Social Predictors of Recovery in Late Middle-Aged and Older Persons After Injury to the Extremities: A Prospective Study

Gertrudis I. J. M. Kempen, Winnie Scaf-Klomp, Adelita V. Ranchor, Robbert Sanderman, and Johan Ormel

1Department of Health Care Studies, Section of Medical Sociology, Maastricht University, The Netherlands.
2Northern Center for Healthcare Research and 3Department of Social Psychiatry, University of Groningen, The Netherlands.

Objectives. The impact of educational level and social support on short-term and long-term recovery of activities of daily living and instrumental activities of daily living after injuries to the extremities was examined in a prospective study concerning late middle-aged and older persons.

Methods. Patients (N = 171) who had sustained fall-related injuries (hip fractures, other fractures, or sprains and dislocations) participated in the study. Disability scores were collected at baseline (before the injury) and 8 weeks, 5 months, and 12 months after the injury. The authors used analysis of variance to assess possible differences between 3 levels of education and social support with respect to changes in disability scores from baseline to the 3 follow-up measurements while adjusting for covariates.

Results. Preinjury assessed educational level or social support did not play a role in short-term changes in disability. In the long term (5 and 12 months after the injury), recovery was significantly associated with social support: Those with higher levels of support had a better recovery. Although patients with high levels of education most closely approached their pre-event level of disability as well, differences did not reach statistical significance. Short-term changes in disability appeared to be determined by the severity of the injury. Social support began to influence recovery only when the impact of severity expired.

Discussion. Patients recovering from fall-related injuries who had reported high levels of social support before their injury had recovered better at 5 and 12 months. Encouragement and special attention given by health professionals to maintain social support may be beneficial for rehabilitation after fall-related injuries in older persons.
To date, little attention has been paid to the role of social factors such as socioeconomic status and social support in the process of recovery after fall-related injuries. The associations of social inequality with health status and functioning in elderly persons have been well documented in the international literature over the years (for a review, see e.g., Parker, Thorslund, & Lundberg, 1994). Previous studies showed that undesirable events and adverse experiences have stronger negative (emotional) consequences for persons holding lower socioeconomic status positions than for their higher status counterparts (e.g., Bebbington, Hurry, Tennant, & Der, 1986; McLeod & Kessler, 1990). These findings suggest a different vulnerability for low- and high-status persons. This different vulnerability may be explained by the fact that socioeconomic status shapes the conditions of how individuals cope with stressful situations (De Ridder, 1995). Rim (1990), for example, found substantial social class differences in coping styles, and Ranchor, Bouma, and Sanderman (1996) reported that socioeconomic status, in particular educational level, was significantly associated with a range of psychosocial characteristics including several aspects of personality (negative self-esteem, social desirability, hostility). These latter studies showed lower class participants in many respects to be at a disadvantage compared with higher class participants. Socioeconomic status may therefore be an important determinant of outcomes of health events.

Another factor that may play a role in the health of the patient concerns social support. There is some evidence that social support might affect recovery after hip fracture, although the reported results are equivocal. Magaziner and colleagues (1990) found that the number of contacts with members of the social network during the recovery process had a positive effect. No effect was found with respect to the presence of a spouse or the size of the social network. Cummings and colleagues (1988), however, did find an effect for the size of a patient’s social network. The underlying mechanism is not clear. One may argue that patients with more social contacts have a greater motivation to remain physically active and maintain their mobility and therefore put more effort into rehabilitation (Cummings et al., 1988). Conversely, patients with less social support may be forced to greater efforts to regain independence. With regard to other possible fall-related injuries than hip fractures, there is a complete lack of research.

In the present study we examined the role of two social factors in recovering ADLs and IADLs after injuries to the extremities related to a fall in older persons: socioeconomic status and social support. More specifically, we studied whether high levels of education and social support speed up the process of regaining preinjury levels of ADL and IADL functioning after a fall. We used a prospective design with a preinjury baseline wave including the assessment of ADL and IADL functioning, social support, and education and three postinjury waves assessing ADL and IADL functioning. We furthermore adjusted for four possible confounders measured at baseline: depressive symptoms, cognitive functioning, chronic medical morbidity, and age. In addition, we adjusted for the severity of the fall-related injury.

**METHODS**

**Data Source**

The persons evaluated in this study participated in the Groningen Longitudinal Aging Study (GLAS). GLAS is a population-based prospective and longitudinal study on the determinants of health-related quality of life of elderly people who live independently in the north of the Netherlands, either in the community or in sheltered accommodations. All patients aged 57 years and older from 27 general practices that were linked to a local morbidity registration network (99% of noninstitutionalized elderly persons in the Netherlands are registered in general practices) were eligible. In 1993, 5,279 participants completed baseline assessments (62% of the eligible population); 4,792 were interviewed at home and filled out a self-report questionnaire, and 487 answered a shorter version of the questionnaire by telephone. Participants were asked to give informed consent to be approached for follow-up studies arising from the baseline assessment and focusing on different health problems. Objectives, design, and matters of representativeness of GLAS have been described earlier (Kempen, Jelicic, & Ormel, 1997; Ormel et al., 1997, 1998).

For this cohort study, the general practitioners (GPs) reported patients who had sustained injuries to the extremities according to site as coded by the International Classification of Primary Care (ICPC; Lamberts & Wood, 1987). Patients who had completed the baseline assessment and had injuries according to ICPC Codes L72–L80 (hip fractures; fractures of wrist or forearm, ankle or lower leg, and hand or foot; and ankle sprains, knee sprains, or other sprains and dislocations) were included until December 31, 1997. Follow-up interviews were conducted 8 weeks after the injury (short-term impact) and 5 and 12 months after the injury (long-term recovery). The interviews were held by experienced middle-aged female interviewers at the respondents’ homes. The interviewers did not know the interviewees in either a clinical or an administrative aspect. At the start of the follow-up interviews, participants completed a shortened version of Folstein’s Mini-Mental State Examination (MMSE; Folstein, Folstein, & McHugh, 1975) so that we could evaluate respondents’ cognitive capacities for completing the assessment (threshold score = 4; Breakhus, Laake, & Engedaal, 1992). The psychometric properties of this Dutch version of the MMSE have been tested earlier (Kempen, Brilman, & Ormel, 1995). If patients were too ill to complete the assessment at follow-up, proxy interviews (with a maximum of one for each patient) regarding perceptible aspects of participants’ physical functioning were conducted with a well-informed person nearby.

**Measurement**

Disability in ADLs and IADLs was assessed at baseline (before the injury in 1993) and at the three follow-ups with the Groningen Activity Restriction Scale (GARS; Kempen, Miedema, Ormel, & Molenaar, 1996; Kempen & Suurmeijer, 1990). GARS was developed for assessment of disability in the domains of personal care and domestic activities. GARS comprises 18 items referring to both ADLs (personal care, 11 items) and IADLs (household chores, 7
The results of previous studies showed that the 18-item GARS meets the stochastic cumulative scalability criteria of the Mokken Model and can thus be considered one dimensional (for detailed information, see Kempen et al., 1996; Kempen & Suurmeijer, 1990). GARS scores range from 18 (no restriction) to 72 (maximum restriction). The internal reliability estimate in the present study was .91 (n = 171, see the Participants and Response section). Recovery was expressed as the difference between the GARS baseline score and one of the three postevent scores (the latter were subtracted from the first).

Level of education was selected as an indicator for socioeconomic status. Other common socioeconomic indicators such as income and occupational prestige are probably more strongly affected by health status in the course of life, particularly for elderly persons. Educational level refers to sociocultural rather than economic aspects of social status (such as income or occupation; De Ridder, 1995). Winkleby, Jatulis, Frank, and Fortmann (1992) found that education was the best socioeconomic predictor of health behavior, disease risk factors, and health. We assessed the level of education according to the International Standard Classification of Education (ISCED; UNESCO, 1976). The index distinguishes six levels of education: no (elementary) school, elementary school, vocational training, high school, undergraduate degree, and graduate degree. The level of education is based on both standard formal education (a very long time ago for most older persons) and vocational courses during adult life. We recorded both during the baseline interview and coded the one that was highest.

Social support interactions were measured at baseline with the 12-item Social Support List (SSL 12-I; Kempen & Van Eijk, 1995). It reflects the extent of perceived support received through interactions with members of a person's primary social network. Examples of the items are “Does it ever happen to you that people . . . drop in for a (pleasant) visit . . . comfort you . . . reassure you . . . emphasize your strong point?” Scores on this 12-item scale range from 12 to 48; higher scores indicate more social support. The internal reliability estimate in the present study was .82.

Two scoring methods were used in this study for both educational level and social support. The original scores of both variables were used for descriptive purposes. We used categorical scores with three levels for each of the two variables to study changes in disability in relation to the level of education or social support, respectively. No (elementary) school or elementary school was considered low, vocational training or high school was considered medium, and undergraduate or graduate degree was considered high. The scores for social support were recoded in tertiles of participants in the present study so that we could study changes in disability in relation to the level of social support: A sum score of 23 or lower was considered low, a sum score of 24–27 was considered medium, and a score of 28 or higher was considered high.

Baseline levels of depressive symptoms, cognitive functioning, chronic medical morbidity, disability, age, and severity of the injury were included as covariates because they were found to be related to recovery after hip fracture in previous studies (see introductory section). Depressive symptoms were assessed at baseline with the depression subscale of the Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983). The psychometric properties of the Dutch version have been described by Spinhoven and colleagues (1997). Items referring to symptoms that may have a physical cause (e.g., insomnia and weight loss) are not included in the scale. Therefore, HADS is considered to be unbiased by coexisting general medical conditions (Spinhoven et al., 1997). Examples of the items are “I still enjoy the things I used to enjoy,” “I can laugh and see the funny side of things,” “I feel cheerful,” and “I feel as if I am slowed down.” The theoretical score range of this seven-item scale varies from 0 to 21; higher scores indicate more symptoms. The internal reliability estimate in the present study was .79.

Cognitive functioning was assessed at baseline with the original Mini-Mental State Examination (MMSE; Folstein et al., 1975). The MMSE consists of 20 items concerning orientation in time and place, naming, repeating, reading, writing, copying, recall, short-term memory, spelling backwards, and performing a three-stage command. Scores range from 0 (severe cognitive impairment) to 30 (no cognitive impairment).

We use a checklist of 19 chronic medical conditions to assess chronic medical conditions at baseline: (a) asthma or chronic bronchitis, (b) pulmonary emphysema, (c) heart disease, (d) hypertension, (e) migraine or chronic headache, (f) consequences of stroke, (g) leg ulcer, (h) stomach ulcer, (i) rheumatoid arthritis, (j) (other) back problems or joint conditions, (k) diabetes mellitus, (l) liver disorder or gallstones, (m) prostate disease, (n) kidney disease, (o) thyroid gland disorder, (p) serious dermatological disorders like psoriasis and eczema, (q) cancer, (r) multiple sclerosis, and

### Table 1. Description of GARS Items and Response Options

<table>
<thead>
<tr>
<th>Can you fully, independently . . .</th>
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</thead>
<tbody>
<tr>
<td>• dress yourself</td>
</tr>
<tr>
<td>• get in and out of bed</td>
</tr>
<tr>
<td>• stand up from sitting in a chair</td>
</tr>
<tr>
<td>• wash your face and hands</td>
</tr>
<tr>
<td>• wash and dry your whole body</td>
</tr>
<tr>
<td>• get on and off the toilet</td>
</tr>
<tr>
<td>• feed yourself</td>
</tr>
<tr>
<td>• get around in the house (if necessary with a cane)</td>
</tr>
<tr>
<td>• go up and down the stairs</td>
</tr>
<tr>
<td>• walk outdoors (if necessary with a cane)</td>
</tr>
<tr>
<td>• take care of your feet and toenails</td>
</tr>
<tr>
<td>• prepare breakfast or lunch</td>
</tr>
<tr>
<td>• prepare dinner</td>
</tr>
<tr>
<td>• do “light” household activities (e.g., dusting and tidying up)</td>
</tr>
<tr>
<td>• do “heavy” household activities (e.g., mopping, cleaning the windows, and vacuuming)</td>
</tr>
<tr>
<td>• wash and iron your clothes</td>
</tr>
<tr>
<td>• make the beds</td>
</tr>
<tr>
<td>• do the shopping</td>
</tr>
</tbody>
</table>

**Answer options**

1. Yes, I can do it fully, independently without any difficulty.
2. Yes, I can do it fully, independently but with some difficulty.
3. Yes, I can do it fully, independently but with great difficulty.
4. No, I cannot do it independently; I can only do it with someone’s help.

*Note: GARS = Groningen Activity Restriction Scale.*
Parkinson’s disease or epilepsy. Participants were asked whether they had had a specific chronic medical condition in the 12 months prior to the interview. The same procedure is used by the Central Office for Statistics in the Netherlands in their periodic General Health Surveys. To reduce potential reporting bias by patients, we included only conditions for which a GP or specialist was consulted or for which medication was used in the 12 months prior to the interview. The number of chronic medical conditions was used as an index of chronic morbidity.

A three-level index of the severity of the injury was constructed on the basis of the ICPC codes used by the GPs. Hip fracture was considered most severe. The second level consisted of fractures other than hip fracture (fractures of wrist or forearm, ankle or lower leg, and hand or foot). The third level consisted of nonfracture injuries (ankle sprains, knee sprains, or other sprains and dislocations).

**Participants and Response**

During the inclusion period, GPs registered 287 patients who had sustained injuries to the extremities; patients were counted only once. Of these, 18 did not meet the inclusion criteria (short-version MMSE score < 5 [n = 2], or enrolled in another GLAS cohort [n = 16], 4 had died in the period between registration date and date of contact, and 5 people could not be located (number of eligible patients was 260). Another 59 patients refused to participate, 22 because they felt too ill and 37 for other reasons. We conducted proxy interviews (only at follow-up with a maximum of one for each patient) to determine the functional status of 10 patients who were hospitalized at the time of the assessment or felt too ill otherwise. Valid data were obtained from 201 patients (including the proxies) who participated in the first series of interviews (8 weeks postevent); of these, 186 participated in the second series (5 months postevent) and 181 in the third (12 months postevent). Attrition after the first series was caused by refusals to continue (n = 9), institutionalization (n = 1), and patients’ death before the assessment (n = 2); for 3 people attrition was not well documented. Attrition after the second assessment was caused by refusal (n = 1), poor health (n = 1), and patients’ death before the assessment (n = 3). Ten patients who participated in three follow-up assessments appeared to have completed the shorter telephone interviews at baseline, which did not include GARS (see the Data Source section). Only those patients with complete data for the dependent variable for all four measurements were included in the analyses (n = 171, response rate is 66% of 260 eligible patients; see above). The included patients sustained fractures of wrist or forearm (n = 44), fractures of ankle or lower leg (n = 14), fractures of hand or foot (n = 12), hip fractures (n = 34), other fractures (n = 32), ankle sprains (n = 14), knee sprains (n = 14), and other sprains and dislocations (n = 7). Of the 116 patients not in the study (including those who declined and those who did not meet the inclusion criteria), 12 (10.3%) sustained fractures of wrist or forearm, 5 (4.3%) of ankle or lower leg, 9 (7.8%) of hand or foot bones, 37 (31.9%) of the hip, 27 (23.3%) other fractures, 14 (12.1%) sprains of the knee, 7 (6.0%) sprains of the ankle, and 5 (4.3%) other sprains and dislocations.

**Analytical Strategy**

First, descriptive baseline statistics were computed for the participants (n = 171) and nonparticipants (n = 116) in the study; differences between both groups were tested with Student’s t test and chi-square. Second, mean levels of disability were estimated within the levels of education and social support for each observation period. We conducted paired t tests to test for significance in differences over time for each of the three levels. Finally, changes in GARS scores between baseline on the one hand and at 8 weeks, 5 months, and 12 months postevent on the other hand were computed for each of the three levels of education and social support. We used multivariate analysis of variance to assess possible differences between three levels of education and social support with respect to changes in disability scores from baseline to the three follow-up measurements while adjusting for the influence of the selected covariates (i.e., age, baseline levels of disability, depressive symptoms, cognitive functioning, chronic medical morbidity, and the severity of the injury). For all analyses, p < .05 was considered statistically significant.

**Results**

Table 2 shows the descriptive statistics for the study sample. The majority of patients were female; mean age of the patients was 70.3 years. At baseline, patients reported, on average, 1.3 chronic medical conditions; 28% of the patients reported no conditions, 36% reported one condition, 14%, and other sprains and dislocations.

![Table 2](https://example.com/table2.png)

*Higher sum scores indicate higher number of conditions and higher levels of depressive symptoms, cognitive functioning, education, social support, and disability.

*One sum score for depressive symptoms, 22 sum scores for cognitive functioning, 4 sum scores for social support, and 12 sum scores for disability were missing.

*Eight sum scores were missing for cognitive functioning, and 6 sum scores were missing for social support.

*p < .05, difference between responders and nonresponders.
23% reported two conditions, and 13% of the patients reported three or more conditions (data not shown). Nearly 20% of the patients sustained hip fractures, nearly 60% other fractures, and 20% sustained sprains (i.e., nonfractures). With respect to education, 46% of the patients reported a low educational level (i.e., no [elementary] school or just elementary school), another 46% reported a medium level (vocational training or high school), and 8% reported a high level of education (i.e., undergraduate or graduate degree). The percentages of low, medium, and high education in the total GLAS baseline sample (N = 5,279, data not shown) were 36%, 53%, and 11% and in the Dutch population of 55 years of age and older were 45%, 44%, and 11%, respectively (Central Office for Statistics, 1990). The percentages of low, medium, and high levels of social support in the GLAS baseline with the same cutoff scores as in the present sample were 34%, 34%, and 32%, respectively. There were significant differences between patients who participated in the study (n = 171) and those who did not (n = 116) with respect to age, severity of the injury, and disability at baseline: Nonparticipating patients were older, sustained more hip fractures, and reported higher levels of disability at baseline than participating patients. Other differences were not significant.

Table 3 shows the GARS mean scores and standard deviations for disability at baseline, at 8 weeks postevent, and at 5 and 12 months postevent according to three levels of education and social support and for the total sample. These results are graphically depicted in Figures 1 and 2. Generally, disability was highest for patients with a low level of education or low level of social support and lowest for those with a high level of education or a high level of social support at all measurements periods; one exception is the difference in disability at baseline for patients with medium and high levels of education. The results of the paired t tests indicated that—irrespective of level of education or social support—patients generally did not regain their pre-event levels of ability. For the total sample, the GARS score increased significantly from 23.0 at baseline to 34.2 at 8 weeks postevent; the differences between the GARS baseline score (23.0) and the scores at 5 months (28.6) and 12 months (29.0) remained statistically significant. The same holds for the differences for each of the three levels of education and social support, respectively, except for the difference between baseline and the 8-week postevent disability score for patients with a high level of education. Eleven of the 171 patients (6%) reported a higher level of ability at 8 weeks compared with baseline, 20 patients (12%) reported the same level, and another 140 (82%) reported a higher level of disability at 8 weeks compared with baseline. After 1 year, these percentages were 5%, 24%, and 71%, respectively (data not shown).

Table 4 shows the changes in disability between baseline and 8 weeks postevent, 5 months postevent, and 12 months postevent for each of the three levels of education and social support and for the total sample. Patients with high levels of either education or social support most closely approached their pre-event level of disability. However, for education the impact did not have statistical significance. However, pre-event assessed level of social support influenced recovery at 5 and 12 months postevent significantly. The results indicate that social support influenced recovery only in the longer run.

In addition (data not shown), the changes in GARS scores between baseline and the three follow-ups were also significant for the patients within the three injury groups: 18.7 (from baseline to 8 weeks postevent), 8.3 (from baseline to 5 months postevent), and 8.8 (from baseline to 12 months postevent) for patients with hip fractures (n = 34); 10.3, 5.1,
and 5.8 for patients sustaining other fractures (n = 102); and 6.7, 4.7, and 4.1 for patients sustaining nonfacture injuries (n = 35), respectively (paired t test, p < .05). Figure 3 presents the GARS scores according to the three injury groups.

The multivariate models of Table 4 included—besides social support or level of education—the covariates age, baseline levels of disability, depressive symptoms, number of chronic medical conditions, cognitive functioning, and severity of the injury. These results showed (data not shown) that younger age was significantly associated with recovery at 5 and 12 months but not with short-term changes in disability. Severity of the injury was significantly related to short-term changes only. The associations of all other covariates with recovery were not significant.

**Discussion**

In this prospective study we analyzed the impact of education and social support on short-term and long-term recovery in ADLs and IADLs after injuries on the extremities in late middle-aged and older persons. We adjusted for pre-injury levels of ADL and IADLs, depressive symptoms, cognitive functioning, chronic medical morbidity, age, and severity of the injury. Several conclusions can be drawn.

First, short-term changes are not influenced by either pre-event assessed educational level or social support. Second, long-term recovery (5 and 12 months after the injury) is significantly associated with social support; recovery is not significantly associated with level of education. Generally, patients with high levels of either education or social support most closely approach their pre-event level of disability. Third, the short-term changes in disability appear to be determined by the severity of the injury; social support only begins to influence recovery when the impact of severity has expired. Age (which may generally represent the amount of physiological reserve) also seems to have an influence in the longer run (i.e., at 5 and 12 months postevent). Fourth, patients generally do not regain their pre-event levels of functioning. This holds for patients with different levels of education and different levels of social support, as well as for patients with different severity of injury (i.e., hip fractures, other fractures, and nonfractures).

The results of our study support the outcomes of Cummings and colleagues (1988), who reported that hip fracture patients with more social support had more complete recovery of their prefracture level of functioning. Magaziner and colleagues (1990) also found that the amount of patients’ phone contacts with social network members 2 months after their hip fracture influenced their 1-year recovery. However, Mossey and colleagues (1989) did not find any significant associations between social support and recovery. None of these studies actually measured the level of disability as well as predictors before the injury, and they included only hip fracture patients. Our prospective study shows evidence that the role of social support in recovery also holds for patients who sustain other fall-related injuries than hip fracture. We find some evidence that educational level plays a role in functional recovery after fall-related injuries even after adjusting for the influences of several covariates; however, the associations do not reach statistical significance. We find no substantial evidence for the hypothesis of differential vulnerability. The findings of our study point to the importance of social factors—particularly social support—for recovery.

Our prospective study includes patients with fall-related injuries to the extremities that occurred after the GLAS baseline assessment in 1993. The strength of this approach is that we assessed social support, education, disability, and the selected covariates at baseline before the injury occurred. However, this approach also has several limitations. The time interval between the start of the study (baseline in 1993) and the fall-related injuries varies from 1 month to 57 months (M = 23.9; SD = 16.1). Health status and social support may have changed during the interval. However, the correlation coefficients between the length of the time

### Table 4. Mean Scores and Standard Deviations for Change in Disability aBetween Baseline and 8 Weeks and 5 and 12 Months Postevent According to Three Levels of Education and Social Support and for Total Study Sample

<table>
<thead>
<tr>
<th></th>
<th>Baseline and 8 Weeks Postevent</th>
<th>Baseline and 5 Months Postevent</th>
<th>Baseline and 12 Months Postevent</th>
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<tbody>
<tr>
<td></td>
<td>n M SD</td>
<td>n M SD</td>
<td>n M SD</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>79 11.7 10.2</td>
<td>5.5 7.5</td>
<td>5.5 8.4</td>
</tr>
<tr>
<td>Medium</td>
<td>79 11.5 10.3</td>
<td>6.3 7.8</td>
<td>7.2 9.8</td>
</tr>
<tr>
<td>High</td>
<td>13 7.0 12.4</td>
<td>3.0 3.8</td>
<td>2.3 3.6</td>
</tr>
<tr>
<td>F testb</td>
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<tr>
<td>Social Support</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>55 12.5 8.7</td>
<td>7.3 7.8</td>
<td>7.7 10.2</td>
</tr>
<tr>
<td>Medium</td>
<td>54 11.7 10.7</td>
<td>6.4 8.1</td>
<td>7.4 9.3</td>
</tr>
<tr>
<td>High</td>
<td>56 9.8 11.7</td>
<td>3.6 5.8</td>
<td>3.3 6.4</td>
</tr>
<tr>
<td>F testc</td>
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</tr>
<tr>
<td>Total sample</td>
<td>171 11.3 10.4</td>
<td>5.7 7.4</td>
<td>6.0 8.9</td>
</tr>
</tbody>
</table>

*aHigher scores indicate higher levels of disability at follow up compared with baseline.

*bAnalysis of variance, adjusted for age and baseline levels of disability, depressive symptoms, social support (range score), number of chronic medical conditions, cognitive functioning, and severity of injury. Raw mean scores are presented.

*cAnalysis of variance, adjusted for age and baseline levels of disability, depressive symptoms, education (range score), number of chronic medical conditions, cognitive functioning, and severity of injury. Raw mean scores are presented.
interval and the changes in disability between the baseline and the follow-ups in the patient sample are \(-0.02, -0.04,\) and \(0.07,\) respectively \((n.s.)\). In addition, the outcomes of Table 4 hardly change when the time of the interval is included as a covariate in the multivariate models. We therefore assume that the variation in the interval from baseline to injury did not substantially affect the outcomes of the study. Next, 116 patients who had sustained fall-related injuries according to their GP did not participate in the study (response rate 60%). Nonparticipants were older and reported higher levels of disability at baseline (age and disability were significantly related). In addition, the group of nonparticipants had a higher proportion of patients who sustained hip fractures compared with participants. Furthermore, 38% of the eligible source population at baseline did not participate in GLAS. Nonparticipants at baseline were older compared with participants. Computerized health care utilization records were available for 55% of the GLAS source population. Comparing these records for baseline participants and nonparticipants (on group level) suggests relatively high nonresponse in four groups of persons (Ormel et al., 1997): those with advanced malignant neoplasms, those with significant cardiac surgery, those with a history of suicide attempt, and those who had not consulted their GP in the past 12 months. This suggests elevated nonresponse in the very sick (life-threatening disease, severe depression) and the very healthy. These results may have induced selection bias stemming from the nonresponse at different observation periods. Although attrition in aging studies may complicate the interpretation of descriptive outcomes, the impact of attrition seems to be less of a problem when associations between variables are analyzed. However, the selective response with respect to age, baseline disability, and the severity of the injury may have affected our outcomes. A last remark refers to the relatively low number of patients with a high level of education \((n = 13)\). We conducted an additional analysis with just two levels of education: no (elementary) education, elementary education, or vocational training \((n = 120)\) versus high school, undergraduate degree, or graduate degree \((n = 51)\). The previous results were supported by this analysis: We found no significant effects of education on recovery.

In conclusion, we find that patients recovering from fall-related injuries who report high levels of social supports before their injury have a better recovery than those patients with low and medium levels of social support recover less well. One could argue that patients with more social contacts might have a greater motivation to remain physically active and maintain their mobility and therefore put more effort into rehabilitation. However, this underlying mechanism is not clear. Although patients with high levels of education most closely approach their pre-event level of disability as well, differences do not reach statistical significance. Additional studies to elaborate these mechanisms in more detail and to obtain more knowledge about how social support and educational level of patients could be incorporated in rehabilitation programs are needed. In any case, encouragement and special attention by health professionals to low- and medium-educated older patients to maintain social support after fall-related injuries may be beneficial to these patients’ rehabilitation.

ACKNOWLEDGMENTS

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Address correspondence to G. I. J. M. Kempen, PhD, Department of Health Care Studies, Section of Medical Sociology, Maastricht University, P.O. Box 616, 6200 MD Maastricht, the Netherlands. E-mail: G.Kempen@zw.unimaas.nl

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