurement all patients followed a standard cardiac rehabilitation programme. Of the 231 patients initially included in the study, 222 (103 men, 119 women) completed the first and second measurements and 177 (79 men, 98 women) completed the third measurement. Drop-

out rate at the second measurement was 4%, and at the third measurement 20%. Reasons for drop-out were either having moved to an unknown address or unwillingness to cooperate with the research 18 months after the coronary incident; there were no drop-outs due to (coronary) death. Drop-outs did not differ significantly ($P > 0.01$) from the non-drop-outs in demographic and medical variables at base-line.

3. Measures

Psychological impairment was measured with three psychological questionnaires. *Agoraphobia, anxiety, depression*, and *hostility* were assessed with the Dutch version of the Symptom Checklist Ninety Revised (SCL-90, Arrindell & Ettema, 1986), a 90-item inventory developed by Derogatis and colleagues as an outpatient psychiatric rating scale (Derogatis, 1977). The Dutch version of the SCL-90 has been found to have adequate internal consistency, reliability and validity for healthy persons and patient populations (Arrindell & Ettema, 1986).[1] *Well-being, feelings of being disabled, displeasure*, and *social inhibition* were assessed with the Dutch Heart Patients' Psychological Questionnaire (HPPQ), a validated 52-item inventory specifically developed for heart patients (Erdman, 1982; Erdman, Duivenvoorden, Verhage, Kazemier & Hugenholtz, 1986). *Vital exhaustion*, a state characterized by feelings of excessive fatigue and lack of energy, increased irritability, and feelings of demoralization, was assessed with the Maastricht Questionnaire (MQ), a 21-item checklist of signs and symptoms of exhaustion over the last half year prior to MI (Appels, Höppener & Mulder, 1987). Vital exhaustion as measured with the MQ has been found to be associated with an increased risk of MI after adjustment for other coronary risk factors (Appels et al., 1994; Appels & Mulder, 1988). *Clinical levels of psychological impairment* were defined according to the manuals of the SCL-90 and the HPPQ. For the MQ, a sample of 3209 Dutch civil servants was used to determine clinical levels. For all three questionnaires, the two highest deciles of the frequency distributions were used as clinical levels (e.g., for the SCL-90 norm-category 'high' and 'very high'). Only the SCL-90 had gender-specific norm-categories.

4. Statistical analysis

For demographic and medical variables, univariate analyses were performed to investigate gender differences. The *t*-test was used for continuous normally distributed variables, the Mann–Whitney test for ordinal variables and continuous non-normally distributed variables, and the Pearson chi-square test for categorical variables. We tested at a 5% significance level. All reported *P*-values are two-tailed.

Multivariate analyses were performed to investigate which variables of psychological impairment were most discriminating between men and women. Because at every measurement, variables measured by the SCL-90 (agoraphobia, anxiety, depression, hostility) were not distributed normally, logistic regression appeared more appropriate than discriminant analysis (Fienberg, 1991).

[1] As the Dutch version is called SCL-90 and not SCL-90 (R), we will refer to it as SCL-90.

Hierarchical logistic regression was performed at every measurement, with variables of psychological impairment as discriminating (or predictor) variables and gender as criterion variable. Because univariate analyses revealed significant gender differences in living status and education, these two variables were entered in the first step of the logistic regression analysis. In this way the effect of living status and education was controlled for. In the second step the variables of psychological impairment were entered, using either absolute scores, or clinical levels. Indicator coding was used for categorical discriminating variables to contrast the effects of the categories in question (in our case, clinical vs nonclinical and living with others vs living alone). The goodness-of-fit of the subsequent steps was evaluated by the step chi-square. All analyses were performed using SPSS 8.0 (SPSS, 1998).

5. Results

5.1. Demographic variables

The mean age of men was 55.80 years (SD 9.71); the mean age of women was 55.20 years (SD 10.04), ($t = 0.43$, $df = 220$, $P > 0.10$). Significantly more women than men lived alone ($\chi^2 = 8.07$, $df = 1$, $P < 0.01$, $n = 222$), and women had a significantly lower level of education ($Z = -5.16$, $P < 0.01$, $n = 211$), two findings that have also been reported by previous research (Brett & Madans, 1995; Fiebach, Viscoli & Horwitz, 1990; Santoro Loose & Fernhall, 1995).

5.2. Coronary incident, medication, and risk factors at entry into the study

Neither the nature of the coronary incident ($\chi = 0.76$, $df = 5$, $P > 0.10$, $n = 222$) nor the number of incidents ($Z = -1.08$, $P > 0.10$, $n = 218$) revealed significant differences between the genders. Regarding medication, there were no significant differences in prescription of antithrombotic therapy ($\chi = 0.33$, $df = 1$, $P > 0.10$, $n = 222$) or in prescription of betablockers and/or calcium-channel blockers and/or anti-arrythmics ($\chi = 2.28$, $df = 2$, $P > 0.10$, $n = 221$).

When coronary risk factors (systolic and diastolic blood pressure, total serum cholesterol, body mass index, diabetes, smoking status before and after the incident) were compared univariately between the sexes, no significant differences were apparent.

5.3. Psychological impairment

5.3.1. Comparing gender differences in psychological impairment, using absolute scores

Table 1 shows the results of three logistic regression analyses using absolute scores of psychological impairment. At all three measurements, the chi-square of the second step was significant, indicating that female patients differed from male patients in psychological impairment, which can not be attributed to differences in demographic variables. At the first measurement (5 weeks after the coronary incident), women reported significantly higher levels of vital exhaustion and social inhibition than men. At the second measurement (4 months after the coronary incident), women still reported significantly higher levels of vital exhaustion and social inhibition than men, whereas men reported significantly higher levels of hostility. At the third measurement (18

Table 1
Hierarchical logistic regression of gender at the first, second and third measurement (0 = male; 1 = female). Adjusted odds ratios (with 95% confidence interval) for demographic variables, entered at the first step, and for absolute scores of all variables of psychological impairment, entered at the second step[a]

Step	Discriminating variable	Measurement 1 ($n = 178$)[b]	Measurement 2 ($n = 175$)[b]	Measurement 3 ($n = 156$)[b]
Step 1	Living status	0.51 (0.22–1.18)	0.55 (0.23–1.28)	0.47 (0.19–1.14)
	Level of education	0.65 (0.53–0.79)**	0.64 (0.53–0.78)**	0.65 (0.53–0.80)**
χ^2 (*df*)		22.95 (2)**	23.49 (2)**	20.63 (2)**
Step 2	Vital exhaustion	1.07 (1.00–1.13)*	1.07 (1.00–1.15)*	1.10 (1.00–1.21)*
	Well-being	0.98 (0.92–1.05)	0.99 (0.92–1.07)	1.04 (0.96–1.13)
	Feelings of being disabled	0.98 (0.91–1.05)	0.97 (0.91–1.05)	1.04 (0.96–1.12)
	Displeasure	0.93 (0.83–1.04)	0.90 (0.78–1.04)	0.88 (0.76–1.02)
	Social inhibition	1.22 (1.08–1.39)**	1.13 (1.00–1.28)*	1.10 (0.97–1.25)
	Anxiety	1.02 (0.91–1.15)	1.04 (0.90–1.21)	1.09 (0.94–1.26)
	Depression	0.94 (0.88–1.02)	0.97 (0.88–1.07)	0.95 (0.86–1.04)
	Agoraphobia	1.04 (0.89–1.21)	1.05 (0.87–1.28)	1.03 (0.85–1.24)
	Hostility	0.96 (0.79–1.17)	0.75 (0.56–0.99)*	0.76 (0.56–1.02)
χ^2 (*df*)		21.38 (9)**	18.42 (9)*	18.21 (9)*

[a] χ^2 = chi-square as a measure of goodness-of-fit of each step; *df* = degrees of freedom. Patients with missing values were excluded from multivariate analyses, resulting in a sample size of 178 patients (76 men, 102 women) for the first measurement, 175 patients (77 men, 98 women) for the second measurement and 156 patients (64 men, 92 women) for the third measurement.

[b] $^*P \leq 0.05$; $^{**}P \leq 0.01$.

months after the coronary incident), women again reported significantly higher levels of vital exhaustion than men.

To control for multicollinearity, correlation coefficients between those variables discriminating significantly between the sexes and the remaining psychological variables were checked. At the first measurement, correlation coefficients of vital exhaustion with the remaining psychological variables varied between 0.34 (with hostility) and 0.74 (with depression), and of social inhibition with the remaining variables between −0.18 (with well-being) and 0.26 (with vital exhaustion). At the second measurement, correlation coefficients of vital exhaustion with the remaining variables varied between 0.31 (with social inhibition) and 0.76 (with depression); for social inhibition, correlation coefficients varied between 0.18 (with hostility) and 0.38 (with displeasure), and for hostility between −0.32 (with well-being) and 0.54 (with anxiety). At the third measurement, correlation coefficients of vital exhaustion with the other psychological variables varied between 0.28 (with social inhibition) and 0.81 (with depression).

Inspection of patients with missing values on the third measurement indicated that there was no significant difference in social inhibition at the first measurement between the patients with missing values and those without at the third measurement ($t = -0.34$, $df = 216$, $P > 0.10$). Therefore, the fact that social inhibition did not discriminate significantly any more at the third measurement can not be attributed to drop-out between the second and third measurement.

5.3.2. Comparing gender differences in psychological impairment, using clinical levels

Table 2 shows the results of three logistic regression analyses using clinical levels of psychological impairment. At all three measurements, the chi-square of the second step was significant, indicating that female patients differed from male patients in clinical levels of psychological impairment, which can not be attributed to demographic differences. At the first measurement (5 weeks after the coronary incident), significantly more women than men reported clinical levels of vital exhaustion and social inhibition. At the second measurement (4 months after the incident), significantly more women showed clinical levels of vital exhaustion and anxiety, whereas significantly more men reported clinical levels of depression, agoraphobia, and hostility. At the third measurement (18 months after the incident), significantly more women reported clinical levels of vital exhaustion and significantly more men clinical levels of hostility.

We also inspected the percentages at each measurement point of female and male patients with clinical levels on the variables which were significant in the logistic regression analyses. For example, at the first measurement, about 70% of the female patients, compared to 45% of the male patients, displayed clinical levels of vital exhaustion. The percentages correspond largely with the results on this variable of the logistic regression analyses, except for anxiety. The percentages did not indicate a difference in clinical level between men and women at the second measurement, whereas the logistic regression analysis showed that more women reported clinical levels of anxiety than men. It is important to note that the latter result is adjusted for the

Table 2
Hierarchical logistic regression of gender at the first, second and third measurement (0 = male; 1 = female). Adjusted odds ratios (with 95% confidence interval) for demographic variables, entered at the first step, and for *clinical levels* of all variables of psychological impairment (0 = clinical; 1 = not clinical), entered at the second step[a]

Step	Discriminating variable	Measurement 1 ($n = 178$)[b]	Measurement 2 ($n = 175$)[b]	Measurement 3 ($n = 156$)[b]
Step 1	Living status	0.51 (0.22–1.18)	0.55 (0.23–1.28)	0.47 (0.19–1.14)
	Level of education	0.65 (0.53–0.79)**	0.64 (0.53–0.78)**	0.65 (0.53–0.80)**
χ^2 (*df*)		22.95 (2)**	23.49 (2)**	20.63 (2)**
Step 2	Vital exhaustion	3.42 (1.45–8.07)**	3.65 (1.42–9.37)**	9.46 (2.26–39.66)**
	Well-being	1.11 (0.38–3.23)	0.39 (0.08–2.08)	0.51 (0.10–2.69)
	Feelings of being disabled	0.62 (0.16–2.39)	1.70 (0.32–8.93)	5.24 (0.50–55.18)
	Displeasure	0.58 (0.19–1.82)	3.19 (0.67–15.24)	0.39 (0.07–2.18)
	Social inhibition	3.38 (1.31–8.76)**	2.14 (0.72–6.31)	2.45 (0.87–6.94)
	Anxiety	0.66 (0.25–1.80)	4.11 (1.05–16.15)*	0.85 (0.25–2.88)
	Depression	0.58 (0.20–1.67)	0.27 (0.08–1.00)*	0.34 (0.08–1.43)
	Agoraphobia	0.57 (0.24–1.35)	0.25 (0.09–0.68)**	0.64 (0.24–1.74)
	Hostility	0.95 (0.38–2.40)	0.11 (0.03–0.43)**	0.22 (0.07–0.69)**
χ^2 (*df*)		24.20 (9)**	29.31 (9)**	24.69 (9)**

[a] χ^2 = chi-square as a measure of goodness-of-fit of each step; *df* = degrees of freedom. Patients with missing values were excluded from multivariate analyses, resulting in a sample size of 178 patients (76 men, 102 women) for the first measurement, 175 patients (77 men, 98 women) for the second measurement and 156 patients (64 men, 92 women) for the third measurement.

[b] $^{*}P \leq 0.05$; $^{**}P \leq 0.01$.

remaining variables of psychological impairment. In other words, given the other measures of psychological impairment, more women than men displayed a clinical level of anxiety at the second measurement.

6. Discussion

This paper describes two ways of comparing psychological impairment after a coronary incident. One way is to compare *absolute scores* on measures of psychological impairment; the other way is to use *clinical levels*, thus increasing the chance of screening out those patients who are particularly in need of psychological interventions.

When absolute scores of psychological impairment were compared in multivariate analyses, vital exhaustion emerged as the one variable discriminating significantly between the genders at every measurement point, with women reporting consistently higher levels than men. However, comparing clinical levels yielded a more differentiated picture of psychological adjustment to a coronary incident. While more women demonstrated clinical levels on some variables of psychological impairment (vital exhaustion, social inhibition, and anxiety), more men displayed clinical levels on other variables (agoraphobia, depression, and hostility). In contrast to what has been suggested by previous research (Brezinka & Kittel, 1996; Conn et al., 1991; Deshotels et al., 1995; Guiry et al., 1987; Lavie & Milani, 1995; McHugh Schuster & Waldron, 1991; Santoro Loose & Fernhall, 1995; Stern et al., 1977; Wiklund et al., 1989, 1993), no uniform pattern of women showing higher levels of psychological impairment than men after a coronary incident could be detected. Thus, if clinical levels were to be used for screening patients in need of further psychological intervention, both women and men would have qualified.

In this study, the SCL-90 was the only psychological questionnaire with gender-specific norms. Generally, women score higher on questionnaires measuring depression, anxiety, or other affective disorders (Baum & Grunberg, 1991; Bebbington, 1996; Bebbington et al. 1998; Grossman & Wood, 1993; Hunt et al., 1984; Kaplan, Anderson & Wingard, 1991; Popay, Bartley & Owen, 1993; Ross & Bird, 1994). Questionnaires with gender-specific norms correct for this phenomenon. Many studies reporting higher psychological impairment in women than in men after a coronary incident have not used gender-specific norms for the measurement of variables similar to depression and anxiety (Ayanian et al., 1995; Conn et al., 1991; Deshotels et al., 1995; Guiry et al., 1987; Lavie & Milani, 1995; Stern et al., 1977; Wiklund et al., 1993). One could thus argue that it is not surprising that female coronary patients score higher on measures of psychological impairment, as healthy women also do. Only the use of instruments with gender-specific norms will clarify whether female coronary patients score higher on anxiety, depression, and similar variables (like vital exhaustion or displeasure) because they are *women* or because they *are* actually more affected by a coronary incident than men.

Another point is that because of women's tendency to score higher on questionnaires measuring affective disorders, psychological impairment in men is underestimated when no gender-specific norms are used. In our study, the variables on which men scored significantly higher than women were all measured with the SCL-90, the only questionnaire with gender-specific norms.

What are the implications of our results? First, gender differences in psychological impairment after a coronary incident seem to be less uniform than has been suggested by previous research

reporting that women are at greater risk of psychological impairment than men. Next to a difference in absolute scores in favour of men, our results showed a more differentiated picture when clinical levels of psychological impairment were used. As a consequence, attention should be paid both to absolute scores and clinical levels, since they are indicators for different forms of psychological intervention. Therefore, coronary patients should be screened on psychological impairment at regular intervals to optimise treatment (van Elderen, Maes, Seegers, Kragten & Relik-van Wely, 1994). In addition, because of healthy women's tendency to score higher on measures of anxiety, depression, or other affective disorders, it should become a standard practice to use gender-specific norms where relevant in the assessment of psychological impairment (van Elderen, Maes, Komproe & v.d. Kamp, 1997).

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