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Disablement process and the utilization of home care among non-institutionalized elderly people: contrasting results between cross-sectional and panel data

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Abstract

Purpose: In this article we studied the role of disablement process variables in home care utilization in a cross-sectional and in a panel approach among low-functioning community dwelling elderly people.
Methods: We analysed data from a prospective follow-up study in The Netherlands ($n = 555$) and used three outcome variables: professional home care (yes or no) measured in the same year as the process variables (cross-sectional approach), professional home care (yes or no) also after 2 years (panel-approach: no change) and the new users of professional home care 2 years later (panel-approach: change). Process variables were categorized as pathology, functional limitations, disability, risk factors and psychosocial attributes.
Results: Trajectories of home care utilization can be divided into an unchanging part and a changing part. Both parts are not predicted by the same process variables. For instance disability did not predict the new users of professional home care 2 years later, but correlated strongly with the stable users. The changing part was predicted by the beginning of the process of disablement (i.e. pathology). In addition, far most predictors could be considered as additive in stead of interactive.
Conclusions: It is important to take into consideration the design of the investigation in studying the disablement process: cross-sectional data and panel data provide different results.

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Purpose

Verbrugge and Jette's Disablement Process Model in explaining trajectories of disability refer to a process.[1, 2] The model describes a causal path of how chronic and acute conditions (pathology) affect symptoms and functions in specific body/mind systems (impairments). The impairments prompt problems in performing basic physical and mental actions (functional limitations, indicating dysfunction independent from the social context) and eventually cause difficulties in performing activities of daily living and social roles (i.e. physical and social disability). In addition, the Disablement Process describes risk factors (such as predisposing socio-demographics) and extra- and intra-individual factors that speed up or slow down the process of disablement. Extra-individual factors refer to medical care, medication, external supports and physical and social environment. Intra-individual factors refer to lifestyle, behavioural changes and psychosocal attributes. The model is based on prior conceptual schemes of the WHO and Nagi.[3–5] One of the suggested outcomes of the Disablement Process Model refer to health care utilization.[1]

Previous studies on the identification of explaining factors of professional home care utilization were often not tested longitudinally but cross-sectionally. After the presentation of research results in a cross-sectional or retrospective design, many researchers mentioned the need for longitudinal research in the future.[6–9] However, one can argue about the surplus value of longitudinal

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study designs. Which additional information do they provide? Cross-sectional research shows the *outcome* of the process but the independent and outcome variables are assessed at the same moment. But in a time process the outcome will occur at a later moment, dependent on the impact of the risk and other factors and their position in the process. Therefore part of the established empirical knowledge derived from cross-sectional analyses could be misleading.

Fifty years ago Haavelmo[10] already stated for econometrics that results from cross-sectional and time-series studies are incomparable. Especially in the case of synchronous analysis the sequence of acquisition is not observed but inferred since the individuals have only been tested once.[11–13] Nesselroade and Featherman[14] write about the lush jungle of intra-individual variability and inter-individual differences.

A systematic study of the differences in outcome between cross-sectional (inter-individual differences) and panel research (intra-individual change and stability) is a first step in detecting the usefulness of both designs for the study of the role of disablement in care utilization of the elderly. Up until now, this has not been done. The outcomes of such comparison may help to understand the role of disablement (and its different components) in the utilization of professional home care. From practical point of view, this kind of knowledge may help to develop specific interventions to reduce the amount of home care used by elderly persons.

In the present study we use the Disablement Process Model as the starting point to select a number of relevant variables and expand the model to the utilization of professional home care among low-functioning community-dwelling older persons. An adapted version of this model including the indicators within the domains as used in this study is shown in figure 1. The arrows 1, 2 and 3 reproduce the path from pathology, functional limitations and disability to professional home care.

The double-headed arrows address different questions. Theoretically, there are (besides non-linearity) two different roles for the risk factors and the psychosocial attributes in the process of disablement. First, we mention the role of an additive effect. For instance, independent of their disabilities older people (the risk factor age) get more professional home care. Second, there is the role of a non-additive effect or interaction. For instance, the association between disability and professional home care is expected to be stronger for the elderly without informal help (a psychosocial attribute). Furthermore, predictors of stable home care utilization may be distinguished from predictors of change in home care utilization. The selected psychosocial attributes refer to extra-individual (informal help, range of social network) as well as intra-individual factors (self-efficacy expectations and mastery).

RESEARCH QUESTION

The variation in the values of the variables in a process model has two components: stability and

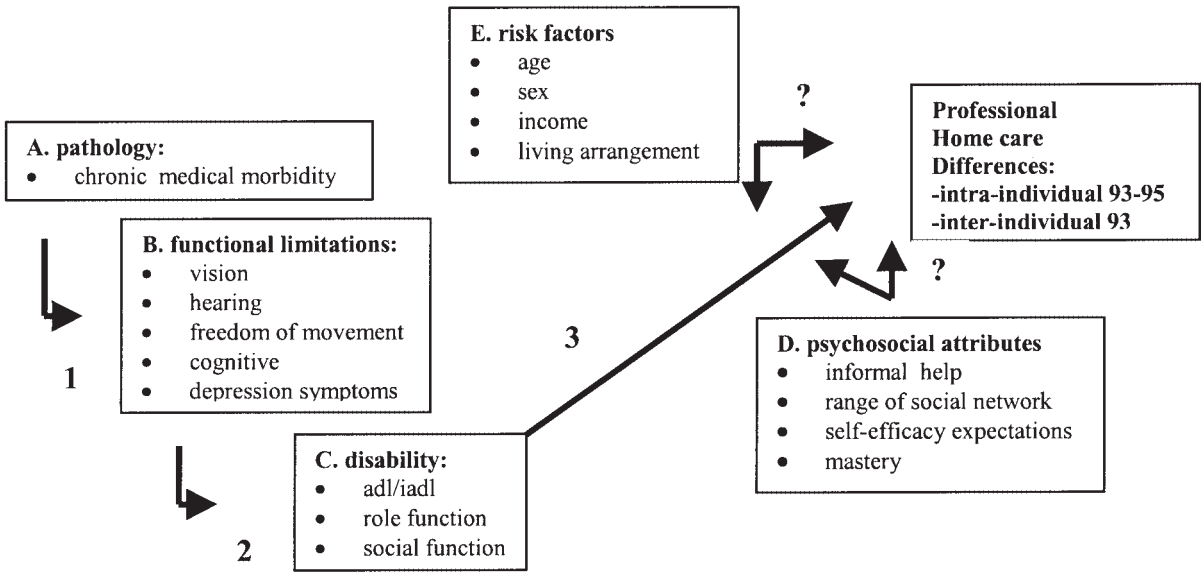

Figure 1 The disablement process of the elderly, adapted from Verbrugge and Jette.[1,2]

change. Therefore we split up the factors of the process model affecting change and those affecting stability in home care utilization. We expect that variables (disability) that immediately precede home care utilization are particularly important in predicting stable home care utilization over time while variables at the beginning of the chain more specifically predict change. For instance, we expect that higher levels of medical morbidity will reflect home care utilization in the future (due to the *process* of disablement), while disability and professional home care utilization are tied close together and reflect stability. The specific research question is: which differences exist between predictors of change, predictors of stability and cross-sectional predictors of home care utilization among older persons?

Methods

SAMPLE

The data were obtained from a sub-sample (14%) of the baseline participants ($n = 5279$) 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 community-dwelling older people, with special emphasis on physical and social disability and well being. Objectives, design and matters of representativeness of GLAS have been described earlier.[15–22] The sub-sample in this study comprises 753 elderly people with the lowest scores on the 6-item physical function scale of the MOS Short-form General Health Survey (SF-20).[23] At baseline four physical limitations were reported by 36% of our respondents, five by 46% and six by 19%, indicating substantial levels of disability.[16] Five hundred and seventy-five persons (76%) participated in follow-up interviews in 1995, 2 years after baseline. Attrition ($n = 178$) was due to mortality ($n = 58$), self-reported bad physical and/or mental health ($n = 66$) and refusal ($n = 54$). The sub-sample in the present study consisted of 429 females (mean age: 73; range: 57–91; SD: 7.3 in 1993) and 146 males (mean age: 71; range: 57–93; SD: 8.6). Because of missing data, another 20 participants were excluded from the analyses. Data were collected by means of face-to-face in-home interviews. The interviewers were well-trained and middle aged.

MEASURES

Pathology, functional limitations, disability and psychosocial and risk factors of disablement were assessed in 1993.

Pathology

A checklist of 19 chronic medical conditions was used to construct an index reflecting the number of chronic medical conditions (block A in figure 1).[24] At baseline, participants were asked whether they had had a specific chronic medical condition in the 12 months prior to the interview. We used asthma/chronic bronchitis, other lung diseases (pulmonary emphysema), heart condition, hypertension, consequences of stroke, diabetes mellitus, back problems lasting at least 3 months or slipped disc, rheumatoid arthritis or other joint complaints, migraine/chronic headache, serious dermatological disorders such as psoriasis and eczema, kidney disease, cancer, thyroid gland disorder, stomach ulcer, multiple sclerosis, other diseases of the nervous system such as Parkinson's disease or epilepsy, liver disease or gallstones, prostate disease and leg ulcer. In theory, scores on the index can range from 0 (no conditions) to 19 (all conditions).

Functional limitations

Five domains of functional limitations were assessed at baseline: vision loss, hearing loss, freedom of movement/mobility, cognitive limitations and depression symptoms (block B in figure 1). Vision loss, hearing loss and freedom of movement were assessed with an indicator proposed by the Organization for Economic Co-operation and Development (OECD).[25, 26] Higher scores indicate poorer function. Depression symptoms were assessed with the Hospital Anxiety and Depression Scale HADS.[27, 28] Cognitive limitations were assessed with the 12-item version of the Mini-Mental State Exam MMSE.[29, 30] The 12 items of this shortened version refer to: ... year ... month ... date ... day of the week ... county ... postal code of address ... backward spelling ... recall ...repeat of sentence ... three stage command ... write a sentence ... copy design. Higher scores indicate more symptoms, i.e. poorer function.

Disability

Three measures for disability (block C) were assessed at baseline: (Instrumental) Activities of Daily Living (ADL/IADL), role function and social function. ADL/IADL were assessed with the Groningen Activity Restriction Scale (GARS).[15] The GARS comprises 18 items: Can you, fully independently ... dress yourself ... get in and out of bed ... stand up from sitting in a chair ... wash your face and hands ... wash and dry your whole body ... get on and off the toilet ... feed

yourself ... get around in the house (if necessary with a cane) ... go up and down the stairs ... walk outdoors (if necessary with a cane) ... take care of your feet and toenails ... prepare breakfast or lunch ... prepare dinner ... do 'light' household activities (for example dusting and tidying up) ... do 'heavy' household ... activities (for example mopping, cleaning the windows and vacuuming) ... wash and iron your clothes ... make the beds ... do the shopping. The four answer options are: (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. Higher sumscores indicate poorer function. Role function and social function were assessed with two subscales of the Short-form General Health Survey.[23] The scores were reversed, so that the higher scores indicate poorer function.

Psychosocial attributes

Four psychosocial attributes (block D) were assessed at baseline: amount of received informal care, the range of the social network, self-efficacy expectations and feelings of mastery. Self-efficacy expectations and mastery refer to (intra-individual) psychological attributes, informal help and range of social network can be considered as (extra-individual) social attributes. The index for informal care reflects the number of ADL/IADL (as assessed with the GARS) for which participants got assistance from family members, neighbours or acquaintances. The range of the social network was assessed according to the 'role relation approach'. Persons within four domains (housemates, (step- and foster) children, neighbours, and remaining contacts) considered as important for the participant were identified and recorded. Self-efficacy expectations refer to the belief that one can successfully perform intended behaviours and was assessed with a scale developed by Sherer[31] and adapted by Bosscher.[32] Feelings of mastery or personal control concern the extent to which one regards one's own life-changes as being under one's own control. Mastery was assessed with the scale of Pearlin and Schooler.[33] Higher scores on the latter two scales reflect higher levels of self-efficacy expectations and mastery, respectively.

Risk factors

Four risk factors were selected: age, sex, income, and living arrangement (block E). Six levels of net income were assessed and adjusted for civil status. Living arrangement reflects whether the participant lived alone, with a partner or with more persons.

The outcome variable: utilization of professional home care

The outcome variable was assessed at baseline in 1993 and 2 years later, in 1995. Participants were asked whether they received home help or community nursing at the time of the interview. Three outcome variables were created:

- utilization of home care in 1993 (inter-individual differences: cells e and f in table 1)
- utilization of home care also in 1995 (intra-individual stability: cells a and d in table 1)
- utilization of home care in 1995 but not in 1993 (intra-individual change: cells a and c in table 1)

ANALYSIS

The analysis comprised four steps. In the first step, we describe the home care utilization (stability and change) of the members of the 2 years panel. We present stability and change in a cross tabulation.

In the second step, we present means and univariate *t*-tests and chi-squares (table 2) for all the selected factors from the process of disablement. We distinguish the three outcome variables.

In the third step, we carried out backward hierarchical logistic regression analysis with one of the three outcome variables as a dependent variable. We present the odds ratios and the 95%-confidence intervals of the odds ratios for one standard deviation increase in the predictor, statistically adjusted for the other variables in the model.[34] Although we analysed all the variables in the process of disablement, we only mention the statistically significant factors ($p < 0.05$ one sided). The analysis started with the variable from the beginning of the process (block A in figure 1), then we added the variables of block B, next block C, and so on. This reflects

Table 1 Home care utilization of low-functioning independently living elderly people in the Netherlands in 1993 and in 1995

		Home care 1993			
Home care 1995	*No*	*Cell*	*Yes*	*Cell*	*Total*
No	352	a	11	b	363
Yes	64	c	128	d	192
Total	416	e	139	f	555

Table 2 Mean scores and standard deviations (in brackets) of independent and intervening variables from the five blocks of the disablement process model of Verbrugge and Jette[1, 2] among low-functioning independently living elderly people in the Netherlands according to home care utilization in 1993 and in 1995

	Intra-individual differences in home care utilization 1993		*Intra-individual stability 1993–1995 in home care utilization*		*Intra-individual changein home care utilization*	
Correlates all measured in 1993 (minimum and maximum score)	*1993 no* n = *416*	*1993 yes* n = *139*	*1993 no 1995 no* n = *352*	*1993 yes 1995 yes* n = *128*	*1993 no 1995 no* n = *352*	*1993 no 1995 yes* n = *64*
A. Pathology						
Chronic morbidity	1.9	2.2**	1.8	2.2**	1.8	2.3*
0 (none)–10 (high)	(1.3)	(1.5)	(1.2)	(1.5)	(1.2)	(1.6)
B. Functional limitations in:						
Hearing	2.7	2.8	2.7	2.8	2.7	2.9
2 (low)–7 (high)	(1.1)	(1.2)	(1.0)	(1.2)	(1.0)	(1.1)
Vision	2.9	3.2*	2.9	3.2	2.9	3.0
2 (low)–8 (high)	(1.3)	(1.7)	(1.3)	(1.6)	(1.3)	(1.4)
Movement	7.1	8.6***	7.0	8.6***	7.0	7.9**
3 (low)–12(high)	(2.4)	(2.3)	(2.4)	(2.3)	(2.4)	(2.2)
Cognition's	0.9	1.2**	0.9	1.2***	0.9	1.2*
0 (low)–5 (high)	(1.0)	(1.1)	(1.0)	(1.2)	(1.0)	(1.1)
Depression symptoms.	5.5	6.9***	5.4	6.9***	5.4	6.0
0 (none)–18 (high)	(3.5)	(4.0)	(3.5)	(3.9)	(3.5)	(3.3)
C. Disability in:						
Adl/iadl	29.0	37.2***	28.6	37.5***	28.6	30.9*
18 (none)–67 (more)	(8.3)	(10.1)	(8.1)	(10.2)	(8.1)	(9.1)
Role functions	65.5	85.4***	63.4	87.5***	63.4	76.6**
0 (low)–100 (high)	(43.9)	(31.0)	(44.6)	(28.8)	(44.6)	(38.8)
Social functions	38.8	47.3**	38.3	48.0**	38.3	41.2
0 (low)–100 (high)	(27.5)	(29.4)	(28.2)	(29.5)	(28.2)	(23.6)
D. Psychosocial attributes:						
Informal help	2.0	1.8	2.0	1.8	2.0	2.2
0 (none)–13 (high)	(2.3)	(2.3)	(2.2)	(2.3)	(2.2)	(2.8)
Range social network	10.8	9.5**	10.9	9.4***	10.9	10.7
1 (small)–24 (large)	(4.2)	(4.0)	(4.2)	(4.1)	(4.2)	(4.0)
Self-efficacy expectations	57.1	54.1*	57.7	54.2**	57.7	53.9*
23 (low)–80 (high)	(11.6)	(12.1)	(11.7)	(12.3)	(11.7)	(10.6)*
Mastery	22.0	20.9*	22.0	20.8**	22.0	21.8
7 (low)–35 (high)	(5.0)	(5.0)	(5.0)	(4.9)	(5.0)	(5.0)
E. Risk factors:						
Age	71.3	74.9***	70.9	74.7***	70.9	73.6**
57 (young)–94 (old)	(7.5)	(7.5)	(7.5)	(7.6)	(7.5)	(6.9)
Sex (% woman)	73%	82%*	73%	84%**	73%	73%
Income	4.3	3.5***	4.3	3.4***	4.3	3.8*
1 (low)–(high)	(1.6)	(1.6)	(1.6)	(1.5)	(1.6)	(1.6)*
Living arrangement.	1.7	1.4***	1.7	1.4***	1.7	1.6
1 (alone)–(more)	(0.6)	(0.6)	(0.6)	(0.6)	(0.6)	(0.6)

T-tests difference of means; * $0.01 < p < 0.05$; **$0.001 < p < 0.01$; ***$p < 0.001$ (one sided)

our assumptions in the section 'The disablement process'.

The search for interaction-variables was carried out in the fourth step with another module of loglinear analysis. For each triple of dichotomized variables (a variable from the disability block, a risk factor or a psychosocial attribute and an operationalization of home care utilization), we tested with a likelihood chi-square for interaction.[34, 35] Data were analysed with Statistical Package for Social Sciences, version 8.

Results

RECEIVING CARE

Table 1 shows the cross tabulation of receiving home care in 1993 and 1995. In the first wave 25% (= 139/555) received home care and 34% in the second wave 2 years later. The high proportion of receiving home care is due to the already existing functional problems of the research participants. These proportions reflect the inter-individual differences. The higher proportions in the second wave refer to change in home care utilization.

In table 1 we also present the number of transitions (intra-individual change). After 2 years, only a few persons (8%, $n = 11$) no longer received home care. Receiving professional home care for the first time is (particularly for the older participants) more common: 15% ($n = 64$) changed from managing themselves or receiving informal help to professional home care. We nominate this proportion the intra-individual change.

There is a large intra-individual stability: 92% of the participants used home care in 1993 as well as in 1995 and 85% did not use home care in both 1993 and 1995.

ASSOCIATIONS WITH HOME CARE UTILIZATION

Table 2 presents the mean scores (except for sex) and the standard deviations for the three outcome variables for each of the selected predictors. The predictors are grouped according to the five different blocks of the model. All the independent and intervening variables from the disablement process show (inter-individual) differences in home care utilization in 1993 in a bivariate analysis. All differences are in the expected direction according to the model. Except for informal care and hearing limitations the differences are statistically significant ($p < 0.05$).

The first column of table 2 (no home care in 1993, $n = 416$) contains the two groups (still no home care in 1995, $n = 352$ and those who change to home care, $n = 64$) of the last columns of the table presenting the intra-individual change. With one exception (informal help), all the differences in the transition situation are in the same direction as the inter-individual differences in the first columns. Partly due to the relatively low number of changers not every predictor gives a statistically significant result. Also the differences in means of the process variables are weaker.

The results of the middle column restrict to the intra-individual stability: we analysed only the elderly who did not change their home care situation in the next 2 years. Most results not only resemble the inter-individual differences, but are stronger. We conclude from this table that studying the factors affecting home care utilization, cross-sectional research (the first column with the inter-individual differences) shows especially stability.

THE FACTORS IN THE PROCESS OF DISABLEMENT

In a hierarchical multivariate model we can simulate the chain in the process of disablement and determine which factors are responsible for differences in the outcome variable. First, home care utilization is only predicted by the indirect determinants at the beginning of the chain (model A pathology). Next we added the functional limitations (model AB) and the levels of disability (models ABC, see table 3).

As expected the direct path from the beginning of the chain to inter individual differences in home care utilization vanishes after addition of the subsequent blocks. Block C (disability) shows the expected direct path to inter-individual differences in home care utilization. We did not expect the path from (less) disability in social functions to home care. More depressive symptoms are an additional explanation.

In explaining the intra-individual change to home care (the right three columns) we expect and find most of the indicators of disability are not important.

The results of analysing intra-individual stability in home care utilization resemble the cross-sectional differences.

RISK FACTORS AND PSYCHOSOCIAL ATTRIBUTES

Table 4 shows the results with the risk factors and the psychosocial attributes as additional explanations of home care (model ABCD and ABCDE). None of the variables from the blocks pathology and functional limitations or disability in role functions have a direct impact on cross-sectional (inter-individual) differences in professional home care utilization. The most important determinant is disability in activities of daily living:

Table 3 Multivariate hierarchical logistic regression on home care utilization in 1993 and in 1995 (predictors from the disablement process model) of low-functioning independently living elderly people in the Netherlands. Odds ratios (statistical significant; one sided; $p < 0.05$) and the limits of the 95% confidence interval (in brackets) for one standard deviation increase in the predictor. The column heads A, AB and ABC point to the blocks used in the logistic hierarchical regression

	Inter-individual differences in home care utilization *Odds ratio:* *1993 (yes)* *1993 (no)*			*Intra-individual stability in home care utilization* *Odds ratio:* *1993 (yes)* *1993 (no)* *1995 (yes)* *1995 (no)*			*Intra-individual change in home care utilization* *Odds ratio:* *1993 (no)* *1993 (no)* *1995 (yes)* *1995 (no)*		
	A	*AB*	*ABC*	*A*	*AB*	*ABC*	*A*	*AB*	*ABC*
Predictors all measured in 1993		n = *510*			n = *444*			n = *388*	
A. Pathology:									
Chronic morbidity	1.31	1.19		1.25	1.25	1.23	1.36	1.34	1.29
none – high	(1.1; 1.5)	(1.0; 1.5)		(1.2; 1.6)	(1.1; 1.5)	(1.0; 1.5)	(1.1; 1.7)	(1.1; 1.7)	(1.0; 1.6)
B. Functional Limitations in:									
Hearing									
low – high									
Vision									
low – high									
Movement		1.72			1.71				
low – high		(1.4; 2.1)			(1.4; 2.2)				
Cognition's					1.25	1.28		1.32	1.28
low – high					(1.0; 1.4)	(1.1; 1.4)		(1.1; 1.6)	(1.0; 1.6)
Depression symptoms		1.35	1.31		1.40	1.34			
none – high		(1.1; 1.6)	(1.1; 1.6)		(1.2; 1.7)	(1.1; 1.7)			
C. Disability in:									
Adl/iadl			2.28			2.20			
none – more			(1.7; 3.0)			(1.7; 3.0)			
Role functions			1.28			1.47			1.30
low – high			(1.1; 1.4)			(1.1; 2.0)			(1.0; 1.6)
Social functions			0.72			0.71			
low – high			(0.6; 0.9)			(0.6; 0.9)			

$n = 510$ and $n = 388$ (due to missing cases)

Table 4 Multivariate hierarchical logistic regression on home care utilization in 1993 and in 1995 (predictors from the disablement process model) of low-functioning independently living elderly people in the Netherlands. Odds ratios (statistical significant; one sided; $p < 0.05$) and the limits of the 95% confidence interval (in brackets) for one standard deviation increase in the predictor. The column heads ABCD and ABCDE point to the blocks used in the logistic hierarchical regression

	Inter-individual differences in home care utilization		*Intra-individual stability in home care utilization*		*Intra-individual change in home care utilization*	
	Odds ratio:		*Odds ratio:*		*Odds ratio:*	
	1993 (yes)		*1993 (yes)*	*1995 (yes)*	*1993 (no)*	*1995 (yes)*
	1993 (no)		*1993 (no)*	*1995 (no)*	*1993 (no)*	*1995 (no)*
Predictors all measured in 1993	*ABCD*	*ABCDE*	*ABCD*	*ABCDE*	*ABCD*	*ABCDE*
	n = 436		*n = 381*		*n = 330*	
A. Pathology:						
Chronic morbidity					1.45	1.56
none – high					(1.1; 1.9)	(1.2; 2.1)
B. Functional limit in:						
Hearing						
low – high						
Vision						
low – high						
Movement					1.34	
low – high					(1.0; 1.8)	
Cognition's						
low – high						
Depression symptoms.	1.26		1.37			
none – high	(1.0; 1.6)		(1.0; 1.9)			
C. Disability in:						
Adl/iadl	4.64	4.64	5.53	5.85		
none – more	(3.1; 7.1)	(3.0; 7.2)	(3.4; 9.1)	(3.5; 10.0)		
Role functions				1.41		
low – high				(1.0; 2.0)		
Social functions	0.69	0.75	0.69			
low – high	(0.5; 0.9)	(0.6; 1.0)	(0.5; 0.9)			
D. Psychosocial attributes:						
Informal help	0.34	0.35	0.30	0.29		
0 (none) – 13 (high)	(0.3; 0.4)	(0.3; 0.5)	(0.2; 0.4)	(0.2; 0.4)		
Range social network						
1 (small) – 24 (large)						
Self-efficacy expect.			0.72		0.59	0.64
23 (low) – 80 (high)			(0.6; 1.0)		(0.5; 0.8)	(0.5; 0.9)
Mastery			1.41	1.46	1.64	1.74
7 (low) – 35 (high)			(1.0; 2.0)	(1.0; 2.1)	(1.2; 2.4)	(1.2; 2.5)
E. Risk factors:						
Age		1.40		1.41		1.82
57 (young) – 94 (old)		(1.1; 1.8)		(1.1; 1.9)		(1.3; 2.6)
Sex (% woman)						
Income		0.64		0.51		0.72
1 (low) – 6 (high)		(0.5; 0.8)		(0.4; 0.7)		(0.6; 1.0)
Living arrangement.						
1 (alone) – 3(more)						

$n = 436$ and $n = 330$ due to missing cases

one standard deviation increase in ADL/IADL disability (adjusting for all other variables in the model) means a 4.6 times higher odds ratio user/non user. The amount of informal help appears to be an additional explanation: one standard deviation less informal help means about 2.9 (= 1/0.35) times increase of the ratio. The current users of professional home care are disabled in daily living activities and receive less informal help. All variables were measured in 1993. Apart from the disability and the amount of informal help, older people and people with a lower level of income had more chance of receiving professional home care in 1993.

Neither disability in daily living activities in 1993 nor the informal help in 1993 predict intra-individual change to home care within 2 years (table 4, right columns). Although both variables are the most important indicators of inter-individual differences in a cross-sectional analysis, they play no role in predicting change to home care within 2 years (panel analysis). The best predictors of new users of professional home care after 2 years (intra-individual change) are a high level of chronic morbidity, older age and a high level of mastery. Lower income ($p = 0.06$ (!)) and less self-efficacy expectations play a role in the intra-individual change too. These predictors seem to be the motor in the process of disablement with as a consequence, receiving professional home care in the future.

The best predictor of stable home care utilization is the last stage (block C) in the process model: one standard deviation more disability in ADL/IADL means a factor 5.9 times the overall ratio user/non user. The most important additional explanation is the psychosocial attribute less informal help (1/0.29 = 3.5 times the ratio). The risk factor a low income is also important additional explanation (2 times). Other predictors are older age and more disability in role functions.

ADDITIONAL OR INTERACTION?

Next to the additional impact of risk factors and psychosocial attributes, we analysed the interaction effects between disability and home care utilization (see figure 1). However, we identified only a very few interaction effects.

(1) The impact of the level of ADL/IADL disability on the inter-individual differences in professional home care is greater for the younger group compared to the older persons.
(2) The levels of self-efficacy affect the associations between the change in home care utilization and ADL/IADL disability. For the elderly with a low level of self-efficacy we detect a stronger association compared to those with higher levels.
(3) The association between change in home care utilization and limitations in social functioning is stronger for the elderly living alone.

Conclusions and Discussion

In this study we investigated the process of disablement among older persons in relation to the utilization of professional home care. We compared the results from a cross-sectional approach with the results from a panel design.

We arrived at several conclusions. The most important one is that the indicators of (inter-individual) differences in the cross-sectional situation are not the same as the indicators of change (panel situation or intra-individual differences). Disability in activities of daily living and the amount of informal help are important predictors for cross-sectional differences in professional home care utilization. In predicting future home care utilization after 2 years, they play no role whatsoever. In predicting change chronic medical morbidity, age and feelings of mastery are important. In a process model especially the variables at the beginning of the process cast a shadow on the future and are indicators of change. The amounts of informal help and ADL/IADL disability on the other hand are the important indicators of stability in using home care. It seems to be important to test models with data reflecting the structure and processes involved. If a process-model to home care utilization is tested in a cross-sectional design the indicators of stability are important. Those variables (morbidity) that are generating the change (the process in the model) did not show effects on home care utilization cross-sectionally. Therefore a longitudinal design is required. Only age and income were significant predictors for inter- and intra-individual change in home care utilization. Cross-sectional and panel approaches result in different outcomes which supports the process of disablement empirically.

As a consequence of the adjustment for other variables in a multivariate model the amount of informal help turns out to be an important predictor for cross-sectional differences in professional home care utilization. In the bivariate analysis the differences are not statistically significant.

A third conclusion refers to the close correspondence between the results of the cross-sectional analysis and the analysis of stability in the panel situation. In a quick process of disablement we should expect more corre-

spondence with the analysis of change. We may conclude that the process from disablement to home care utilization can be considered as a rather stable process.

Another conclusion is the absence of important interaction effects in the last chain of disability to professional home care, which were assumed in the model. Neither in the situation of cross-sectional differences, nor in studying the panel change or stability we found substantive interaction-effects. In the Disablement Process Model the additive effects (apart from the process) are more important in explaining cross-sectional differences and panel change and panel stability in professional home care.

Contradictory with the expectations from the Disablement Process Model is the pathway in the multivariate analysis from (less) disability in social functions to the utilization of home care. In the bivariate analysis the relation was still in line (more disability) with the expectation. The strong correlation (between 0.27 and 0.57) of the limitations in movement and the disability in the activities of daily living with disability in social functions and utilization of home care is an explanation for it.

This study has several limitations. One limitation is the attrition of 66 persons who refused to participate in the follow-up due to (self-reported) substantial physical and/or mental health problems. One can image that such persons may have used more home care compared to those who participated. This may have resulted in an underestimation of the effects reported in the presented study. Another limitation refers to the measurement of cognitive limitations. The association between cognitive limitations and home care utilization (as presented in the tables 2 and 3) disappeared mainly when the psychosocial variables were added to the model. The lack of strong association between cognitive limitations may be partly due to the assessment of cognitive limitations. The Mini Mental State, and particularly the shortened version which we used in the present study, was developed as screening instrument for just a global detection of cognitive disorders. Furthermore, we included only the level of disability as assessed at baseline. Change in disability between baseline and follow-up may be related to the intra-individual change in home care utilization.

We found that self-efficacy expectations is a significant predictor of intra-individual change in home care utilization in older persons. There is empirical evidence that self-efficacy expectations may be increased and health care utilization may be reduced by self-management programs among persons with chronic health problems.[36, 37] Our results are in line with these outcomes: low levels of self-efficacy expectations in older persons are associated with home care utilization in the future and *vice versa*. This indicates that such self-management programmes may not only improve self-efficacy expectations and quality of life but also help to reduce the utilization of health care facilities among older persons.

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