The Impact of Psychological Attributes on Changes in Disability Among Low-Functioning Older Persons

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We studied the impact of four psychological attributes (neuroticism, extraversion, mastery or perceived control, and general self-efficacy expectancies) on changes in disability in a community-based sample of 575 low-functioning elderly persons between 1993 and 1995. Unlike elderly persons with low or medium levels of mastery and general self-efficacy expectancies, older persons with high levels of such attributes showed no significant increase of disability between 1993 and 1995. However, multivariate analyses showed only unique contributions of mastery to changes in disability. Neuroticism and extraversion were found to be not related to changes in disability, supporting previous research outcomes. Findings highlight that, particularly, feelings of perceived control are crucial for maintaining functional ability in later life.

Assessment of disability is of increasing interest to clinical workers and researchers in the field of aging. In the case of community-living elders, one central concern of research is to identify individuals who are most likely to lose functional abilities and the ability to lead an independent life in their day-to-day living environment (Katz, 1983; Laukkanen, Kauppinen, Era, & Heikkinen, 1993). Although the pace of disablement may be affected primarily by the aging process itself, other factors may speed up or retard the progression of disablement (Verbrugge, 1995; Verbrugge & Jette, 1994). In the present study, we examined the impact of four psychological attributes on subsequent changes of disability among low-functioning older community-living persons over a period of 2 years.

Associations between psychological attributes and functional ability can be explained in several ways. Previous studies, mainly based on the stress and coping paradigm (e.g., Lazarus & Folkman, 1984; Ormel, Stewart, & Sanderman, 1989; Parker, 1986; Pearlin, Lieberman, Menaghan, & Mullan, 1981) showed the importance of individual differences (neuroticism, mastery, self-efficacy expectancies) to health outcomes after stressful situations. Such psychological resources can be considered as indicators of psychological resilience and therefore as major features within the process of coping with health problems (Fleishman, 1984; McCrae & Costa, 1986). The stress and coping paradigm (Lazarus & Folkman, 1984) suggests that high levels of psychological resources may protect against progression of disability over time. Functional decline can be considered as a chronic stressor that may induce stress responses such as anxiety, depression, and demoralization. These responses, particularly depressive symptomatology, may result in higher levels of associated disability (e.g., Prince, Harwood, Blizard, Thomas, & Mann, 1997; Turner & Noh, 1988). Psychological resources may be helpful in reducing distress resulting from the increase in disability, which, in turn, may protect against further functional decline (Ormel et al., 1997).

Self-efficacy is a central concept in Bandura's social cognitive theory (Bandura, 1986). Self-efficacy expectancies refer to the belief that one can successfully perform intended behaviors. According to this theory, self-efficacy expectancies influence the likelihood that such behaviors will be undertaken. From this perspective, low self-efficacy expectancies may result in greater functional disability (Mendes de Leon, Seeman, Baker, Richardson, & Tinetti, 1996). Perceived control or mastery, a concept related to self-efficacy, which indicates the extent to which one regards one's life changes as being under one's control (in contrast to being factually ruled), is supposed to affect activity levels in daily life, which in turn influence health and functional ability (e.g., Baltes, Wahl, & Schmid-Furstoss, 1990; Menec & Chipperfield, 1997). Therefore, higher levels of mastery predict higher levels of functional ability.

Associations between psychological attributes (such as self-efficacy expectancies and mastery) on the one hand and self-management of disability on the other hand have been widely studied in patients suffering from rheumatoid arthritis (e.g., Krol et al., 1998; Schiaffino & Revenson, 1992; Schiaffino, Revenson, & Gibofsky, 1991; Tal, Rasker, Seydel, & Wiegman, 1993). Longitudinal studies in the area of aging research are scarce; a recent study, however, provided support for the buffering effect of ADL-related self-efficacy on functional decline in community-living elders (Mendes de Leon et al., 1996).

Several recent studies have observed cross-sectional associations between self-efficacy expectancies and physical functioning (Berkman et al., 1993; Kempen, Steverink, Ormel, & Deeg, 1996; Tinetti, Mendes de Leon, Doucette, & Baker, 1994) and between perceived control and physical functioning in older persons (Kempen, Steverink et al., 1996; Kempen, Van Heuvelen et al., 1996; Rodin, 1989). Recently, Femia, Zarit, and Johansson (1997) reported sig-
significant negative associations between mastery and subsequent levels of ADL dysfunction in elderly persons. Fear of falling in particular, which is quite common among older persons who have or have not experienced a fall, may result in lower levels of self-efficacy expectancies, and consequently in the avoidance of previously performed activities (Tinetti, Speechley, & Ginter, 1988; Walker & Howland, 1991). In addition, successful recovery and rehabilitation of older persons after, for example, a hip fracture seem to be related to perceived control (Furstenberg, 1988; Toby Brown & Furstenberg, 1992). Neither neuroticism nor extraversion was found to be related to levels of disability in older persons (Jorm et al., 1993; Kempen, Steverink, et al., 1996; Pearson, 1990), although Kempen, Van Heuvelen, and colleagues (1996) reported negative associations between neuroticism and levels of mobility.

In the present study we analyzed the impact of four psychological attributes (neuroticism, extraversion, mastery, and self-efficacy expectancies) on subsequent changes in disability among low-functioning, community-living older persons over a period of two years. We assumed that progression of disability is primarily associated with time covering changes in pathology, impairments, and functional limitations (Verbrugge, 1995; Verbrugge & Jette, 1994). However, we expected that psychological attributes would affect this progression of disability. More specifically, we hypothesized that low levels of neuroticism and high levels of extraversion, mastery, and self-efficacy expectancies would slow down the progression of disability. In order to test this hypothesis, we selected a low-functioning older sample, as changes in functional ability within a two-year interval are expected to show in moderately disabled elders in particular.

METHODS

Sample

The data were obtained from a subsample (n = 753) of the baseline participants (N = 5,279) in the Groningen Longitudinal Aging Study (GLAS) in 1993. This is a population-based prospective follow-up study of the determinants of health-related quality of life of elderly persons, with special emphasis on physical and social disability and well-being (Kempen, Jelicic, & Ormel, 1997; Kempen, Ormel, Brilman, & Relyveld, 1997; Ormel et al., 1997, 1998). The primary objective of GLAS is to identify the psychosocial factors that influence the trajectory of the quality of life, either independently or in combination with disease-related factors. The source population of GLAS is defined as people aged ≥ 57 years living either on their own or in adapted housing for elderly people in the north of The Netherlands in 1993. Research participants with severe cognitive impairments at baseline (MMSE < 17; Folstein, Folstein, & McHugh, 1975) were excluded (n = 78) from this group.

The subsample comprises 753 low-functioning elderly people (14.3%) having the lowest scores on the 6-item physical functioning scale of the Medical Outcomes Study (MOS) Short-form General Health Survey (SF-20; Stewart, Hays, & Ware, 1988). The selected persons reported four (35.9%), five (45.7%), or six (18.5%) physical limitations on this scale in 1993 indicating substantial levels of disability (Kempen, Steverink, et al., 1996). Examples of the questions that signal physical limitations are: “Has your health limited you in moderate activities, like moving a table, carrying groceries or bowling?,” “Walking uphill or climbing a few flights of stairs?,” “Bending, lifting or stooping?,” and “Walking one block?” Five hundred seventy-five persons (76.4%) participated in follow-up interviews in 1994 and 1995, one and two years after baseline. Attrition (n = 178) was due to mortality (n = 58), bad physical and/or mental health (n = 66), and refusal (n = 54).

The subsample consisted of 429 women (mean age = 72.9; range = 57–91; SD = 7.3 in 1993) and 146 men (mean age = 71.3; range = 57–93; SD = 8.6). Of all the research participants, 110 (19.1%) were younger than 65 years of age, and 219 persons (38.1%) were 75 years of age or older.

Measures

Disability in 1993, 1994, and 1995 was assessed with the Groningen Activity Restriction Scale (GARS; Kempen, Miedema, Ormel, & Molenaar, 1996). The GARS comprises 18 ADL/IADL items, each with four response categories. Scores may range from 18 (no disability) to 72 (maximum disability). Examples of the GARS items are: “Can you, fully independently, dress yourself?” “Can you stand up from sitting in a chair?” “Can you go up and down the stairs?” “Can you prepare dinner?” and “Can you make the beds?” The results of previous studies showed that GARS meets the stochastic cumulative scalability criteria of the Mokken Model (Kempen & Suurmeijer, 1990; Kempen, Miedema, et al., 1996). Changes in disability are expressed as individual differences between the 1993, 1994, and 1995 scores.

Four psychological attributes were measured in 1993: mastery or perceived control (Pearlin & Schooler, 1978), general self-efficacy expectancies (Bosscher, Laurijssen, & De Boer, 1992; Bosscher, Smit, & Kempen, 1997; Sherer et al., 1982), neuroticism and extraversion (both using subscales of the revised version of the Eysenck Personality Questionnaire [EPQ-R; Eysenck, Eysenck, & Barrett, 1985]). Mastery concerns the extent to which one regards one’s life changes as being under one’s control in contrast to being fatalistically ruled. Self-efficacy expectancies refer to the belief that one can successfully perform intended behaviors. Neuroticism (or emotional instability) is related to a constant preoccupation with things that might go wrong and a strong emotional reaction of anxiety to these thoughts. Extraversion refers to sociability, being easygoing, liking parties, having many friends, being talkative, and being optimistic. The selected psychological attributes are considered to be rather stable over time, particularly within a reasonably short interval of two years, although levels of mastery and self-efficacy expectancies may be susceptible to serious events or therapeutic interventions (Mendes de Leon et al., 1996; Rodin, 1986; Sanderman & Ranchor, 1994; Sherer et al., 1982). Higher scores on the four measures indicate higher levels of neuroticism, extraversion, mastery, and general self-efficacy expectancies, respectively. The descriptive...
Nonresponse Analysis

In our study we included only elderly persons with at least four physical limitations on the SF-20 physical functioning scale in 1993 (n = 753). As was mentioned before, 178 persons did not participate in the follow-up due to mortality (n = 58), very poor physical and/or mental health (n = 66), or refusal to participate (n = 54). Nonresponse analyses revealed that the 178 nonparticipants were significantly older (mean age of 72.5 years vs 75.2 years at baseline, p < .001), had significantly higher levels of disability in 1993 (37.2 vs 31.3; t test, p < .001), and reported significantly lower levels of mastery (20.5 vs 21.7, p < .01) and general self-efficacy expectancies (53.7 vs 56.3, p < .01) than those who participated in the follow-up. Participants and nonparticipants did not differ in levels of neuroticism or extraversion. Although attrition was clearly related to age and disability (as was expected), as well as to mastery levels and general self-efficacy expectancies, one can argue how this has affected the outcomes. However, an additional analysis (not presented in this article) showed that the baseline correlation coefficients between the selected variables (n = 575, see Table 2) were quite similar to those computed with the total sample of 1993 (n = 753).

Statistical Analysis

Bivariate associations between disability and psychological attributes were analyzed by means of correlation analysis. Changes in disability over time were studied in the total sample as well as for three levels (tertiles) of neuroticism, extraversion, mastery, and general self-efficacy expectancies by means of paired t tests. Differences in disability change over time between the three levels of psychological attributes while adjusting for 1993 levels of disability were tested with analysis of variance (ANOVA). Previous research identified age, gender, educational level, social support, number of chronic conditions, and cognitive status as predictors of functional status (e.g., Mendes de Leon et al., 1996). In addition, it was suggested that the association between perceived control and health status in older persons is mediated by exercising (Menec & Chipperfield, 1997). We assessed the amount of time spent on physical activities in 1993. An index was constructed to estimate the number of hours per month regularly spent on nine physical activities: swimming, playing tennis, gardening, bowling, dancing, shopping, walking, cycling, and gymnastics (Eijk, 1997; Kempen, Verbrugge, Merrill, & Ormel, in press). A correlation analysis revealed significant associations between level of physical activity in 1993 on the one hand and mastery (.137), general self-efficacy expectancies (.166), extraversion (.086), and level of disability in 1993 (.346) on the other hand (p < .05). However, with respect to increase in disability over two years' time we only found a significant positive association with age (r = .217, p < .001). Therefore, we included only age in our research—next to levels of disability in 1993—as covariate. All analyses were conducted with SPSS/PC+, version 5.0.2 (Norusis, 1992).

Results

The mean level of disability as assessed with GARS increased from 31.3 in 1993 to 32.1 in 1994 (t value -3.40, p < .001), and from 32.1 in 1994 to 33.3 in 1995 (t value -3.98, p < .001). Additional paired t tests showed no significant differences in the increase of GARS scores between the 1993–1994 and 1994–1995 intervals for the total sample (t value -0.9, p = .392), nor for the subsamples with respect to each level of the selected psychological attributes. The

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**Table 1. Baseline Characteristics of Study Sample (N = 575)**

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<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>Observed Range</th>
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<tr>
<td>Disability</td>
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<tr>
<td>GARS 1993 (baseline)</td>
<td>31.3</td>
<td>9.6</td>
<td>18-67</td>
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<tr>
<td>Psychological Attributes</td>
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<tr>
<td>Neuroticism</td>
<td>4.4</td>
<td>3.3</td>
<td>0-12</td>
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<td>Extraversion</td>
<td>6.2</td>
<td>3.0</td>
<td>0-12</td>
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<tr>
<td>Mastery</td>
<td>21.7</td>
<td>5.0</td>
<td>7-35</td>
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<tr>
<td>Self-efficacy expectancies</td>
<td>56.3</td>
<td>11.9</td>
<td>23-80</td>
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<tr>
<td>Sociodemographic</td>
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<tr>
<td>Age (yrs)</td>
<td>72.5</td>
<td>7.7</td>
<td>57-93</td>
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<td>Female (%)</td>
<td>74.6</td>
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**Table 2. Correlation Coefficients Between Disability Scores in 1993 and 1995, Psychological Attributes in 1993, and Age**

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<tr>
<td>1. GARS 1993</td>
<td>.742*</td>
<td>−.187*</td>
<td>−.040</td>
<td>−.069</td>
<td>−.253*</td>
<td>−.187*</td>
<td>.114*</td>
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<td>2. GARS 1995</td>
<td></td>
<td>.520*</td>
<td>−.053</td>
<td>−.089*</td>
<td>−.280*</td>
<td>−.234*</td>
<td>.247*</td>
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<tr>
<td>Psychological Attributes*</td>
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<td>4. Neuroticism</td>
<td></td>
<td></td>
<td>−.251*</td>
<td>−.388*</td>
<td>−.406*</td>
<td>−.101*</td>
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<tr>
<td>5. Extraversion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.259*</td>
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<tr>
<td>6. Mastery</td>
<td></td>
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<td></td>
<td></td>
<td>.489*</td>
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<td>7. Self-efficacy expectancies</td>
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<td></td>
<td>−.144*</td>
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<td>8. Age</td>
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*Higher scores indicate higher levels of disability and psychological attributes in 1993 and 1995. Higher scores for change reflect increase of disability.
*Higher scores indicate higher levels of neuroticism, extraversion, mastery, and self-efficacy expectancies; the original, continuous scores were used for computing correlations.
* p < .05.
level of disability in 1994 stayed in between the levels of 1993 and 1995. We may conclude that the increase of GARS scores can be considered linear across the three measurement waves. Therefore, we decided to include only the 1993 and 1995 disability scores in this report. Changes in disability reflect subtraction of 1993 levels from 1995 levels.

Table 2 shows the correlation coefficients between the levels of disability in 1993 and 1995, the changes in disability, the four psychological attributes (continuous scores were used), and age. As was expected, levels of disability in 1993 were strongly related to levels of disability in 1995 (.742).

Both mastery and general self-efficacy expectancies were significantly associated with levels of disability in 1993 and 1995 as well as with changes in disability over time. Neuroticism and extraversion were hardly related to disability.

Table 3 shows the disability levels in 1993 and 1995 for the total sample and for all three levels of the psychological attributes. The level of disability for the total sample increased significantly. The same holds when the levels of disability were examined for each of the three levels of neuroticism and extraversion. However, for the research participants who reported high levels of mastery or general self-efficacy expectancies in 1993, the level of disability did not increase significantly between 1993 and 1995.

Table 4 shows the mean differences in disability scores between 1993 and 1995 according to the three levels of psychological attributes. Both raw differences and differences adjusted for age and levels of disability in 1993 are shown. Research participants who reported high levels of mastery or general self-efficacy expectancies in 1993 had a significantly lower disability increase than participants who reported medium and low levels of mastery and self-efficacy expectancies. With respect to neuroticism and extraversion, no significant differences were found.
The results from Table 2 showed a significant association between mastery and general self-efficacy expectancies ($r = .489$). In order to analyze the independent associations between these variables and changes in disability, we repeated the analyses of Table 4 for both mastery and self-efficacy expectancies. This time, however, self-efficacy expectancies and mastery (next to age and level of disability in 1993) were included as covariates. The original, continuous mastery and general self-efficacy scores were used as covariates. With respect to mastery, the results still revealed a significant effect ($p < .01$); however, there were no significant effects with respect to self-efficacy expectancies ($p = .224$).

**DISCUSSION**

Our hypothesis that changes in disability over time among low-functioning older community-living persons depend on psychological attributes is partly supported by our findings. The results showed substantial effects of mastery. Low-functioning elderly persons who reported high levels of mastery at baseline showed no significant increase in disability over a period of two years. Because of the association between mastery and self-efficacy expectancies, the impact of the latter disappeared as the independent effects of both variables were examined together. We may conclude that mastery or perceived control influence trajectories of disability. General self-efficacy expectancies, neuroticism, and extraversion showed no significant independent contributions to changes in disability.

The levels of disability for the total sample increased during the two years of study. As we did not include a specific clinical population in our research, this increase may have resulted from various conditions. Some older persons may have experienced an acute event (such as a stroke or a hip fracture), whereas others may have developed a gradual decline in functional ability. As was pointed out by Mendes de Leon et al. (1996), there is reason to believe that high levels of self-efficacy expectancies (and also mastery) are beneficial for the maintenance of independence in ADL/IADL functions in both cases. The outcomes of our study among low-functioning community-living elderly adults are consistent with previous research results for self-efficacy expectancies (Mendes de Leon et al., 1996) as well as for mastery (Femia et al., 1997).

Self-efficacy has been primarily conceptualized as a situation- or domain-specific belief (Bandura, 1986). However, there is some evidence that the experience of personal mastery that contributes to self-efficacy expectancies generalizes to actions other than the target behavior only (Sherer et al., 1982). Therefore, Sherer and colleagues developed the general self-efficacy scale that was used in the present study. One can argue whether domain-specific measures such as ADL-related or fall-related efficacy (e.g., Mendes de Leon et al., 1996; Tinetti et al., 1994) may be stronger predictors of subsequent functioning than general self-efficacy expectancies. The concept of general self-efficacy may be particularly useful in comparing its predictive power on changes in different domains of disability (e.g., physical, social) or functional limitations (cognitive functioning, mobility, hearing, vision). The results from our study showed that the impact of general self-efficacy expectancies on changes in disability disappears when levels of mastery or perceived control are taken into account. We therefore conclude that mastery seems to be a stronger predictor of subsequent disability in low-functioning older community-living persons than general self-efficacy expectancies. This may partly result from the fact that feelings of mastery or personal control can be considered as more stable over time compared to general self-efficacy expectancies. In addition, both concepts are quite strongly interrelated ($r = .489$). Therefore, we may conclude that the univariate association between general self-efficacy expectancies and the increase in disability over time largely reflects the overlap between mastery and efficacy beliefs. The sense of control, or mastery, in particular seems to be helpful in reducing stress responses in case persons experience a decline in functional ability. We did not find any evidence for the mediating role of initial levels of activity as was suggested by Menec and Chipperfield (1997): Initial levels of activity were not related to subsequent changes in disability. The question whether the association between sense of control and changes in disability in elderly persons is mediated by change in activity level has to be left to future longitudinal studies, as this was not assessed in our study. The same holds for possible effects of changes of either mastery or self-efficacy expectancies on changes in disability.

We did not find any evidence for a significant impact of neuroticism and extraversion on changes in disability. In a recent cross-sectional study among older persons, Kempen, Jelicic, and Ormel (1997) found that neuroticism was much more strongly related to the affective domains of health (e.g., mental health) than mastery and self-efficacy expectancies. In contrast, mastery and self-efficacy expectancies were more strongly related to functional domains of health (e.g., physical functioning, role functioning). Future studies could analyze whether effects of neuroticism and extraversion may be particularly at work for subsequent levels of affective functioning.

For the present study, we selected only older adults with the lowest scores on the SF-20 physical functioning scale. However, our sample still showed substantial variations in levels of disability at baseline. It would be of interest to study whether psychological resources are still at work in protecting functional decline in higher functioning older adults. Future longitudinal analyses in healthy older samples are needed to evaluate this.

The correlations between the levels of disability in 1993 and 1995 clearly showed that subsequent levels of disability depend on initial levels of disability. In what way scores of changes with respect to initial levels should be analyzed is still being discussed (Plewis, 1985). We included initial levels of disability in the multivariate analysis of variance (see Table 4). However, additional ANOVAs (not presented in this article) excluding 1993 levels of disability yielded similar results as those shown in Table 4.

We may conclude that self-efficacy expectancies and mastery affect subsequent changes in disability in low-functioning older adults. As was pointed out by Menec and Chipperfield (1997) and Femia and colleagues (1997), our outcomes emphasize the role of control: Feelings of personal control in particular seem to be crucial for maintaining functional ability in later life.
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Nominations for Editors

Journal of Gerontology: Biological Sciences
Journal of Gerontology: Medical Sciences
Journal of Gerontology: Psychological Sciences

The Gerontological Society of America Publications Committee is seeking nominations for three new editors. The positions are Editor of the Journal of Gerontology: Biological Sciences; Editor of the Journal of Gerontology: Medical Sciences; and Editor of the Journal of Gerontology: Psychological Sciences.

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