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ORIGINAL INVESTIGATION

Influence of psychological characteristics and social relations on receiving preventive home visits in older men and women

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Abstract The purpose was to analyze whether psychological characteristics and social relations in older men and women were related to accepting and receiving preventive home visits during 3 years, when offered as part of a national scheme. The study was based on secondary data from the Danish Intervention Study on Preventive Home Visits in 34 municipalities. The study population included 3,377 men and women who answered questions about psychological characteristics and social relations at baseline, survived and took part in the three year follow-up study. Number of preventive home visits was registered during 3 years in a specially designed software installed in the municipalities. Psychological characteristics were measured by questions on sadness, aggressiveness, life satisfaction, mood, loneliness and sense of coherence. Social relations were measured by questions on cohabitation status, diversity in social relations and social participation. Covariates included age and disability. Older men with poor psychological rating on most of the variables had larger odds ratios of accepting and receiving preventive home visits compared to older men with higher ratings. Older women with poor rating on the psychological characteristics and high social participation had larger odds of accepting and receiving preventive home visits, and women with a strong sense of coherence had larger odds of receiving many visits. It is concluded that psychological characteristics and social relations in older persons seem to influence whether they accept and receive preventive home visits, but patterns of associations are complex and vary for men and women.

Keywords Preventive home visits · Psychological characteristics · Life satisfaction · Gender differences

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Introduction

In 1998 it became law in Denmark that the municipalities shall offer two preventive home visits to all 75+ year old citizens annually. The aim is to "give feelings of security and well-being, to give advice and guidance about activities and possibilities for support and to facilitate that the older persons make better use of own resources and sustain their functional ability for as long as possible". The law is based on several randomized research studies, which have shown that preventive home visits to older adults have beneficial effects on hospitalisation, mortality and functional ability (Stuck et al. 2002). A recent study found that it has a beneficial effect on older persons' functional ability to perform these preventive home visits as part of the daily routine in the municipalities, the effect being largest among the oldest persons and among the women (Vass et al. 2004, 2005; Avlund et al. 2007a).

Preventive home visits are offered to all 75+ year-olds, but only 60% of older Danes accept and receive preventive home visits. Therefore, knowledge about factors, which influence whether older persons accept and receive preventive home visits is important. Studies have shown that psychological characteristics (e.g. self-efficacy, depressive

symptoms, sense of coherence) and social relations influence participation in and adherence to other types of preventive interventions. Thus, Jette et al. (1998) demonstrated that older persons' positive attitude towards exercise and strong sense of control, lower levels of perceived confusion and depressed mood were associated with higher adherence to an individual home exercise programme. Other studies in older adults demonstrated that individuals with high self-efficacy were more likely to initiate preventive care and seek early treatment (Grembowski et al. 1993), to adhere to diabetes recommendations (Nakahara et al. 2006) and to take part in exercise programmes (Grembowski et al. 1993; Van Heuvelen et al. 2006). Sjösten et al. (2007) found that older persons who felt lonely did not participate in a multifactorial fall prevention programme. In addition, a strong sense of coherence was related to active management of diabetes (Sandén-Erikson 2000), to adherence to self-care behaviours among diabetes patients (Cohen and Kanter 2004) and to participation in a revalidation programme after myocardial infarction (Breuer and Etienne 2001).

Also, older persons' social relations may be related to adherence to preventive interventions. Older persons with strong social support were more likely to adhere to diabetes recommendations (Carranza and LeBaron 2004; Nakahara et al. 2006), to comply with antidepressant medications (Voils et al. 2005), to adhere to cancer screening programmes (Gili et al. 2006), to participate in rehabilitation projects (Jette et al. 2005; Keysor et al. 2006) and to maintain physical activity (McAuley et al. 2003).

It is thus possible that older persons with positive psychological characteristics and strong social relations are more likely to accept and receive preventive home visits than persons without these characteristics.

There is evidence that men and women are different as regards their biology and health (Newman and Brach 2001; Macintyre et al. 1996) and their use of social and health services (Olsen and Nybo Andersen 1998). Higher proportions of women than men feel depressed (Heikkinen et al. 2002; Olsen et al. 2004), whereas proportions with high and low sense of coherence seem to be largely the same in men and women (Volanen et al. 2004). Research on associations between gender and social relations also show conflicting results. Some studies report that men have higher levels of social support than women (Gallicchio et al. 2007; Kristofferzon et al. 2003), while other studies showed that men's social relations in general are fewer than women's (Akiyama et al. 1996; Avlund et al. 2004), but also that men and women serve different functions in the various types of relations and situational circumstances that evolve around them in old age. It is thus possible that patterns of associations between psychological characteristics/social relations and accept of preventive home visits are different for men and women.

The purpose of the present study is to analyze whether psychological characteristics and social relations in older men and women are related to accepting and receiving preventive home visits, when offered as part of daily routine in the municipalities under the national scheme.

Materials and methods

Study population

The study is based on secondary analyses on data from a randomized intervention study on preventive home visits, which had the main aim to examine whether the education of home visitors had an influence on the functional status of older people (Avlund et al. 2007a, b; Vass et al. 2002, 2004, 2005, 2007a).

Altogether, 5,788 non-institutionalised citizens living in the 34 municipalities (17 intervention and 17 control municipalities) born in 1918 (80 years old) or 1923/1924 (75 years old) were invited to participate in the baseline study in 1998–1999. Eligible subjects were drawn from the Civil Registration Office. Participants from both intervention and control municipalities were included and we adjusted by the intervention in the analyses. In total, 4,060 persons (participation rate 70.1%) gave informed consent to take part in a questionnaire study. Twenty-two persons died and four were institutionalised before the intervention programme started ($n = 4{,}034$). The baseline non-participants had a higher mortality rate and a higher rate of admission to nursing homes during the next 5 years compared to participants (Vass et al. 2007b). One hundred and forty persons with missing data on some of the baseline questions on psychological characteristics, social relations or covariates were excluded ($n = 3{,}894$). For the present study the outcome measures was number of home visits during 3 years. Therefore, the study population was restricted to the 3,377 individuals who survived and participated in the 3-year follow-up study. A baseline comparison of the 3,377 participants and the 517 non-participants in the present study showed that significantly higher proportions of the participants were females, younger, had better scoring on the psychological items (except for feelings of sadness and aggression), better functional ability and stronger social relations compared to the non-participants ($p < 0.001$ on all comparisons). No differences were seen with regard to household composition. The study is thus based on a restricted population of generally well-functioning older adults.

All 75+ year old Danes are offered preventive home visits according to National law. Detailed information on use of health and social services of the study participants was continuously registered in a specially designed software

installed in the municipalities. Number of preventive home visits during the three year study period was quarterly sent to the research team and transferred into a file that protected study participants from identification. We distinguish persons with no, 1–4 and 5 or more preventive home visits during 3 years.

Main independent variables

All the items on psychological characteristics and social relations were measured at baseline.

Psychological characteristics

The first two questions on psychological well-being were developed from clinical observations and were intended to measure mental function among older persons without mental disease.

Sadness measured by the question: Do you ever feel sad without special reason? (1) Yes, often, (2) yes, sometimes, (3) seldom, (4) no, never.

Feelings of aggression measured by the question: Are you sometimes quick-tempered and aggressive without special reason? (1) Yes, often, (2) yes, sometimes, (3) seldom, (4) no, never.

Other questions of importance for psychological well-being include:

Life satisfaction measured by the question: How satisfied or unsatisfied are you altogether with your present life: (1) very satisfied, (2) somewhat satisfied, (3) neither satisfied nor dissatisfied, (4) somewhat dissatisfied, (5) very dissatisfied.

Self-rated mood measured by the question: How do you evaluate your mood at present? (1) excellent, (2) good, (3) reasonable, (4) changing, (5) poor.

Loneliness measured by the question: Do you feel lonely? (1) Yes, often, (2) yes, some times, (3) no.

Analyses on differential item functioning using the Rasch item analysis indicated that none of the answers to these five questions belonged to the same construct (not published). Consequently, they were included in the analyses as separate variables.

Sense of coherence was measured by three questions. Manageability was measured by the question: "Do you usually see a solution to problems and difficulties that other people find hopeless?" Meaningfulness by the question: "Do you usually feel that your daily life is a source of personal satisfaction?" Comprehensibility by the question "Do you usually feel that the things that happen to you in your daily life are hard to understand?" The response alternatives to the questions were (1) Yes, usually, (2) Yes, sometimes, and (3) No. Each response alternative was given a score and a summed index was computed with reversed scoring for comprehensibility. The resulting index ranges from 0 to 6, where a higher value indicates a lower sense of coherence. The reliability of these items was fairly good (kappa value of 0.5–0.6) and a principal components analysis showed that the three items used form one single factor (Lundberg and Peck 1995).

Social relations

Living alone measured with a question at baseline: yes/no.

Social diversity measured as number of categories with which the participants have personal contact at least once a month: children, grandchildren/great-grandchildren, siblings, other relatives, friends/acquaintances (range 0–5). We distinguish persons with high (4–5), medium (2–3) and low (0–1) social diversity.

Social participation measured by three items about (1) paying visits to others, (2) receiving visits at home, and (3) participating in social activities outside the home (range 0–3), all several times per month. We differ between low (0–1), medium (2) and high social participation (3 points).

A test-retest study of the included items of social relations showed that the agreement percents were between 72 and 100 and the kappa values between 0.5 and 1.0 for all items. Further, in-depth interviews demonstrated high face and content validity of the social relations measures used (Due et al. 1999).

Covariates

It has been shown that older age (Gidlow et al. 2007) and functional status (Sjösten et al. 2007; Jette et al. 2005) are related to participation in preventive interventions. Studies have also shown that psychological characteristics (Heikkinen et al. 2002) and social relations vary with age (van Tilburg 1998). We therefore include age and disability as the most important potential confounders of the associations between psychological and social relations characteristics and receiving preventive home visits.

Age: 80 years versus 74–75 years.

Disability: Measured in two ways as *tiredness in daily activities* by the Mob-T Scale (Mobility-Tiredness) and *need of help in daily activities* by the Mob-H Scale (Mobility-Help) (Avlund et al. 1996). The scales are formed by answers to questions about the following six activities: transfer, walk indoors, going outdoors, walk outdoors in nice weather, walk outdoors in poor weather, and climb stairs. The Mob-T Scale describes whether the participants perform the activities with or without tiredness afterwards and counts the number of items performed without tiredness. The Mob-H Scale describes whether the participants manage the activities with or without need of help and counts the number of items managed without help. In the present analyses the scales are dichotomized into persons with maximum and persons

below maximum score. Reliability tests showed agreement per cents from 88.1 to 1.0 and kappa values from 0.55 to 1.0 for the included items on intra-rater and inter-rater tests (Avlund et al. 1995). The construct validity of the included items has been tested by the Rasch model of item analysis (Avlund et al. 1996). Analyses of criterion-related validity concluded that mobility as measured by the scales was strongly associated with diagnosed diseases (Schultz-Larsen et al. 1992), isometric muscle strength (Avlund et al. 1994), and physical performance (Avlund et al. 1994).

Further, we included intervention status as a covariate: living in an intervention- versus a control-municipality.

Statistical analysis

All analyses were stratified by gender. Initially, all analyses were performed using all categories for the included psychological characteristics and social relations. If the results were in the same direction for some of the categories, and if there were only a few persons in some of the categories, we combined them as described in Table 2. Statistical analyses included bivariate and multivariate logistic regression analyses. Regression models were reduced by use of forward selection of variables. Variables which were associated with receiving preventive home visits at the bivariate level ($p < 0.1$) were included group-wise for the psychological and social relations variables, separately. The final model included variables which were related to the outcome measures ($p < 0.1$) in the preceding steps, including age and functional ability. The SAS procedure LOGISTIC was used for all logistic regression analyses.

Ethics

The regional Ethical Committees involved approved the study.

Results

Table 1 shows that 41 and 34% of the men who were 75 and 80 year old, respectively, at baseline did not accept and receive preventive home visits during the next 3 years. The corresponding percentages for the women were 37 and 38%. The oldest men received significantly more home visits than the younger men. This age difference was not seen in the women. The oldest men tended to receive more home visits than the oldest women.

Table 2 shows the distribution of measures of psychological characteristics, social relations and functional ability in 75- and 80-year-old men and women. For the men there were no age differences regarding the psychological factors, while, among the women, significantly fewer of the 80-year-olds had aggressive feelings, and a significantly larger proportion felt lonely and had a low sense of coherence compared to the 75-year-olds. Further, significantly more women than men felt sad without reason, felt lonely and dissatisfied (only the 80-year-olds), while significantly more men than women felt aggressive. Significantly more women than men lived alone, but the women had a larger diversity in social relations (only the 75-year-olds) and a stronger social participation compared to the men. Diversity in social relations and social participation decreased with age for the women. With regard to functional ability the analyses show an increase in tiredness in daily activities with age for both men and women and an increase with age in need of help for the women. Further, women felt more tired and more in need of help than the men.

Table 3 shows the bivariate associations between the independent variables and receiving 0, 1–4 and 5+ preventive home visits during 3 years. For the men poor rating on nearly all the psychological characteristics were related to accepting and receiving preventive home visits. Further, men who were older and who felt tired in mobility received more home visits compared to men without these characteristics. Sense of coherence and the social relations factors were not related to receiving preventive home visits for men.

For women no significant associations were seen between the psychological factors and preventive home visits. But more women with high social participation and more well-functioning women (managed mobility activities without help) received preventive home visits compared to women without these characteristics.

Table 1 Percentage of 75- and 80-year-old men and women who accepted and received preventive home visits during 3 years ($n = 3377$)

	Men			Women				
	75 years ($n = 1083$) (%)	80 years ($n = 353$) (%)	P^1	75 years ($n = 1368$) (%)	80 years ($n = 573$) (%)	P^2	P^3	P^4
No visits	41	34	0.0007	37	38	0.397	0.126	0.075
1–4 visits	52	53		55	53			
5+ visits	7	14		8	9			

Pearson's chi-square test for equal distribution of preventive home visits between P^1: 75- and 80-year-old men, P^2: 75- and 80-year-old women, P^3: 75-year-old men and women, P^4: 80-year-old men and women

Table 2 Distribution of psychological characteristics, social relations and functional ability in 75- and 80-year-old men and women at baseline

	Men			Women				
	75 years ($n = 1083$) (%)	80 years ($n = 353$) (%)	P^1	75 years ($n = 1368$) (%)	80 years ($n = 573$) (%)	P^2	P^3	P^4
Sad without reason								
Yes (1–2)	13	15		26	25			
Seldom (3)	36	39		34	34			
No (4)	51	46	0.219	39	41	0.743	<0.0001	0.002
Feeling aggressive								
Yes (1–2)	11	11		7	4			
Seldom (3)	36	33		29	23			
No (4)	53	57	0.457	64	72	0.001	<0.0001	<0.0001
Life satisfaction								
Dissatisfied (3–5)	9	10		9	11			
Somewhat (2)	33	30		36	38			
Very satisfied (1)	59	60	0.62	55	51	0.114	0.199	0.024
Mood								
Poor/changing (3–5)	23	24		28	29			
Good (2)	32	34		31	33			
Excellent (1)	45	41	0.462	41	38	0.302	0.036	0.189
Lonely								
Yes	15	18		27	34			
No	85	81	0.178	73	66	0.002	<0.0001	<0.0001
Sense of coherence								
Low (3–6)	10	11		11	16			
Medium (1–2)	43	44		43	39			
High (0)	47	45	0.768	46	45	0.011	0.633	0.088
Live alone	23	27		54	72			
Live with others	77	73	0.115	46	28	<0.0001	<0.0001	<0.0001
Social diversity								
Small (0–1)	7	8		5	6			
Medium (2–3)	38	42		39	44			
Large (4–5)	55	50	0.291	57	50	0.045	0.037	0.406
Social participation								
Low (0–1)	14	14		10	14			
Medium (2)	41	42		37	34			
High (3)	46	44	0.88	53	52	0.011	0.0001	0.033
Mobility-Tiredness								
Tired	26	36		36	50			
Not tired	74	64	0.0003	64	50	<0.0001	<0.0001	<0.0001
Mobility-Help								
Need help	12	16		19	31			
No need of help	88	84	0.25	81	69	<0.0001	<0.0001	<0.0001

Pearson's chi-square test for equal distribution of psychological resources between P^1: 75- and 80-year-old men, P^2: 75- and 80-year-old women, P^3: 75-year-old men and women, P^4: 80-year-old men and women

Table 4 shows the results of the multivariate logistic regression analyses for accepting and receiving preventive home visits among the old men using two different cut points by psychological characteristics and social relations. The crude analyses show that men who felt sad, aggressive, dissatisfied with life, had poor mood and felt lonely (marginally significant), had higher odds ratios of receiving at least one preventive home visit during 3 years. When these variables were entered simultaneously in the model feelings of aggression and feelings of dissatisfaction stayed

Table 3 Bivariate associations between psychological characteristics, social relations and functional ability and receiving preventive home visits

	Men					Women				
	n	0 visits (%)	1–4 visits (%)	5+ visits (%)	*p*	*n*	0 visits (%)	1–4 visits (%)	5+ visits (%)	*p*
Sad										
Yes	198	33	52	14	0.019	502	39	54	7	0.116
Seldom	526	37	54	9		664	34	56	10	
No	712	42	50	8		775	39	53	8	
Aggressive										
Yes	155	38	50	12	0.073	124	36	56	7	0.981
Seldom	506	35	56	9		530	37	55	8	
No	775	42	50	8		1,287	38	54	8	
Life satisfaction										
Dissatisfied	126	33	56	12	0.02	179	44	48	8	0.438
Somewhat satisfied	462	35	55	10		710	36	56	8	
Satisfied	846	43	50	8		1,041	37	55	8	
Mood										
Poor	337	36	54	10	0.063	548	39	52	9	0.156
Good	462	36	54	11		608	34	59	7	
Excellent	634	43	49	8		781	39	53	8	
Lonely										
Yes	224	34	53	13	0.022	562	37	55	8	0.053
No	1,209	40	52	8		1,377	37	54	8	
Sense of coherence										
Low	144	34	56	10	0.62	237	39	56	5	0.152
Medium	620	39	55	8		817	38	54	8	
High	672	40	50	10		887	36	54	10	
Live alone										
Yes	341	38	50	12	0.117	1,155	38	54	8	0.304
No	1,091	40	52	8		786	36	55	9	
Social diversity										
Small	104	42	48	10	0.929	96	36	51	13	0.232
Medium	556	40	51	10		783	39	52	9	
Large	776	38	53	9		1,062	36	57	8	
Social participation										
Low	198	42	52	6	0.54	210	51	40	8	<0.0001
Medium	588	38	53	9		703	38	55	7	
High	648	39	51	10		1,027	34	57	9	
Age										
80 years old	353	34	53	14	0.0007	573	38	53	9	0.397
75 years old	1,083	41	52	7		1368	37	55	8	
Mobility-Tiredness										
Tired	404	32	58	10	0.001	780	38	55	7	0.468
Not tired	1,032	42	49	9		1,161	37	54	9	
Mobility-Help										
Need help	186	33	56	10	0.217	434	43	51	6	0.011
No need of help	1,250	40	51	9		1,507	36	56	9	

P Pearson's chi-square tests for equal distribution of the different characteristics among persons who receive 0, 1–4 and 5 preventive home visits

Table 4 Odds ratios (95% CI) for accepting and receiving preventive home visits during three years by psychosocial factors among the 75- and 80-year-old men

	Receiving at least one versus not receiving home visits			Receiving 5+ versus 0–4 home visits		
	Crude OR (95% CI)	Mutually adjusted[a]	Final model	Crude OR	Mutually adjusted[a]	Final model
Sad						
Yes	**1.42 (1.02–1.98)**	1.18 (0.78–1.78)		**2.00 (1.23–3.27)**	**2.20 (1.21–3.99)**	**1.93 (1.18–3.17)**
Seldom	1.24 (0.98–1.56)	1.05 (0.82–1.36)		1.20 (0.80–1.80)	1.15 (0.75–1.78)	1.17 (0.78–1.77)
Never	1.0	1.0		1.0	1.0	1.0
Aggressive						
Yes	1.19 (0.83–1.69)	1.06 (0.72–1.55)	1.06 (0.73–1.54)	1.49 (0.85–2.59)		
Seldom	**1.37 (1.09–1.73)**	**1.28 (1.01–1.64)**	**1.32 (1.04–1.68)**	1.18 (0.80–1.76)		
Never	1.0	1.0	1.0	1.0		
Satisfied						
Dissatisfied	**1.54 (1.03–2.28)**	1.51 (0.93–2.44)	1.43 (0.89–2.30)	1.60 (0.88–2.90)	1.54(0.75–3.18)	
Somewhat	**1.40 (1.11–1.77)**	**1.34 (1.02–1.77)**	**1.32 (1.00–1.74)**	1.34 (0.90–1.98)	1.24(0.79–1.94)	
Satisfied	1.0	1.0	1.0	1.0	1.0	
Mood						
Poor	**1.33 (1.02–1.75)**	0.92 (0.64–1.34)	0.92(0.64–1.31)	1.28 (0.80–2.05)	1.54(0.75–3.18)	
Good	**1.36 (1.06–1.74)**	1.18 (0.91–1.54)	1.17(0.90–1.52)	1.45 (0.95–2.20)	0.72(0.38–1.37)	
Excellent	1.0	1.0	1.0	1.0	1.0	
Lonely	1.31 (0.97–1.77)	1.09 (0.77–1.53)		**1.73 (1.12–2.68)**	1.30 (0.83–2.03)	
Sense of coherence						
Low	1.29 (0.89–1.89)			1.02 (0.56–1.88)		
Medium	1.03 (0.82–1.29)			0.85 (0.58–1.25)		
High	1.0			1.0		
Live alone	1.06 (0.83–1.37)			**1.52 (1.02–2.25)**		1.40 (0.93–2.08)
Social diversity	0.85 (0.56–1.29)			1.09 (0.54–2.19)		
Small	0.95 (0.76–1.19)			1.01 (0.69–1.48)		
Medium	1.0			1.0		
Large						
Social participation						
Low	0.89 (0.64–1.23)			0.59 (0.31–1.12)		
Medium	1.03 (0.82–1.29)			0.89 (0.60–1.30)		
High	1.0			1.0		
80 versus 75 years	**1.36 (1.06–1.75)**		**1.34 (1.04–2.08)**	**1.95 (1.33–2.85)**		**1.90 (1.30–2.79)**
Tired (Mobility-Tiredness)	**1.57 (1.23–2.00)**		**1.52 (1.11–2.08)**	1.21 (0.82–1.79)		
Need help (Mobility-Help)	1.33 (0.96–1.85)		0.88 (0.58–1.33)	1.18 (0.71–1.97)		

Significant associations ($p < 0.05$) are shown with bold types

[a] Psychological variables

significantly related to the outcome. In the final analyses with adjustment for the covariates men who seldom felt aggressive (compared to never) and who felt somewhat satisfied (compared to those who felt very satisfied) had higher odds of receiving at least one preventive home visit during the three years. Old age and tiredness in daily activities were also significantly related to receiving at least one preventive home visit.

The results went in the same direction when the outcome was measured as receiving many (5 or more home visits) compared to fewer home visits (less than five home visits) during the 3 years. The final model showed that older men who felt sad had higher odds of receiving many visits, and men who lived alone tended to receive more home visits compared to cohabiting.

Sense of coherence, social participation and diversity in social relations were not related to accepting and receiving preventive home visits among the old men.

Table 5 shows the results of the multivariate logistic regression analyses for accepting and receiving preventive home visits by psychological characteristics and social relations among the old women. The crude analyses show

Table 5 Odds ratios (95% CI) for accepting and receiving preventive home visits during 3 years by psychosocial factors among the 75- and 80-year-old women

	Receiving at least one versus not receiving home visits				Receiving 5+ versus 0–4 home visits		
	Crude OR (95% CI)	Mutually adjusted[a]	Mutually adjusted[b]	Final model	Crude OR	Mutually adjusted[b]	Final model
Sad							
Yes	1.01(0.80–1.27)	1.04(0.79–1.37)		1.00(0.76–1.33)	0.85 (0.55–1.31)		
Seldom	**1.26(1.02–1.57)**	1.21(0.97–1.52)		1.19(0.95–1.49)	1.27 (0.88–1.83)		
Never	1.0	1.0		1.0	1.0		
Aggressive							
Yes	1.05(0.72–1.55)				0.87 (0.43–1.77)		
Seldom	1.04(0.84–1.28)				1.03 (0.72–1.49)		
Never	1.0				1.0		
Satisfied							
Dissatisfied	0.76(0.55–1.05)	0.75(0.52–1.10)			1.02 (0.57–1.13)		
Somewhat	1.03(0.84–1.25)	0.97(0.77–1.22)			0.95 (0.67–1.35)		
Satisfied	1.0	1.0			1		
Mood							
Poor	1.01(0.81–1.26)	1.08(0.80–1.45)		1.17(0.89–1.33)	1.14 (0.78–1.69)		
Good	**1.24(1.00–1.55)**	1.21(0.96–1.53)		1.23(0.98–1.55)	0.91 (0.61–1.36)		
Excellent	1.0	1.0		1.0	1.0		
Lonely	1.03(0.84–1.27)				1.02 (0.72–1.46)		
Sense of coherence							
Low	0.87(0.65–1.17)				**0.46 (0.24–0.88)**		**0.49 (0.25–0.94)**
Medium	0.92(0.75–1.12)				0.80 (0.57–1.13)		0.82 (0.58–1.16)
High	1.0				1.0		1.0
Live alone	0.91(0.75–1.10)				0.80 (0.58–1.10)		
Social diversity							
Small	0.98(0.63–1.51)		1.28(0.81–2.01)		1.73 (0.91–3.30)	1.90(0.97–3.74)	1.95 (0.99–3.84)
Medium	0.87(0.72–1.06)		0.95(0.78–1.16)		1.13 (0.81–1.59)	1.18(0.84–1.66)	1.21 (0.86–1.71)
Large	1.0		1.0		1.0	1.0	1.0
Social participation							
Low	**0.48(0.36–0.65)**		**0.47(0.34–0.64)**	**0.51(0.38–0.71)**	0.87 (0.51–1.50)	0.75(0.43–1.33)	0.90 (0.50–1.62)
Medium	0.84(0.69–1.02)		0.84(0.69–1.02)	0.86(0.70–1.05)	0.74 (0.52–1.07)	0.72(0.50–1.04)	0.77 (0.53–1.10)
High	1.0		1.0	1.0	1.0	1.0	1.0
80 versus 75 years	0.97(0.79–1.19)				1.24 (0.88–1.75)		
Tired (Mob-T)	0.97(0.80–1.16)				0.81 (0.58–1.13)		
Need help (Mob-H)	**0.74(0.59–0.92)**			0.83(0.65–1.04)	0.69 (0.45–1.05)		0.75 (0.48–1.18)

Significant associations ($p < 0.05$) are shown with bold types

[a] Psychological variables

[b] Social relations variables

that women who seldom felt sad (compared to never), who felt in good mood (compared to excellent), who had a high social participation and low diversity in social relations had higher odds ratios of receiving at least one preventive home visit during 3 years. When the psychological characteristics were entered simultaneously in the model feelings of sadness and less than excellent mood stayed marginally significant related to the outcome. When the social relations variables were entered simultaneously in the model only social participation stayed significantly related to the outcome. The final model showed that women who seldom felt sad (compared to never), who had good mood (compared to excellent), with high social participation and with no need of help ($p < 0.1$) had larger odds of receiving at least one preventive home visit compared to women without these characteristics. Women in need of help with mobility tended not to receive home visits.

The results were different when the outcome was measured as receiving many (5+) versus fewer (0–4) home visits during 3 years. With regard to the psychological characteristics women with a low sense of coherence received significantly fewer preventive home visits compared to women with a high sense of coherence. The other psychological variables were not related to receiving many home visits among the women. The final analyses showed that women with a low sense of coherence and women with a small diversity in social relations (only marginally significant) received more preventive home visits compared to others. Tiredness and need of help in mobility-activities were not related to receiving more preventive home visits among the women.

Adjustment by the intervention did not change the estimates.

The associations between the selected psychosocial variables and the acceptance of home visits were very different for women and men. Inspection of the confidence limits in Tables 4 and 5 shows that the estimates for one gender systematically (e.g., men) is outside the confidence interval of the estimate for the other gender (e.g., women), indicating an interaction with gender for most of the selected psychosocial variables.

Discussion

The primary focus of the present study was on the importance of individual psychological characteristics and social relations for accepting and receiving preventive home visits, which are offered to all home-dwelling 75+ year olds in Denmark. To our knowledge this has never been studied before in other countries.

We found some unexpected gender differences in the results. Among the men the primary finding was that a significantly higher proportion of persons with poor rating on some of the psychological characteristics and with early signs of disability (tiredness in daily activities) accepted and received preventive home visits during a 3 year period compared to older men with higher ratings on these items. This is in disagreement with earlier studies, which showed that persons with positive psychological characteristics had higher adherence to preventive interventions (e.g. Jette et al. 1998; Grembowski et al. 1993). Several potential explanations might be considered for this result. Men with negative feelings may have accepted the preventive home visits because they associated participation in these with an improvement in their mental well-being. The results actually showed that older men who felt tired were more likely to accept the visits (Table 4). Tiredness in daily activities in older adults is a result of multiple potentially modifiable factors, e.g. comorbidity, cognitive decline and poor muscle strength (Avlund et al. 2007c). It is thus plausible that the men may feel more dissatisfied and aggressive because they have physical problems, and that they believe preventive home visits may be a possibility to get help with some of their health problems.

The findings are more complex for the women. On the one hand more women with poor rating on some of the psychological items tended to accept and receive at least one preventive home visit during 3 years compared to women without these characteristics. On the other hand, significantly more women with high social participation and with a strong sense of coherence received preventive home visits compared to others, while early and actual signs of disability were not related to receiving home visits. The finding on the importance of social participation indicates that family/friend environment has been able to encourage the older women to accept the visits, maybe because the social relations serve as models of appropriate behaviour and normative influence, or because they have exerted more direct influence over the person to accept the visits. It is also possible that open minded and social women with many social relations are also more open to receive preventive home visitors. The finding is in agreement with several studies, which showed that strong social relations are frequently associated with better preventive health behaviour, including compliance with preventive and/or therapeutic medical regimens (for a review, see Seeman 2000).

Women with a strong sense of coherence received more preventive home visits than others. One can only speculate about this finding. Sense of coherence is a general expression of an individual's view of the world, including the components comprehensibility, manageability, and meaningfulness. The present finding supports the arguments by Antonovsky (1987) that a strong sense of coherence is crucial to coping with many stressors in life, and consequently to health maintenance. The present finding is thus in agreement with earlier studies, which showed that persons with strong sense of coherence had better adherence to other kinds of preventive interventions (e.g. Sandén-Erikson 2000). The finding indicates that it is the resourceful older women who accept and receive many visits.

Previous analyses on the same data showed that older men had less beneficial effects of the preventive home visits compared to older women (Vass et al. 2004; Avlund et al. 2007a). The present study indicates that these gender differences in effects may be due to self-selection, since it is the mentally and physically frail older men and the resourceful older women who accept the visits.

The present study had focus on the importance of psychological characteristics and social relations for accepting and receiving preventive home visits. We can not exclude the possibility that contextual factors may also play a role, e.g. the general acceptance of preventive offers in the local

environment and the social capital in the municipality. Further, we do not know whether the preventive home visitors put a special effort into persuading the weak older men to receive a preventive home visit.

Strengths of the study included the high number of participants and the low drop-out, which was achieved through vigorous follow-up and high motivation among all participating municipalities. Other strengths include the use of register-based information on preventive home visits during 3 years, well-validated measures of tiredness in daily activities, actual disability (Avlund et al. 1995, 1996) and social relations (Due et al. 1999). The study was not designed for the present purpose, and a limitation of the present analyses is that we used brief global measures of the different aspects of psychological resources instead of validated scales or a more qualitative approach.

In conclusion, psychological characteristics and social relations in older persons seem to influence whether they accept and receive preventive home visits, but the patterns of associations are complex and vary for men and women. The message to the home visitors is that it is important to be aware of these factors when inviting older people to participate in preventive home visits.

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