Part 2

Explanatory factors

This part focuses on an original article, accepted for publication in a peer-reviewed journal, which explores whether socioeconomic disparities in different domains of functional status are explained by specific aspects of perceived control, such as mastery and self-efficacy.
Chapter 5

The mediating role of mastery and self-efficacy on the relationship between socioeconomic status and changes in functional status one year after the onset of coronary heart disease in older adults

Giorgio Barbareschi
Robbert Sanderman
Gertrudis I.J.M. Kempen
Adelita V. Ranchor

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Abstract

This study examines the mediating effect of perceived control in explaining the predictive role of socio-economic status (SES) in long-term changes in functional status as a consequence of the occurrence of coronary heart disease (CHD). The study employs a prospective design. 221 CHD older patients were followed using a community-based survey. Data on patients’ functional status were collected before the disease and 1 year after the diagnosis. Multiple linear regressions show that SES predicts functional changes only in relation to physical functioning. Furthermore, self-efficacy, but not mastery, mediates the predictive role of SES in changes in physical functioning in CHD patients. Self-efficacy is the only aspect of control which mediates the relation between SES and changes in physical functioning. Our findings provide a basis for future interventions in disadvantaged groups of older persons and new theoretical models of recovery processes.
**Introduction**

Coronary heart diseases (CHD) have a severe impact on well-being, functioning and quality of life (QoL) (Brown et al., 1999; Jaarsma et al., 1999; Mayou, Blackwood, Bryant, & Garnham, 1991; Roebuck, Furze, & Thompson, 2001; Torres et al., 2004; van Jaarsveld, Sanderman, Miedema, Ranchor, & Kempen, 2001). In particular, the functional status of aged patients may be affected after the emergence of CHD (de Leon et al., 1998; Kempen, Ormel, Brilman, & Relyveld, 1997; Stewart et al., 1989).

Socio-economic status (SES) has been found to be an important element for predicting changes in functional status in the long term after CHD. There is evidence that the SES of CHD patients has a substantial impact on the level of disability and changes in functional status up to one year after the diagnosis (Clarke, Frasure-Smith, Lesperance, & Bourassa, 2000; Ickovics, Viscoli, & Horwitz, 1997). However, the role of psychological and behavioural factors in this relationship is not completely clear (Koster et al., 2005; Koster et al., 2006).

There are indications that psychosocial resources, such as social support, optimism and perceived control, are involved in the relation between SES and health outcomes (Lachman & Weaver, 1998; Marmot, 2005; Mirowsky & Ross, 1998; Taylor & Seeman, 1999). In particular, low levels of perceived control are linked to higher risk of CHD (Bosma et al., 1997; Bosma, Stansfeld, & Marmot, 1998) and greater impairment in functional status (Seeman & Lewis, 1995). Furthermore, different aspects of perceived control seem to be implicated in individual changes in functional status during the course of CHD. For instance, both mastery and self-efficacy predicted physical decline in the short term after diagnosis (Kempen, Sanderman, Miedema, Meyboom-de Jong, & Ormel, 2000) and patients’ functional status 6 and 12 months after the incidence of CHD (Rankin, 2002; Sullivan, LaCroix, Russo, & Katon, 1998; van Jaarsveld, Ranchor, Sanderman, Ormel, & Kempen, 2005). As a consequence, one or more characteristics of perceived control might underlie the impact of SES on functional trajectories after CHD in older
persons (Taylor & Seeman, 1999). Mastery is a subjective aspect of control concerning the extent to which a person considers the events that occur in their life as being under their own control, as opposed to being fatalistic (Pearlin & Schooler, 1978). Mastery has been found to moderate chronically stressful features of the environment which have deleterious effects on self-regulatory activities. As a consequence, people high in mastery report more active self-regulatory behaviour, which is linked to better health outcomes (Pham, Taylor, & Seeman, 2001). Self-efficacy, in contrast, has been defined as an agent-means construct of control and represents a person’s conviction that outcomes can be influenced by his or her own behaviour, which can produce a determined response (Bandura, 1977; Skinner, 1996). Mastery and self-efficacy may both be important for adjustment to CHD, but they cover different aspects of perceived control. The main distinction between the two constructs is that mastery pertains to a general feeling of being in control of the personal forces that influence the direction of one’s life, while self-efficacy concerns the confidence people have in using specific skills in order to produce determined outcomes (Kempen et al., 2005). For example, a person with high mastery will be more likely to respond quickly and actively to any adversities, like a chronic condition, which could threaten her personal sense of control. On the other hand, a person with high self-efficacy would probably target specific aspects of the disease in which she knows she can obtain positive results (like exercising or changing eating habits in order to maintain a good physical condition). It is reasonable to expect that these constructs may have different impacts on the changes in functional status of aged CHD patients. Because self-efficacy has been found to be associated with health-improving behaviour like cessation of smoking (Meland, Maeland, & Laerum, 1999), adherence to medication (Gifford et al., 2000) and physical exercise (Lox & Freehill, 1999), it seems likely that in late adulthood self-efficacy has a bigger impact than mastery on physical health (Steunenberg, Beekman, Deeg, Bremmer, & Kerkhof, 2007).
The positive relation between SES and perceived control is documented in the literature (Boardman & Robert, 2000; Ross & Sastry, 1999). There are two main explanations for this association. 1) Individuals with high SES have access to a larger pool of resources, which results in a wider range of daily activities. Consequently, people with high SES are more likely to engage in activities which increase their sense of personal control (Hughes & Demo, 1989). 2) Social conflict and situational uncontrollability are more prevalent in a lower SES environment. Persons of lower SES are more exposed to uncontrollable situations or conflicting relationships, and consequently report a reduced level of perceived control (Taylor & Seeman, 1999).

Previous research has shown a positive effect of mastery and self-efficacy on functional status after the incidence of CHD (Kempen et al., 2000; Rankin, 2002; Sullivan et al., 1998). Therefore our hypothesis is that mastery and self-efficacy mediate the relation between SES and changes in functional status, providing independent contributions in specific domains (social, role and physical functioning). More specifically we expect that, in older adults, self-efficacy will have a greater role than mastery in mediating the relation between SES and changes in physical functioning. In the present study we will address this issue by applying a prospective design, including a pre-morbid measurement of functional status as a reference point for measuring the functional change in CHD patients.

**Method**

The present study is part of the Groningen Longitudinal Aging Study (GLAS). GLAS is a population-based prospective follow-up study of the determinants of health-related QoL of older people (Kempen et al., 1997).

This study was approved by the Medical Ethical Committee of the University Medical Center of Groningen.
Recruitment procedures

Available data for the present study have been collected and organised since 1993 (T0). A total of 5,279 persons 57 years and older were recruited to participate in the baseline assessment. Details of the sampling procedure and the representativeness of the sample are given in a previous study (Kempen, Jelicic, & Ormel, 1997). Participants in the baseline sample were monitored for selected disease episodes by their GPs. Between 1993 and 1998. Four weeks after the event, the patients were asked to participate in the follow-up assessment 12 months after the diagnosis.

Patients

During the enrolment period, n = 494 patients were recruited. Data for two types of CHD were collected: acute myocardial infarction and congestive heart failure, according to the criteria of the International Classification of Primary Care (Lamberts & Woods, 1987). An additional assessment, 2 months after the diagnosis, followed the baseline to measure the severity of disease of the patients. Of the 494 identified patients, 74 died shortly after the diagnosis and 199 either refused to participate, were already part of another cohort-study, died within 1 year of the diagnosis or did not respond. The remaining 221 CHD patients completed the follow-up and were included in the study. Participants (n = 221) were compared with non-participants (n = 273) at the pre-morbid stage. The two groups did not significantly differ for most of the measurements, except for the fact that participants were significantly younger (on average 72.0 years versus 74.7 years; F=14.1, p<0.001) and reported higher levels of social functioning (on average 74.4 versus 68.3; F=5.7, p<0.05).

Measures

Data at both measurement points were collected through semi-structured interviews and by means of self-report questionnaires.
Socio-economic status. We constructed a weighted sum index combining three major indicators of SES, namely educational level, income and occupational prestige.

Educational level was defined as the highest level of basic education attained by the patients with scores ranging from 1 (elementary school not completed) to 6 (higher education, second phase). The level of education of the patients was reported on the basis of the SOI-1978 (Standard Onderwijs Indeling) (1987), which is based on the International Standard Classification of Education - ISCED (Unesco, 1976).

Income of the patients was measured as their net monthly household income. Patients who were married or unmarried but living with a partner were asked to state the monthly after-tax income both for themselves and for their partner. This household income was converted to an individual level on a scale with six equivalent categories, ranging from euros 522 per month or less (category 1) up to euros 795 per month or more (category 6).

Occupational prestige was derived by coding the last profession attained by the patient according to the classification of the Dutch Central Bureau for Statistics (Centraal Bureau voor de Statistiek, 1984). These nominal codes correspond with the International Standard Classification of Occupations (ISCO) (International Labor Office, 1990). The occupational codes were converted into prestige scores with an interval level of measurement ranging from 0 to 100 (Sixma & Ultee, 1984). According to Dahl (Dahl, 1991), the SES of the male partner for married, divorced or widowed women is a more influential factor than the woman’s own occupational score when studying health issues among women. Therefore, we used the information on the male partner for female patients who were living with their partner or were widowed or divorced.

We performed a principal component analysis (unrotated) to determine whether the three indicators all loaded on one factor, which turned out to be the case. The factor loadings of the three variables were high and comparable: 0.82 for
educational level, 0.76 for income and 0.77 for occupational prestige. We then multiplied the score for each variable with its factor loading and summed them up to a weighted index for SES. Missing data for income (N = 26) and occupational prestige (N = 14) were replaced by the mean standardized income score or the mean standardized occupational prestige score calculated for participants with the corresponding value in educational level. The new variable ranged from -4.36 to 4.64. Because SES is preferentially treated as a categorical variable, we inspected the sample on the basis of educational level, income and job prestige below and above the cut-off point (−0.047) of the numerical variable. Of the patients below the cut-off point, 91% had a low educational level (from elementary school to vocational education, lower level), 64% had a small income (less than 658 euros per month) and 90.5% had low professional prestige (below 50 on the Sixma and Ultee scale). Conversely, 69% of those above the cut-off point had a high educational level (from advanced education, higher level to higher education second phase), 91% had a high income (more than 658 euros per month) and 63% had high job prestige (scoring more than 50 on the Sixma and Ultee scale). According to the description above, the median discriminates to a good approximation between patients of high and low education, income and job prestige. Therefore we used the median to recode the values of the numerical variable into low and high.

Mastery and self-efficacy. Both mastery and self-efficacy were measured during the baseline assessment. Pearlin and Schooler’s (1978) Mastery Scale was used to measure mastery, the extent to which people believe that their behaviour matters for the events that occur in their environment. Scores on this 7-item scale range from 7 (low mastery) to 35 (high mastery) (Cronbach’s alpha = 0.79 in GLAS baseline sample). One of the items is: “Sometimes I feel that I am being pushed around life”. General self-efficacy is the extent to which people believe that they can perform a certain behaviour, and was measured with Sherer’s General Self-Efficacy Scale (Sherer et al., 1982). Scores on this 16-item can range from 16 (low
self-efficacy) to 80 (high self-efficacy) (Cronbach’s alpha = 0.84 in GLAS baseline sample). One of the items is: “When trying to learn something new, I soon give up if I am not initially successful”. The psychometric properties of the Dutch versions of the mastery and self-efficacy scales were approved in previous studies (Kempen et al., 1999; Kempen, van Sonderen, & Ormel, 1999).

Functional status. The participants’ social, role and physical functioning were quantified using three subscales of the Medical Outcomes Study Short Form 20 (MOS SF-20) (Stewart, Hays, & Ware, 1988). The social functioning subscale measures the extent to which health interferes with normal social activities such as having contacts and visiting friends (1 item). The role functioning subscale measures the extent to which health interferes with usual daily activities such as housework or the professional job (2 items, Cronbach’s α = 0.87 in GLAS baseline sample). The physical functioning subscale provides a global indication of physical limitations in basic activities such as walking uphill or eating and dressing (6 items, Cronbach’s α = 0.79 in GLAS baseline sample). All three subscales range from 0 to 100, with higher scores indicating better functioning. The psychometric properties of the Dutch version of the MOS were approved in a previous study (Kempen, 1992).

Covariates. Gender, age, severity of the disease and comorbidity were found to be related to CHD outcomes in the present dataset and in other studies (Penninx et al., 2001; van Jaarsveld et al., 2005). Disease severity was assessed according to the New York Heart Association (NYHA) classification 2 months after diagnosis. The NYHA classification indicates the severity of cardiac symptoms by documenting the level of complaints of breathlessness in relation to physical activities. It ranges from I (mild symptoms) to IV (severe symptoms) (New York heart Association, 1964). Comorbidity was assessed at the baseline according to the number of chronic conditions using a self-reported questionnaire (van de Berg & van den Bos,
Participants were asked whether they had suffered from one or more of 19 chronic medical conditions in the 12 months prior to their baseline interview.

Statistical Analyses

Bivariate correlation analyses were performed to study associations between SES, mastery, self-efficacy, social, role and physical functioning (at the pre-morbid measurement and 1 year after the diagnosis), gender, age, severity of the disease and comorbidity. To examine whether mastery and self efficacy mediate the relation between SES and changes in functional status, multiple linear regression analyses were conducted to test each component of the model according to the recommendations of Baron & Kenny (Baron & Kenny, 1986). Changes in functional status were measured by introducing social, role or physical functioning at one year after the diagnosis as a dependent variable and adjusting for the corresponding variable at the pre-morbid measurement. First, we verified that the effect of the independent variable (SES) on the dependent variable (changes in functional status) was significant. Then we checked that the path from SES to perceived control and from perceived control to changes in functional status was also significant. Once all these conditions had been satisfied, we could then verify the mediating effect of perceived control on the relation between SES and changes in functional status (figure 1). If SES no longer has an effect on changes in functional status once perceived control has been added to the statistical model, complete mediation has occurred. Mastery and self-efficacy were entered in separate models as we intended to measure the independent contribution of the two constructs of perceived control. Finally, any eventual mediating effect of mastery and self-efficacy between SES and outcome variables was verified using the Airoian version of the Sobel test suggested by Baron and Kenny (1986). The Sobel equation (reported below) uses the unstandardized regression coefficient for the association between the independent variable and the mediator (a), the unstandardized regression coefficient for the association between the mediator and
**Figure 1.** Impact of SES on changes in functional status after CHD diagnosis. The mediation of mastery and self-efficacy.
the dependent variable, adjusted for the effect of the independent variable (b), and
their corresponding standard errors (s_b and s_e):
\[ z\text{-value} = \frac{a^b}{\sqrt{QRT(b^2s^2 + a^2s^2 + s^2a^2)}} \]

All the regression models were tested for multicollinearity to check that the
predictors were not too highly correlated with each other.

Results

Characteristics of the patients

Table 1 reports the characteristics of the participants. The total sample is almost
equally distributed across genders and SES groups, with an average age of 72
years. Regarding changes in functional status the patients reported more
decrement in role and physical functioning. A closer inspection of the two SES
groups shows a different composition with respect to gender: participants of the
low socio-economic group are predominantly women, while the high-SES group is
mostly composed of men. Furthermore, high SES individuals are better off in terms
of self-efficacy and suffered a smaller decline in role functioning.

Table 1. Demographic variables and characteristics of the sample

<table>
<thead>
<tr>
<th></th>
<th>Total 221</th>
<th>Low SES 119 (53.8%)</th>
<th>High SES 102 (46.2%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males N (%)</td>
<td>114 (51.6%)</td>
<td>48 (40.3%)</td>
<td>66 (64.7%)</td>
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<tr>
<td>Females N (%)</td>
<td>107 (48.4%)</td>
<td>71 (59.7%)</td>
<td>36 (35.3%)</td>
</tr>
<tr>
<td>Age, mean (SD)</td>
<td>72.0 (7.7)</td>
<td>72.9 (7.9)</td>
<td>71.0 (7.4)</td>
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<tr>
<td>Change in social functioning, mean (SD)</td>
<td>-10.6 (29.9)</td>
<td>-10.3 (32.8)</td>
<td>-11.0 (26.2)</td>
</tr>
<tr>
<td>Change in role functioning, mean (SD)</td>
<td>-20.2 (48.0)</td>
<td>-24.3 (47.5)</td>
<td>-15.3 (48.4)</td>
</tr>
<tr>
<td>Change in physical functioning, mean (SD)</td>
<td>-19.5 (26.1)</td>
<td>-20 (27.0)</td>
<td>-19.0 (25.1)</td>
</tr>
<tr>
<td>Comorbidity, mean (SD)</td>
<td>1.6 (1.4)</td>
<td>1.8 (1.5)</td>
<td>1.3 (1.3)</td>
</tr>
<tr>
<td>Severity of the disease NYHA class, mean (SD)</td>
<td>2.2 (1.0)</td>
<td>2.4 (1.0)</td>
<td>2.1 (1.0)</td>
</tr>
<tr>
<td>Mastery, mean (SD)</td>
<td>23.7 (4.8)</td>
<td>22.5 (4.5)</td>
<td>25.0 (4.9)</td>
</tr>
<tr>
<td>Self-efficacy, mean (SD)</td>
<td>58.2 (11.5)</td>
<td>54.9 (11.4)</td>
<td>62.1 (10.3)</td>
</tr>
</tbody>
</table>

Information over gender, age, comorbidity, mastery and self-efficacy were collected at the pre-morbid
assessment. Severity of the disease was measured at the moment of the diagnosis. Changes in social,
role and physical functioning were measured by difference scores between the second (one year after
the diagnosis) and first (pre-morbid) assessment.
Relationship between SES, perceived control, functional status and the covariates

The input for the regression model consisted of the correlation matrix presented in table 2. All the independent variables, including SES, mastery and self-efficacy, are significantly correlated with social functioning, role functioning and physical functioning 1 year after the diagnosis and with the pre-morbid levels of social and physical functioning. In contrast, SES and self-efficacy were not significantly correlated with pre-morbid role functioning. We found particularly strong positive correlations between pre-morbid social functioning, role functioning and physical functioning and their corresponding functioning 1 year after the diagnosis (0.43 ≤ r ≤ 0.60; p < 0.001), showing that the pre-morbid level of functioning might be the strongest predictor of the post-morbid outcome. Finally, both mastery (r = 0.25; p < 0.01) and self-efficacy (r = 0.31; p < 0.001) were both positively correlated with SES.

The contribution of mastery and self-efficacy as mediators in the relationship between SES and functional status

First, a series of regression analyses were performed to assess whether SES predicted changes in social, role and physical functioning once the other variables had been entered into the model. SES significantly predicted changes in physical functioning (β = 0.11, p < 0.05), but not in social or role functioning (table 3). Social and role functioning were therefore excluded from the following analyses.

In the second series of regressions, the mediating variables (mastery and self-efficacy) were separately regressed onto the independent variable (SES), demonstrating a significant effect of SES on both variables (table 4).

In the third series of regressions, the change in physical functioning was regressed onto the two mediating variables (mastery and self-efficacy) separately. A significant relationship was found only for self-efficacy (β = 0.12, p < 0.05) (table 5). We therefore excluded mastery from the following analysis, as it did not show any effect on the dependent variable.
Table 2. Correlations between SES, functional status, perceived control and covariates

<table>
<thead>
<tr>
<th></th>
<th>1.</th>
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<th>3.</th>
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<tbody>
<tr>
<td>1. Age</td>
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<td>2. Gender</td>
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<tr>
<td>3. Severity of the disease</td>
<td>0.21*</td>
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<tr>
<td>4. Comorbidity</td>
<td>0.10</td>
<td>0.16*</td>
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<tr>
<td>5. Pre-morbid social funct.</td>
<td>-0.22**</td>
<td>-0.30***</td>
<td>-0.27***</td>
<td>-0.40***</td>
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<tr>
<td>6. Pre-morbid role funct.</td>
<td>-0.21**</td>
<td>-0.23**</td>
<td>-0.26***</td>
<td>-0.35***</td>
<td></td>
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<tr>
<td>7. Pre-morbid physical funct.</td>
<td>-0.32***</td>
<td>-0.31***</td>
<td>-0.32***</td>
<td>-0.43***</td>
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<tr>
<td>8. Social funct. after 1 year</td>
<td>-0.34***</td>
<td>-0.34***</td>
<td>-0.35***</td>
<td>-0.36***</td>
<td>0.46***</td>
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<tr>
<td>9. Role funct. after 1 year</td>
<td>-0.32***</td>
<td>-0.34***</td>
<td>-0.30***</td>
<td>-0.28***</td>
<td></td>
<td>0.43***</td>
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<tr>
<td>10. Physical funct. after 1 year</td>
<td>-0.40***</td>
<td>-0.41***</td>
<td>-0.43***</td>
<td>-0.34***</td>
<td></td>
<td></td>
<td>0.60***</td>
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<tr>
<td>11. Mastery</td>
<td>-0.22**</td>
<td>-0.18**</td>
<td>-0.15*</td>
<td>-0.20**</td>
<td>0.42***</td>
<td>0.33***</td>
<td>0.33***</td>
<td>0.34***</td>
<td>0.29***</td>
<td>0.33***</td>
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<tr>
<td>12. Self-efficacy</td>
<td>-0.20**</td>
<td>-0.19*</td>
<td>-0.13</td>
<td>-0.10</td>
<td>0.26***</td>
<td>0.07</td>
<td>0.22**</td>
<td>0.25***</td>
<td>0.35***</td>
<td>0.32***</td>
<td>0.51***</td>
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<td>13. SES</td>
<td>-0.12</td>
<td>-0.24***</td>
<td>-0.15*</td>
<td>-0.17*</td>
<td>0.22***</td>
<td>0.14</td>
<td>0.31***</td>
<td>0.22**</td>
<td>0.27***</td>
<td>0.33***</td>
<td>0.25***</td>
<td>0.31***</td>
</tr>
</tbody>
</table>

*p<0.05; **p<0.01; ***p<0.001
Table 3. Regression analyses of SES on changes in functional status, including gender, age, severity of disease and comorbidity

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Social functioning 1 year after</th>
<th>Role functioning 1 year after</th>
<th>Physical functioning 1 year after</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B (SE) β R²</td>
<td>B (SE) β R²</td>
<td>B (SE) β R²</td>
</tr>
<tr>
<td>Gender</td>
<td>-7.49 (-0.13*)</td>
<td>-15.4 (-0.17**)</td>
<td>-9.75 (-0.17**)</td>
</tr>
<tr>
<td>Age</td>
<td>-0.85 -</td>
<td>-1.15 (-0.20**)</td>
<td>-0.83 (-0.22**)</td>
</tr>
<tr>
<td></td>
<td>(0.22) 0.23**</td>
<td>(0.35)</td>
<td>(0.19)</td>
</tr>
<tr>
<td>Severity of the disease</td>
<td>-5.72 -0.20**</td>
<td>-6.56 -0.15*</td>
<td>-7.23 -0.25**</td>
</tr>
<tr>
<td></td>
<td>(1.70)</td>
<td>(2.71)</td>
<td>(1.49)</td>
</tr>
<tr>
<td>Comorbidity</td>
<td>-2.98 -0.14*</td>
<td>-3.05 -0.01</td>
<td>-1.18 -0.06</td>
</tr>
<tr>
<td></td>
<td>(1.27)</td>
<td>(2.00)</td>
<td>(1.13)</td>
</tr>
<tr>
<td>Pre-morbid functioning</td>
<td>0.27 0.26**</td>
<td>0.25 0.25**</td>
<td>0.33 0.33***</td>
</tr>
<tr>
<td></td>
<td>(0.07)</td>
<td>(0.06)</td>
<td>(0.06)</td>
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<tr>
<td>SES</td>
<td>2.51 0.04 0.37</td>
<td>9.23 0.10 0.33</td>
<td>6.24 0.11 0.52</td>
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<td></td>
<td>(3.43)</td>
<td>(5.42)</td>
<td>(3.01)</td>
</tr>
</tbody>
</table>

*p<0.05; **p<0.01; ***p<0.001

Table 4. Regression analyses of SES on mastery and self-efficacy

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Mastery</th>
<th>Self-efficacy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B (SE) β R²</td>
<td>B (SE) β R²</td>
</tr>
<tr>
<td>SES</td>
<td>2.45 (0.64) 0.25*** 0.06</td>
<td>7.22 (1.49) 0.31*** 0.10</td>
</tr>
</tbody>
</table>

***p<0.001

Table 5. Regression analysis of mastery and self-efficacy on change in physical functioning, including gender, age, severity of disease and comorbidity

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Physical functioning after 1 year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B (SE) β R²</td>
</tr>
<tr>
<td>Gender</td>
<td>-11.14 (3.03) -0.19***</td>
</tr>
<tr>
<td>Age</td>
<td>-0.75 (0.20) -0.20***</td>
</tr>
<tr>
<td>Severity of the disease</td>
<td>-7.23 (1.50) -0.25***</td>
</tr>
<tr>
<td>Comorbidity</td>
<td>-1.17 (1.12) -0.06</td>
</tr>
<tr>
<td>Pre-morbid physical functioning</td>
<td>0.35 (0.06) 0.35***</td>
</tr>
<tr>
<td>Mastery</td>
<td>0.51 (0.31) 0.08 0.53</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>- -</td>
</tr>
</tbody>
</table>

*p<0.05; **p<0.01; ***p<0.001
Finally, we included both self-efficacy and physical functioning to determine whether the mediator explains the relationship (table 6). Inclusion of the self-efficacy variable caused a substantial decrease in the size of the effect of SES on the change in physical functioning, together with a loss of statistical significance. This result indicates a complete mediation of self-efficacy in the relationship between SES and the change in physical functioning. Together with the other covariates, self-efficacy and SES account for 55% of the explained variance in the present study. We checked this last result by performing a Sobel test, which confirmed the mediating effect of self-efficacy presented in the previous analysis ($Z = 1.99, p < 0.05$).

For all models, we checked the variance inflation factor (VIF) as an index of possible multicollinearity. The highest VIF value reported in the present study is 1.6, which indicates that the correlation between the predictor variables was not too high.

**Table 6.** Mediating effect of self-efficacy on the relationship between SES and change in physical functioning, including gender, age, severity of disease and comorbidity

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Physical functioning after 1 year</th>
<th>B (SE)</th>
<th>$\beta$</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td>-9.97 (3.04)</td>
<td>-0.17&quot;</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td>-0.74 (0.19)</td>
<td>-0.20***</td>
<td></td>
</tr>
<tr>
<td>Severity of the disease</td>
<td></td>
<td>-7.07 (1.48)</td>
<td>-0.25</td>
<td></td>
</tr>
<tr>
<td>Comorbidity</td>
<td></td>
<td>-1.10 (1.11)</td>
<td>-0.05</td>
<td></td>
</tr>
<tr>
<td>Pre-morbid level of functioning</td>
<td></td>
<td>0.34 (0.06)</td>
<td>0.34***</td>
<td></td>
</tr>
<tr>
<td>Self-efficacy</td>
<td></td>
<td>0.29 (0.13)</td>
<td>0.12*</td>
<td></td>
</tr>
<tr>
<td>SES</td>
<td></td>
<td>4.90 (3.05)</td>
<td>0.08</td>
<td>0.55</td>
</tr>
</tbody>
</table>

*p<0.05; **p<0.01; ***p<0.001
Discussion

This prospective study intended to investigate the mediating effect of mastery and self-efficacy in the relation between SES and functional status in middle-aged and older CHD patients. The results showed that self-efficacy, but not mastery, mediated the relation between SES and changes in physical functioning from the pre-morbid measurement to 1 year after diagnosis.

In the light of these results, we discuss three major issues. First, the mediating effect of self-efficacy was only found in relation to changes in physical functioning, not in social or role functioning. Table 2 reveals a stronger correlation between SES and physical functioning than between SES and any of the other dependent variables. It is already known that CHD has a particularly profound impact on physical functioning which is more extended than on any other domains of QoL (FaiIdde & Soto, 2006; van Jaarsveld et al., 2001). Moreover, it has been discussed that SES has a substantial influence on physical recovery (Clarke et al., 2000; Ickovics et al., 1997; Rankin, 2002). In conclusion, physical functioning is the element of functional status which is principally compromised by the impact of CHD and, at the same time, the domain which is more affected by differences in SES.

Second, the last part of our model investigated the mediating role of mastery and self-efficacy, taking into the account the previous prediction. The results showed that self-efficacy explained part of the relation between SES and the change in physical functioning 1 year after the diagnosis, while mastery did not. The influence of self-efficacy on physical functioning in the adaptation to CHD has already been shown in previous research (Arnold et al., 2005; van Jaarsveld et al., 2005). Hence the present results corroborate previous findings and show the importance of self-efficacy when we evaluate the impact of CHD by SES.

Third, the fact that only self-efficacy and not mastery showed a mediating effect in the relation between SES and changes in physical functioning needs some clarification. To do that, we should consider the specific attributes of the two
variables. As mentioned before, mastery can be considered a more comprehensive concept of control and may improve coping behaviours, resulting in beneficial coping with distress during the adjustment to CHD (Pearlin & Schooler, 1978; van Jaarsveld et al., 2005). On the other hand, self-efficacy is considered a cognitive control system which influences the likelihood of performing learned behaviours (Bandura, 1977; Bandura, 1982; Skinner, 1996). More specifically, it is related to the ability to anticipate and influence the outcomes of a familiar behaviour. Therefore, self-efficacy becomes particularly important for maintaining a good level of physical functioning after CHD, since it promotes and regulates recovery-related behaviours such as adherence to treatments, dieting and rehabilitative exercise (Bastone & Kerns, 1995; Jeng & Braun, 1997; Mccann et al., 1995). In short, mastery represents the perception of general control over the patient’s life, while self-efficacy is an aspect of perceived control which is regulated by the actual effectiveness of specific behaviours. In conclusion, CHD patients with high SES might be more confident of being able to accomplish specific tasks (i.e. have more self-efficacy) which ameliorate their physical condition in the long run.

Until now we have considered the different functional domains separately. It might be worthwhile to verify whether mastery and self efficacy have a mediating effect on functional status in general. To do so we performed a factor analysis, which revealed that the three functional domains could be combined in a single factor (functional status). We replicated the mediation analysis using functional status as the dependent variable. The new model showed that SES predicted change in functional status ($\beta = 0.10$, $p < 0.05$). Similarly to the previous results, self-efficacy ($\beta = 0.16$, $p < 0.01$), but not mastery, absorbed the effect of SES, providing a complete mediation effect. It is important to investigate the mediating effect of self-efficacy on functional status in general, but on the other hand to tailor future interventions it is essential to identify in detail the specific domain in which such mediation takes place.
Further discussion on the aging-related issues is necessary. Although there is
evidence pointing to a progressive decrease in perceived control in older age
groups over a long period of time (Mirowsky, 1995), we cannot generalize this
notion since there are contrasting opinions in relation to the specific facet of control
under consideration. For instance, mastery in older people is not simply
determined by the response to a current condition (such as CHD or functional
impairment), but is rooted in their early life perceptions and responses to
challenging events. Past circumstances forge older people’s understanding that
they, despite their present situation, are (or are not) in control of their own
trajectory in life. Such a general sense of control over life is typical of late
adulthood and is known as life-course mastery (Pearlin, Nguyen, Schieman, &
Milkie, 2007). Conversely, constructs of control related to specific domains, like
self-efficacy, are tied to the outcomes in specific areas, such as physical
functioning, and are more likely to follow the decline usually perceived in such
domains in later life (Lachman & Leff, 1989). The fact that changes in self-efficacy
and physical functioning are strongly interrelated, due to the aging process, could
partially explain why self-efficacy mediates the changes in physical functioning in
our sample.

There are three additional issues we would like to consider. First of all, the role of
covariates and the pre-morbid level of functioning. Despite the fact that in our
sample SES inequalities are more pronounced in relation to changes in role
functioning compared to physical functioning (table 1) such discrepancy was not
revealed by our analysis once we included the selected covariates (table 3). As
suggested by other research the confounding effect of age, gender, severity of the
disease and comorbidity have substantially contributed to these outcomes (van
Jaarsveld et al., 2002). Therefore we tested the effect of SES on changes in
functional status, excluding the confounders from the regression model. As a
result, in the unadjusted model, SES was a better predictor of differences in role
functioning ($\beta = 0.20$, $p < 0.01$) than in physical functioning ($\beta = 0.16$, $p < 0.01$). This
means that differences in age, gender, severity of the disease and comorbidity between the patients of the two socioeconomic groups are directly accountable for changes in role functioning rather than SES itself. Gender is particularly important in relation to incidence and mortality in CHD patients: men are more at risk of developing CHD (Weidner, 2000) and male CHD patients show worse survival rates than women (van Jaarsveld et al., 2006). Furthermore, in our sample there were considerably more women with low SES and fewer with high SES compared to men. The percentage of women and men in the sample of participants (table 1) is very close to that observed in the original sample of CHD patients at the time of the diagnosis (42.5% of men and 57.5% of women in the low SES group, 68.1% of men and 31.9% of women in the high SES group). As we can also see in table 2, there is a negative correlation between gender and SES (fewer women in the high SES group) and between gender and physical functioning (women are associated with lower physical functioning pre-morbidly and after the CHD). This picture suggests that, in the present sample, socioeconomic inequalities in physical functioning are more pronounced for women than for men. However, this observation remains speculative, since findings related to gender differences in SES health inequalities are still rather inconsistent and are likely to vary between different life stages (Matthews, Manor, & Power, 1999; Wu et al., 2003). In addition to gender, pre- and post-CHD levels of functioning were strongly associated, suggesting that the pre-morbid level has a large influence on functional trajectories after CHD has emerged. This is probably due to a cumulative effect: patients who were already more impaired in their functional status before the CHD event report an even more aggravated situation afterwards. Also concerning the other covariates included in our study, there are not enough evidences for conclusive explanations over the interrelation between SES and age or clinical variables (severity of disease and comorbidity) in CHD. More light should be shed on this topic in further study.
A second point regards the attrition of the original sample. In our analysis we were able to compare the patients who took part to the study with the ones who dropped-out along time. However the present dataset did not include any variable which allowed us to distinguish between subgroups of non-participants on the basis of the specific reasons for exclusion. Therefore we were not able to investigate more in detail differences in SES, perceived control or functional status among the patients who died between the first and second assessment, refused to participate to the follow-up or did not respond and the group of participants. Because high mortality rates, poor health, low perceived control and reduced participation to medical screenings are generally associated with low SES, future research on socioeconomic disparities in health should include a more comprehensive analysis of the role of these factors on the sample selection process.

Another issue concerns the interval between the baseline assessment and the diagnosis. A longer period of time between the diagnosis and the first assessment could result in a greater change in functional status in patients who entered the follow-up several months later than those who were registered shortly after the baseline. This is of particular concern in an older sample, where a decrease in functional status might be seen as a consequence of aging. However, we calculated the mean time between baseline and diagnosis for both socio-economic groups and found no statistically significant difference between them (25.5 months for the low SES group and 27.8 months for the high one).

To conclude, our prospective study demonstrates the existence of a positive relation between SES and physical functioning (i.e. lower SES implies worse functioning) 1 year after the incidence of CHD in late middle-aged and older adults. In addition, it shows that this relationship is mediated by a specific aspect of control, namely self-efficacy. The main strength of our study is the inclusion of a baseline measurement which took place before CHD emerged, which allowed us to consider the functional change in our sample to its full extent, as a comprehensive estimate of the consequences of the disease.
The results of the present study are potentially an important reference for caregivers, who intend to empower specific aspects of control, such as self-efficacy, in order to ameliorate the unfavourable situation of disadvantaged groups facing a CHD. Because self-efficacy is less strictly reliant than mastery on previous life experiences, it can be improved in order to promote a sense of control on specific domains among aged patients (Lachman, 2006).
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