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Chances of employment in a population of women and men after surgery of congenital heart disease: Gender- specific comparisons between patients and the general population

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Abstract

It was examined whether women and men (17-45 years) with operated congenital heart disease (CHD) differ with respect to chances of employment. Patients were compared with the general population. Patients (N=314) were classified by type of surgery (curative, reparative, palliative) as indicator of initial severity of disease. The second classification was performed according to a system proposed by the New York Heart Association in order to take subjectively reported impairments into account. Controls (N=1165) consisted of a 10% random sample drawn from the German Socio-Economic Panel. Chances of full- time employment decreased as disease severity increased. Chances of part- time and minor employment were higher in patients than among controls. These general effects were due to male patients, while the employment patterns of women did not differ from the control group. Independently of patient status women were more likely to have lower rates of full- time employment, and the rates of part- time and minor employment were higher.

Long- term adaptation to impairments due to congenital heart disease differs between women and men with respect to employment status. While female patients do not differ from the general population, males may lower their engagement in paid work.

Keywords: congenital heart disease, employment, unemployment, gender

Chances of employment in a population of women and men after surgery of congenital heart disease: Gender- specific comparisons between patients and the general population

Introduction

Approximately one out of 100 children is born with a congenital heart defect (Kovacs, Sears and Saidi 2005;Schoetzau, Sauer and van Santen 1999). Congenital heart diseases are ranging from defects causing no or minor complaints to very critical ones (e.g. single ventricle hearts) that are associated with marked physical disability and permanent danger. Due to increasing success of heart surgery and subsequent cardiologic treatment survival rates and life expectancy have increased in the last decades. The consideration of long- term consequences is not only focussed on chances of survival, but also on patients' social and psychological adaptation (Kovacs, Sears and Saidi 2005).

In an earlier paper it had been reported that patients with operated congenital heart disease (CHD) do not differ from the general population with respect to their chances for social upward or downward intergenerational mobility (Geyer et al. 2007). In the literature on the long- term consequences of congenital heart disease only a few findings on the integration of patients into working life are available. Quality of life studies and research on the psychological correlates of CHD are not uniform in their conclusions about the way patients are reacting to their congenital defects (Geyer et al. 2006a; Kovacs, Sears and Saidi 2005; Moonset al. 2006; van Rijen et al. 2005a). Against the backdrop of these studies it cannot be predicted whether patients' chances of finding employment might be comparable with the general population. In a British study it was reported that the rate of employment in patients had been lower than among controls, but it had not been differentiated between part-time and full-time employment (Crossland et al. 2005). This should be significant because employment status might be an indicator of career prospects. In another study patients were differentiated

according to disease severity (Kamphuis et al. 2002). The chances of finding employment decreased with increasing complexity of patients CHD. Patients with complex diseases were also more likely to experience unemployment than patients with a mild heart defect. In the age groups above 25 years the employment rate was lower than expected, and more than half of the patients with complex CHD reported career- related problems (Kamphuis et al. 2002). It had also been reported that patients attained only low-level occupations, and they were underrepresented in higher- level and academic positions (Van Rijen et al. 2003). The diagnostic groups also differed with respect to sickness absence, and patients with more severe heart defects were reported to being more often on sick leave. Patients and a reference population did not differ with respect to full- time or part- time employment.

A Finnish study with CHD-patients conveys a more optimistic view (Nieminen et al. 2003). The overall educational level was higher than expected if population distributions were used for comparison. Cyanotic patients were an exception, but after having excluded patients with mental retardation, their average educational level did no longer differ from the general population. Employment rates in patients (70%) were higher than expected (66%), and the unemployment rate was about half the size than the nationwide average. 207 out of 2896 patients were retired prematurely, but only in 38 this was due to heart defects, and in these cases mental retardation was the main reason. In this study severity was classified according to a system proposed by the New York Heart Association (NHYA) (Criteria Committee of the New York Heart Association 1953). Again it had not been differentiated between full- time and part-time employment. In two of these studies employment of women and men had not been considered separately (Crossland et al. 2005; Kamphuis, Vogels et al. 2002), although they are differing with respect to part- time and full-time employment. In one study gender was controlled for (Van Rijen et al. 2003), but in only one separate analyses for women and men had been performed (Nieminen et al. 2003).

CHD-patients may also respond to their health- related impairments by preferring part- time employment over full- time engagements. In our study we differentiated employment status by differentiating between full-time, part-time and minor employment. Furthermore, if patients had not been in paid employment, they could also be differentiated by several categories.

For purposes of comparison a general population sample was available that permitted analyses at the individual level. We decided for two measures, one reflecting initial CHD-severity independently of patients' judgements and for a second one that is based on subjectively reported impairments.

Based on these considerations two research questions will be examined:

- Do CHD-patients and controls differ with respect to chances of different levels of employment and unemployment?
- Do women and men with operated CHD differ with respect to employment status?

Methods

The patient group consisted of males and females who were operated at the University Hospital of Göttingen. They were receiving continuous medical care at the Department of Paediatric Cardiology, thus complete medical records were available. At examination patients were between 14 and 45 years, and in order to ensure comparability with controls, the minimum age for being included in the following analyses was set to 17 years. Individuals with syndromes, unclear diagnoses and patients whose heart disease turned out as not congenital were excluded. The study protocol was approved by the local ethics committee, and written informed consent was obtained by all patients.

The severity of the CHD was classified according to the type of surgery which is strongly associated with the severity of congenital heart defects at birth. With increasing complexity curative surgery becomes unlikely, and outcomes will be more reparative or palliative and

accompanied by higher degrees of residual symptomatology. Type of surgery rather reflects a physiological measure that is independent from subjectively felt impairment. According to Perloff (Perloff 1998) the following classification was used:

- ***Curative***: Defects cured without or with minor postoperative residua, sequelae, or complications. This applies to atrial and ventricular septal defects and arterial duct.
- ***Reparative***: Anatomy repaired or reconstructed with obligatory postoperative residua or sequelae. This group consists of all defects not assigned to the curative or palliative group
- ***Palliative***: Basic morphologic anomalies being neither repaired nor reconstructed. This group includes patients with Fontan circulation and transposition of the great arteries after Mustard or Senning procedure.

We decided against using the diagnostic grouping for classifying patients. In spite of having a relatively large sample the available case number would be insufficient because the CHD-types are not occurring with the same probability.

In order to include subjectively perceived impairments we classified patients according to a system proposed by the New York Heart Association (NYHA) (Criteria Committee of the New York Heart Association 1953). It is based on questions about impairments of everyday functioning that are classified into four categories:

- Class 1: Without limitations; no symptoms while performing ordinary activities.
- Class 2: With some limitations of activities; comfortable at rest or at mild exertion.
- Class 3: With marked limitations of activities; comfortable only at rest.
- Class 4: Patients should be at complete rest, confined to bed or chair; physical activity is associated with discomfort and symptoms also occurring at rest.

The control group was drawn from the German Socio-Economic Panel (SOEP), a longitudinal project for providing data on socio-economic change and social development. Detailed accounts of the SOEP have been published elsewhere (Haisken- DeNew and Frick

2003). The first wave was carried out in 1984, and the comparisons performed in the following analyses are based on the 2002 survey. As the total sample in the SOEP is larger than our patient population, a 10% random sample was drawn in order to cope with unbalanced group sizes between cases and controls.

Both datasets are based on face-to-face- interviews with mostly closed-ended questions.

Information on occupations and employment status were collected according to a system proposed by the Federal Statistical Office Germany (Statistisches Bundesamt 2004).

Statistical analyses

Multivariate analyses with employment status as dependent variable were performed by means of logistic regression. A given employment category was tested against all others taken together. Since the frequencies of some NYHA- categories and type of surgery were low, some analyses had to be conducted where all patients were counted together. The SOEP-subsample was drawn by the sampling option of STATA 10 SE (Stata Corp. 2007), and the same software was used for all statistical computations.

Results

After having screened the records, the potential study population was N=628. In April 2003 a written announcement and a detailed explanation of the study was sent out, and the potential respondents were asked to participate. A second modified letter was sent out in June 2003, a final one in January 2004. Appointments were made by telephone, and respondents came to the outpatient clinic where the interviews were combined with medical checkups. Finally 89 subjects could not be tracked, 32 were deceased, 79 did not respond after three letters, 108 explicitly refused to participate, and in six cases the interview had to be terminated prematurely. A more detailed account of the selection criteria had been published elsewhere (Geyer et al.2007).

As all medical records had been available, participants and non-participants could be compared with respect to a number of variables. They did not differ for type of surgery, type of heart defect, gender and age (Geyer et al. 2008).

The final study population consisted of 314 patients (51.4% female) and 1165 controls (42.4% female). The basic description can be found in table 1.

The ***SOEP*** 2002 was used as the basis for drawing a 10% subsample. It was examined whether the whole sample and the subsample differed with respect to the variables used in the following analyses (age distribution, gender, socio-economic position). For all cases no significant differences were found.

In 53%, the operation took place before the age of 6, in 76% before the age of 10, 90% underwent CHD- surgery before the age of 16 (mean age at surgery: M=7.3; Sd=7.4 yrs.), and 25% had more than one operation for correcting the heart function. As only one patient fell into NYHA IV, III and IV were counted together.

The age mean of patients was lower than of controls ($M_{patients}$: 26.9 yrs, $M_{controls}$: 31.4 yrs.; T=11.76; $p<0.01$), thus age had to be included in all multivariate analyses.

At the level of group percentages the proportion of full-time employment was higher in patients than in controls. For part- time employment there are no differences between the two main groups, but the rate of minor employment was again higher in patients. There were no differences between patients and controls with respect to the unemployment rate, and the same held for women and men not searching employment.

Multivariate analyses

Separate analyses with NYHA and type of surgery are justified if they are not measuring the same. This is the case because the correlation between the two measures was moderate (r=0.32). It was examined whether patients and controls differed with respect to employment status. Controls were used as standard of comparison, and the odds ratios for patients are displayed according to disease severity. The analyses were performed for the three types of

employment and for unemployment only. For the retired subjects the case numbers in the control group were low, and the “not employed” group was too heterogeneous for permitting detailed analyses.

Full- time employment

The chance of being fully employed decreases monotonously with increasing disease severity. This holds irrespective of the predictor chosen (tables 2 and 3), but the effects are more pronounced if patients are classified by NYHA.

The significant effects are due to males only. Independently from patient or non-patient status, the chance of full- time employment in women is only one fifth of the chances of males. Also after counting all degrees of severity together (table 4) there is no effect of patient status in females.

Part- time employment

Using NYHA as predictor the chance of part-time employment was higher in patients than in controls. This does not hold for the group of patients with palliative surgery (tables 2 and 3). Analysing the relationships separately for women and men revealed that the effects are again due to men only. For type of surgery the effect is statistically significant only for reparative operations. The significant effect in men and its absence in women remain if the perspective is coarsened by counting the patients together (table 4). The chances of part- time employment in women are again higher, and this holds irrespective of patient status.

Minor employment

The chances of minor employment in the patient group are higher than in controls. The effects are again significant only in males. Minor employment is more prominent in women than in men without being associated with patient status. This effect appears only if patients are classified by NYHA and if all patients are counted together.

Unemployment

For unemployment no significant effects were found, neither for disease severity nor are there any other gender effects.

Discussion

In the preceding analyses effects of CHD-severity on different levels of employment had been considered. The analyses had been conducted separately for women and men. It had been shown that effects had been found only in males, and they turned out to be more pronounced if patients were classified in terms of subjectively assessed functional impairments.

With increasing disease severity the chances of full- time work diminished, and the likelihood of part- time employment was increased. Employment status in women appeared as being unaffected by disease severity, but gender was independently related to employment status. The chances of women for doing full-time work were lower, and they were considerably more likely to working part-time.

The employment patterns found in our study may result out of men suffering more from the residuals of their heart defects than women. In the literature the evidence for this assumption is mixed. While van Rijen et al (Van Rijen et al. 2004; Van Rijen et al. 2005b) reported that women were more affected by psychopathological reactions, other studies concluded that the quality of life of CHD- patients in general was comparable with the general population (Immer et al. 2007; Moons et al. 2006). In our study we found evidence that males suffered considerably more than female patients on a series of psychological measures, in particular anxiety, depression, and hostility. Comparing them with general population samples revealed that only the scores of men were deviating from normal standards, while those of women (Geyer et al. 2006a) did not. These disadvantageous psychological consequences in male patients can be explained by an unfavourable body image, in particular if the body is considered as unreliable and insufficient while this was not the case in females (Geyer et al.

2006b). Choosing part- time or minor employment may be an adaptive response to CHD-related impairments. Women did not react this way. Their rates of full- time employment were a priori lower, and part- time and minor employment was more frequent. In that respect the presence of CHD may have caused a convergence between women and men.

The shift from full- time to part- time employment in males had not been reported in earlier studies. This may have been masked by analyses where only gender was controlled for without using it as an independent source of effects (Van Rijen et al. 2003). A second prerequisite for finding gender differences was to differentiate by type of employment. If analyses were restricted to comparisons between employment and unemployment status only, the lower preferences for full- time work may result in a net effect of zero. The same holds for the main effect of gender for the two types of employment.

Unemployment rates in patients and controls were about the same size. This is in accordance with a Finnish study (Nieminen et al. 2003), but in two other reports the results had been into the opposite direction (Crossland et al. 2005; Kamphuis et al. 2002). Differences between studies examining employment status may also result out of country- specific prospects of providing jobs to women and men with impairments. If such opportunities are low, more patients may stay outside the labour market, they may not even be counted as unemployed, but those who are inside may be quite satisfied with their lot. On the other hand, in countries where the opportunities are good, individuals with impairments may get a job, but they may not attain higher positions.

Early retirement might be considered an alternative to employment. In our sample some patients may have preferred this option over low prospects of getting a job, but their number cannot be quantified. In the age groups covered in our study the probability of heart failure is increasing with severity of congenital defects. For patients with single ventricle or transposition of the great arteries the risk at the age of 30 is 40% (Norozi et al. 2006). As our study sample included only the age groups of 45 years and below, it can be expected that

health- related sickness absences in patients may increase in the future. Extrapolating the results of a Norwegian study (Elstad 2004) it can be concluded that employment rates and career prospects will get worse with increasing age.

Effects of disease severity had been higher if patients had been classified by NYHA instead by type of surgery. From this finding we may conclude that subjectively perceived restrictions are more important for determining employment decisions than medical criteria. Both are measuring different contents and may thus not be used as interchangeable; this is supported by low correlationships between cardiologic and subjective measures (Norozi et al. 2007).

Finally some limitations of our study need to be discussed. Although the sample size of our patient group had been satisfactory, it was insufficient for estimating the effects of palliative surgery and of NYHA- classes III/ IV on employment status, particularly as far as part- time and minor employment are concerned. Cardiac surgery has made progress in the last decades, and depending on the time period when the operation took place patients with the same underlying defect will have different prospects. These time- dependent effects can hardly be depicted in our study, so we had to confine our analyses to the whole group of patients.

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Table 1: Basic characteristics of the study population (N=1,479)

Patients: diagnostic groups (Frequency/ %)									
Tetralogy of Fallot	Stenosis-type		Left- to- right shunt	Transposition of the great arteries		Single ventricle		Miscellaneous heart defects	
83 (26.4%)	83 (26.4%)		80 (25.5%)	39 (12.4%)		19 (6.1%)		10 (3.2%)	
Freq	**Full- time employment**			**Part- time employment**			**Minor employment**		
NYHA:	**W**	**M**	**W+M**	**W**	**M**	**W+M**	**W**	**M**	**W+M**
NYHA I	17	56	73	8	7	15	10	7	17
NYHA II	9	22	31	11	3	14	6	4	10
NYHA III/ IV	3	2	5	1	1	2	0	1	1
Surgery:									
Curative	5	11	16	5	1	6	5	2	7
Reparative	18	55	73	13	8	21	9	7	16
Palliative	6	14	20	2	2	4	2	3	5
Patients***	29	80	109 34.7%	20	11	31 9.9%	16	11	28 8.9%
Controls ***	190	402	592 50.8%	8	110	118 10.1%	47	11	58 5.0%
	Unemployed			**Retired***			**Not employed****		
NYHA:									
NYHA I	4	5	9	1	9	10	14	25	39
NYHA II	2	9	11	8	5	13	18	20	38
NYHA III/ IV	0	0	0	8	6	14	7	6	13
Surgery:									
Curative	2	2	4	2	0	2	9	7	16
Reparative	4	12	16	10	10	20	25	32	57
Palliative	0	0	0	5	10	15	5	12	17
Patients ***	6	14	20 6.4%	17	20	37 11.8%	39	51	90 28.7%
Controls ***	33	46	76 6.5%	2	1	3 0.3%	218	108	326 28.0%

* Left job due to deteriorations of the CHD or early retirement ** Students, school education, vocational training, housewives ***Row percentages

Table 2: Effects of disease severity on chances of employment in women and men; odds ratios and 95% confidence intervals

Full- time employment			
Predictor	**Women**	**Men**	**Women and men**
Controls (SOEP)	1 (reference cat.)	1 (reference cat.)	1 (reference cat.)
Curative surgery*	0.49 (0.18-1.32)	0.70 (0.28-1.71)	0.60 (0.31-1.60)
Reparative	0.65 (0.37-1.12)	0.46 (0.28-0.75)	0.55 (0.39-0.79)
Palliative	1.16 (0.42-3.14)	0.30 (0.13-0.68)	0.44 (0.24-0.81)
Gender (women)	--	--	0.18 (0.14-0.23)
Age	1.03 (1.01-1.05)	1.19 (1.16-1.22)	1.10 (1.08-1.11)
Part- time employment			
Predictor	**Women**	**Men**	**Women and men**
Controls (SOEP)	1 (reference cat.)	1 (reference cat.)	1 (reference cat.)
Curative surgery	2.20 (0.71-6.84)	3.50 (0.40-30.56)	2.28 (0.85-6.15)
Reparative	1.23 (0.63-2.40)	5.90 (2.12-16.38)	1.85 (1.07-3.18)
Palliative	0.80 (0.17-3.72)	4.11 (0.81-20.84)	1.43 (0.47-4.39)
Gender (women)	--	--	9.44 (5.69-15.63)
Age	1.14 (1.10-1.17)	1.03 (0.97-1.09)	1.12 (1.09-1.15)
Minor employment			
Predictor	**Women**	**Men**	**Women and men**
Controls (SOEP)	1 (reference cat.)	1 (reference cat.)	1 (reference cat.)
Curative surgery*	2.19 (1.02-4.67)	2.31 (0.86-6.23)	2.21 (0.93-5.27)
Reparative	1.20 (0.49-2.94)	2.47 (0.74-8.29)	1.81 (0.99-3.23)
Palliative	--**	5.12 (0.55-47.90)	2.05 (0.77-7.34)
Gender (women)	--	--	3.17 (1.93-5.20)
Age	1.01 (0.98-1.04)	0.89 (0.83-0.95)	0.98 (0.95-1.01)
Unemployment			
Predictor	**Women**	**Men**	**Women and men**
Controls (SOEP)	1 (reference cat.)	1 (reference cat.)	1 (reference cat.)
Curative surgery*	1.27 (0.28-5.73)	0.93 (0.21-4.14)	1.06 (0.37-3.07)
Reparative	0.74 (0.25-2.14)	0.74 (0.25-2.14)	0.91 (0.51-1.60)
Palliative	---**	---**	---**
Gender (women)	--	--	0.67 (0.44-1.03)
Age	1.01 (0.97-1.05)	1.01 (0.97-1.05)	1.00 (0.98-1.02)

** Palliative and reparative operations were counted together

Table 3: Effects of functional status on chances of employment in women and men, odds ratios and 95% confidence intervals

Full- time employment			
Predictor	**Women**	**Men**	**Women and men**
Controls (SOEP)	1 (reference cat.)	1 (reference cat.)	1 (reference cat.)
NYHA I	0.86 (0.48-1.56)	0.60 (0.37-0.97)	0.70 (0.48- 1.00)
NYHA II	0.46 (0.22-0.96)	0.38 (0.19-0.76)	0.41 (0.26- 0.68)
NYHA III/ IV	0.76 (1.01-1.05)	0.03 (0.01-0.18)	0.19 (0.06-0.58)
Gender (women)	--	--	0.18 (0.14-0.23)
Age	1.03 (1.01-1.05)	1.19 (1.17-1.23)	1.10 (1.08-1.11)
Part- time employment			
Predictor	**Women**	**Men**	**Women and men**
Controls (SOEP)	1 (reference cat.)	1 (reference cat.)	1 (reference cat.)
NYHA I*	1.21 (0.53-2.80)	5.30 (1.81-15.49)	1.97 (1.05-3.71)
NYHA II*	1.73 (0.81-3.70)	4.64 (1.16-18.59)	2.06 (1.06-3.99)
NYHA III/ IV*	0.40 (0.05-3.21)	7.01 (0.79-61.77)	0.83 (0.18-3.85)
Gender (women)	--	--	9.57 (5.77-15.88)
Age	1.13 (1.10-1.17)	1.03 (0.97-1.09)	1.12 (1.09-1.15)
Minor employment			
Predictor	**Women**	**Men**	**Women and men**
Controls (SOEP)	1 (reference cat.)	1 (reference cat.)	1 (reference cat.)
NYHA I*	2.35 (0.84-6.59)	2.35 (0.50-11.54)	2.15 (1.19-3.89)
NYHA II*	1.47 (0.69-3.14)	2.72 (1.02-7.30)	1.81 (0.89-3.72)
NYHA III/ IV*	1.51 (0.34-6.76)	2.09 (0.54-8.14)	0.96 (0.13-7.34)
Gender (women)	--	--	3.17 (1.93-5.20)
Age	1.01 (0.98-1.04)	0.89 (0.82-0.95)	0.98 (0.95-1.01)
Unemployment			
Predictor	**Women**	**Men**	**Women and men**
Controls (SOEP)	1 (reference cat.)	1 (reference cat.)	1 (reference cat.)
NYHA I*	1.18 (0.39-3.52)	0.53 (0.20-1.38)	0.70 (0.33-1.44)
NYHA II*	0.55 (0.13-2.37)	1.79 (0.82-3.91)	1.27 (0.65-2.48)
NYHA III/ IV*	---***	---***	---***
Gender (women)	--	--	0.67 (0.44-1.02)
Age	1.01 (0.97-1.06)	0.99 (0.96-1.02)	1.00 (0.98-1.02)

*** NYHA II-IV were counted together

Table 4: Effects of patient/ non- patient status on chances of employment in women and men, odds ratios and 95% confidence intervals

Full- time employment			
Predictor	**Women**	**Men**	**Women and men**
Controls (SOEP) Patients	1 (reference cat.) 0.67 (0.43-1.06)	1 (reference cat.) 0.45 (0.30-0.68)	1 (reference cat.) 0.54 (0.40-0.72)
Gender (women)	--	--	0.18 (0.14-0.23)
Age	1.03 (1.01-1-05)	1.19 (1.16-1.22)	1.10 (1.08-1.12)
Part- time employment			
Predictor	**Women**	**Men**	**Women and men**
Controls (SOEP) Patients	1 (reference cat.) 1.29 (0.73-2.28)	1 (reference cat.) 5.23 (2.00-13.72)	1 (reference cat.) 1.84 (1.15-2.95)
Gender (women)	--	--	9.50 (5.73-15.72)
Age	1.14 (1.10-1.17)	1.12 (1.09-1.15)	1.11 (1.08-1.15)
Minor employment			
Predictor	**Women**	**Men**	**Women and men**
Controls (SOEP) Patients	1 (reference cat.) 1.66 (0.90-3.07)	1 (reference cat.) 2.48 (1.06-5.85)	1 (reference cat.) 1.93 (1.18-3.14)
Gender (women)	--	--	3.13 (1.91-5.13)
Age	1.01 (0.98-1.04)	0.88 (0.83-0.95)	0.98 (0.95-1.01)
Unemployment			
Predictor	**Women**	**Men**	**Women and men**
Controls (SOEP) Patients	1 (reference cat.) 0.85 (0.34-2.11)	1 (reference cat.) 0.97 (0.50-1.84)	1 (reference cat.) 1.18 (0.40-3.54)
Gender (women)	--	--	0.68 (0.44-1.03)
Age	1.01 (0.97-1.05)	0.98 (0.95-1.02)	1.00 (0.97-1.02)