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Original Article

Educational differences in functional limitations: comparisons of 55–65-year-olds in the Netherlands in 1992 and 2002

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Summary

Objectives: This study compares educational differences in the functional limitations of 55–65-year-olds in the Netherlands in 1992 and 2002 and examines whether changes are explained by cohort lifestyle and psychosocial changes.

Methods: Data from two cohorts of 55–65-year-olds (n = 948 in 1992 and n = 980 in 2002) in the Longitudinal Aging Study Amsterdam are analysed.

Results: Men's disability ratios are similar in both cohorts. The women's disability ratio is higher in 2002 than in 1992. In 2002 the male and female cohorts both report unhealthier behavior than in 1992. Multivariate logistic regression analyses show that adjusted for age, cohort, lifestyle and psychosocial resources, poorly educated men have higher odds of functional limitations than well-educated men (OR = 2.62, 95 % CI = 1.57–4.37). Analyses among women show a significant interaction effect between education and cohort. Poorly educated women have higher odds of functional limitations in 2002 than in 1992 (OR = 3.33, 95 % CI = 1.02–10.87).

Conclusions: The results underscore the need for policies focused on improving the health and lifestyle of the poorly educated.

Key words: Socio-economic health differences – Functional limitations – Health trends – Cohort comparison.

Older people with a low socio-economic status have higher functional disability, morbidity and mortality rates than those with a high socio-economic status. These differences have been observed as regards various socio-economic indicators and health outcomes and assessed in various countries[1–4]. Despite policies designed to reduce socio-economic health differences, there is no indication that they have diminished. Previous trend studies focus on differences between poorly and well-educated people and show persisting or even increasing health differences between these groups in the general population[5] and among older people[6–8].

There are two explanations for the increase in health differences among older people. One is that the higher general educational level has reduced the absolute number of poorly educated people among recent cohorts of 55–65-year-olds. A lower number of poorly educated older people coincides with an increase in the relative number of disabled or other frail people in this group. The other explanation is that there has been a decrease in the prevalence of disability over time. This might be because technological developments in medical science and health care in recent decades have led to improved ways of detecting, diagnosing and treating diseases. As a result, there is greater longevity among older people and lower disability rates[9,10]. Since poorly educated people have more health problems, they might have benefited less from the decreasing prevalence than well-educated people. This should result in increased health differences over time[6–8].

Changes in health differences can thus result from there being fewer poorly educated people as well as from a decrease in the prevalence or severity of disability among well-educated people. However, understanding changes in health differences may be more complicated than merely studying the prevalence of a low educational level and poor health in the population. Education influences health via various pathways, including

health-related behavior and psychosocial resources[11,12]. People with a low socio-economic status generally have a less healthy lifestyle and fewer psychosocial resources. Both factors are associated with negative health outcomes[12–15]. Until now, trends in mediating factors have not been taken into account in trend studies on socio-economic health differences in the older population. Birth cohorts, however, age in different periods and may differ in several health-related characteristics[16,17]. Better economic conditions in the second half of the twentieth century may have caused younger cohorts to have less healthy lifestyles than older cohorts[18]. Socio-economic and socio-cultural developments in society may have contributed to altered psychosocial resources among recent cohorts[19]. If a less healthy lifestyle and changes in psychosocial resources in recent decades have been more marked among poorly educated than well-educated people, this could contribute to an understanding of increased differences in health over time.

Using data from the Longitudinal Aging Study Amsterdam (LASA), in the present study we examine changes in educational differences in functional limitations among 55–65-year-olds in 1992 (birth cohort 1928–1937) and 2002 (birth cohort 1938–1947). This age group is selected because most studies do not include "new" generations of older people, and solely focus on cohorts of people born before World War II who are above 65. We take educational level as our socio-economic status indicator. It is the best indicator of lifetime socio-economic status across age and over time[5]. It reflects people's social position in a comprehensive manner and is causally prior to other socio-economic indicators such as occupational status and income. It is the only indicator that is stable after young adulthood[20,21], and thus reflects opportunities to reach a specific socio-economic status better than income and occupational status. The absence of functional limitations is used as an indicator of health, since these limitations are related to many diseases and are an important predictor of mortality in older populations[22]. Lifestyle factors (BMI, physical activity, smoking, alcohol consumption) and psychosocial resources (partner status, personal network size, support, mastery, work status) are examined as explanatory factors. Three questions are addressed:

1) To what degree do Dutch 55–65-year-old men and women differ in educational level, functional limitations, health behavior and psychosocial resources in 1992 and in 2002?

2) To what degree are there educational differences in functional limitations, health behavior and psychosocial resources in 1992 and in 2002?

3) To what degree do lifestyle and psychosocial resources explain cohort-specific educational differences in functional limitations?

Methods

Study sample

The Longitudinal Aging Study Amsterdam is an ongoing study on the physical, emotional, cognitive and social functioning of older adults[23]. A nationally representative survey was conducted in 1992–1993 among 3107 respondents between the age of 55 and 85. The response rate was 62 %, which is relatively high for surveys in the Netherlands. The sample was stratified by sex and age, and the respondents were randomly selected from the population registers of eleven municipalities in the west, northeast and south of the Netherlands. Data was collected via face-to-face interviews on physical, emotional, cognitive and social functioning and medical interviews with clinical observations. In 2002 a new cohort (birth years 1938–1947, N = 1002) was selected from the population registers of the same municipalities, with a response rate of 57 %.

The birth cohort 1928–1937 (N = 998) was selected from the 1992–1993 data collection, resulting in data from two consecutive birth cohorts in the same age range (55–65) with an interval of ten years. We refer to these cohorts as the *early* (born in 1928–1937) and the *late* cohort (born in 1938–1947). In the present study, respondents with missing data on physical limitations or education are excluded from the sample, resulting in 948 and 980 respondents respectively.

Socio-economic indicator

Level of education is used as the indicator of socio-economic status. Respondents are asked to state their highest level of education. Three educational categories are distinguished: low level (elementary school or less), middle level (lower vocational, general intermediate, intermediate vocational or general secondary school) and high level (higher vocational education, college or university).

Functional limitations

Respondents are asked if they have difficulty performing six common daily activities: walking up and down a fifteen-step staircase without resting, getting dressed and undressed, sitting down and getting up from a chair, cutting their own toenails, walking five minutes outdoors without resting, and driving or using public transport[24]. The response categories are: (0) unable to do that, (1) only with help, (2) with a great deal of difficulty, (3) with some difficulty, and (4) without any difficulty. The sum scores of the six items range from 0 to 24, with lower scores indicating greater functional limitations. The reliability coefficient Cronbach's α is 0.82 in 1992 and 0.79 in 2002. Most respondents (72 %) have the maximum score of 24 and respondents with one or more limitations are distinguished from those without any limitations.

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Covariates

Lifestyle factors include body mass index (BMI), physical activity, smoking and alcohol consumption. BMI is the composite score of body weight in kilograms divided by height in meters squared and is categorized as normal (BMI lower than 25), overweight (BMI between 25 and 30) and obese (BMI 30 or more)[25]. Physical activity is defined as the total number of physical activities (walking, cycling, gardening, light and heavy household chores and sports) in the past two weeks. Three levels are distinguished: low (0–2 activities), moderate (3–4) and high physical activity level (5 or more). Respondents are categorized as people who never smoked, once smoked or still smoke, and as people who do not drink, drink moderately (not daily and/or not more than a few glasses each time) and drink excessively (at least three glasses daily). Missing values for lifestyle factors have been replaced by modal categories in the multivariate analyses: normal weight (N = 188), moderate physical activity (N = 34), once smoked (N = 162) and drinks moderately (N = 165). Not all the respondents participated in the medical interview, which explains the high number of missing values for lifestyle variables.

Psychosocial factors include partner status, personal network size, instrumental support, emotional support, mastery and work status. Partner status indicates whether a respondent has a spouse or partner (yes or no). The size of the personal network is assessed using the domain-contact method. With respect to seven role types, respondents are asked to identify people (other than their partner) they have frequent contact with and who are important to them (range 0–75)[26]. For the nine network members they have the most frequent contact with, information is collected on the intensity of the received instrumental and emotional support (range 0–36, with 0 = no social support and 36 = frequent support from all the network members). Mastery is assessed using a five-item version of the Mastery Scale (range 5–25) with low scores indicating a more external (versus internal) locus of control, i.e. lower mastery[27]. The reliability coefficients Cronbachs α are 0.74 in 1992 and 0.77 in 2002. Work status indicates whether the respondent is employed at the time of the interview (yes or no).

Statistical analyses

Since studies show that trends in health differences are greater in men than women, analyses have been conducted separately for men and women[5,8]. Differences in characteristics between cohorts (research question 1) are determined using chi-square tests for categorical variables and t-test statistics for interval variables. To examine differences in characteristics between educational groups within the cohorts (research question 2) chi-square tests for categorical variables and analyses of variance for interval variables are used. Logistic regression analysis is applied to examine the degree of educational and cohort differences in the functional limitations, and the degree to which these differences are explained by lifestyle factors and psychosocial resources (research question 3). Five models are analysed. The main educational level and cohort effects, adjusted for age, are studied in the first model. The interaction of educational level and cohort is added in the second model. For men, the interaction effect proves to be non-significant, and is not included in the subsequent three models. Lifestyle and psychosocial factors are added separately as explanatory variables in the third and fourth model. The fifth model includes all the predictors. Since the focus is on the effects and changes in odds ratio of these variables, the tables only include the effects of educational level and cohort and the interaction effect for women.

Results

Differences between cohorts

Tab. 1 shows the characteristics of the two cohorts. Men in the late birth cohort have higher levels of education than those in the early cohort. The percentage of men with functional limitations is about 25 % in both cohorts. With respect to lifestyle factors, there is a significant increase in the percentage of obesity and excessive alcohol use. In contrast to this unhealthy behavior, there is an increase in the percentage of men who never smoked. As to psychosocial factors, there is only one cohort difference: men in the late cohort are more often employed than men in the early cohort.

Women in the late cohort are also more often better educated than those in the early cohort (Tab. 1). The percentage of women with physical limitations increases from 23 % in the early cohort to 36 % in the late cohort. In addition, the results show an unhealthier lifestyle in the late cohort. The late cohort includes higher percentages of obese women, women with limited physical activity, women who are former smokers and women who use alcohol than the early cohort. As to the psychosocial factors, there is only a difference in work status, with women in the late cohort more often employed.

Educational differences within cohorts

The second research question pertains to educational differences in both of the cohorts. The men's results are presented in Tab. 2. In both cohorts, functional limitations are more common among poorly educated than well-educated people. Expressed as a disability ratio (the percentage of poorly educated people with functional limitations divided by the percentage of well-educated people with functional limitations), the ratio

is 2.92 (41/14) in 1992 and 2.60 in 2002. The disability ratio for men with a middle level versus a high level of education increases somewhat from 1.57 in 1992 to 1.68 in 2002. As the logistic regression analyses confirm, these changes in the disability ratio over time are not statistically significant. It can be concluded that the educational differences in men's functional limitations persist from 1992 to 2002.

In the early cohort, there are educational differences among men regarding BMI and alcohol consumption (Tab. 2). Being overweight is more common among poorly educated men and alcohol use is more common among well-educated men. In the late cohort, however, there are no educational differences in BMI and alcohol consumption. Poorly educated men are more likely to smoke than well-educated men. Educational differences in psychosocial resources are observed for partner status, personal network size, receiving emotional support and employment, all in favor of men with a higher level of education. With the exception of receiving emotional support and employment, the differences do not occur in the late cohort. It can be concluded that men in the early cohort exhibit educational differences in lifestyle and psychosocial resources, with poorly educated men generally being in a more disadvantaged

Table 1. Characteristics by cohort for men (n = 928) and women (n = 1000).

	Men			Women		
	1992 n = 459	2002 n = 469	p	1992 n = 489	2002 n = 511	p
Educational level (%)			0.00			0.00
– Low	22	19		41	23	
– Middle	57	50		50	64	
– High	21	31		9	13	
Age (55–65, mean)	60.3	59.9	0.07	60.3	59.9	0.07
Functional limitations (% one or more)	25	26	0.29	23	36	0.00
BMI (%)			0.00			0.04
– Normal (<25)	31	24		32	31	
– Overweight (25–<30)	50	51		39	35	
– Obese (≥ 30)	8	17		19	25	
– Missing	11	9		11	8	
Physical activity (%)			0.26			0.00
– Low activity level (0–2)	11	8		5	8	
– Moderate activity level (3–4)	46	50		61	51	
– High activity level (≥5)	40	40		34	39	
– Missing	2	1		1	3	
Smoking (%)			0.00			0.00
– Never smoked	7	14		40	28	
– Once smoked	50	47		30	41	
– Smokes	34	31		22	24	
– Missing	9	8		9	8	
Alcohol consumption (%)			0.00			0.00
– Does not drink	8	4		19	11	
– Drinks moderately	71	70		70	79	
– Drinks excessively	11	18		2	3	
– Missing	10	8		9	8	
Partner status (% with partner)	89	89	0.54	76	79	0.13
Network size (0–75, mean)	15.3	14.8	0.29	15.7	16.1	0.51
Instrumental support (0–36, mean)	14.8	14.9	0.70	14.1	14.8	0.06
Emotional support (0–36, mean)	21.1	20.2	0.09	24.3	24.6	0.59
Mastery (mean, 5–25)	18.3	18.5	0.41	17.7	17.8	0.78
Employed (%)	38	54	0.00	20	32	0.00

Chi^2 values have been computed for categorical variables and t-values for interval variables.

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position. However, the differences decrease as regards four aspects and are insignificant in the late cohort.

Tab. 3 resembles Tab. 2 and shows the educational differences for women. The percentage of poorly educated women reported to have functional limitations is much higher in the late cohort (54%) than the early cohort (24%). As a result, the ratio of educational differences in functional limitations increases considerably from 1.04 in 1992 to 2.84 in 2002, which is about the same disability ratio as among men in the late cohort. The disability ratio of women with a middle level of education compared to that of well-educated women increases from 0.91 in 1992 to 1.68 in 2002. As the logistic regression analysis confirms, only the change from 1992 to 2002 in the disability ratio for poorly educated compared to well-educated women reaches statistical significance.

Women's educational differences in lifestyle factors are negligible in 1992 but clearly in evidence in 2002 (Tab. 3). In both cohorts, poorly educated women are more frequently overweight and obese than women with a higher level of education. Poorly educated women in the late cohort report less physical activity, are more frequently a current smoker and use less alcohol than women with a higher educational level. These differences are not observed in the early cohort. In both cohorts, poorly educated women are more often married but have smaller personal networks, receive less emotional support, have a lower level of mastery and are less often employed than well-educated women. One can conclude that educational differences in lifestyle clearly increase from 1992 to 2002, though differences in psychosocial resources do not change.

Table 2. Characteristics by educational level and cohort for men (n = 928).

	55–65 years in 1992				55–65 years in 2002			
Level of education	**Low n = 102**	**Middle n = 263**	**High n = 94**	**p**	**Low n = 88**	**Middle n = 235**	**High n = 146**	**p**
Age (years, mean)	60.3	60.3	60.1	0.84	60.1	59.9	59.8	0.80
One or more functional limitations (%)	41	22	14	0.00	42	27	16	0.00
BMI (%)				0.01				0.38
– Normal (<25)	17	34	37		16	25	26	
– Overweight (25–<30)	54	49	46		52	53	47	
– Obese (≥ 30)	13	7	7		22	14	19	
– Missing	17	10	10		10	8	8	
Physical activity (%)				0.09				0.93
– Low activity level (0–2)	14	13	4		10	8	7	
– Moderate activity level (3–4)	48	46	44		51	49	51	
– High activity level (≥5)	37	38	51		38	42	40	
– Missing	1	3	1		1	1	1	
Smoking (%)				0.24				0.04
– Never smoked	6	7	7		8	15	17	
– Once smoked	40	52	53		38	46	51	
– Smokes	39	32	33		44	31	25	
– Missing	15	8	6		10	8	7	
Alcohol consumption (%)				0.00				0.55
– Does not drink	17	6	4		6	5	3	
– Drinks moderately	59	72	80		62	70	73	
– Drinks excessively	9	13	11		22	17	17	
– Missing	16	9	5		10	8	7	
Partner status (% with partner)	79	90	96	0.01	86	91	85	0.19
Network size (0–75, mean)	13.4	16.0	15.6	0.05	13.7	14.3	15.8	0.20
Instrumental support (0–36, mean)	14.0	15.4	13.9	0.07	14.5	15.4	14.5	0.41
Emotional support (0–36, mean)	19.1	21.7	21.4	0.02	18.2	19.9	21.8	0.00
Mastery (5–25, mean)	17.9	18.6	18.1	0.19	18.0	18.5	18.9	0.14
Employed (%)	25	43	40	0.01	41	49	64	0.00

Chi^2 values have been computed for categorical variables and F ratios for interval variables

Explanation of differences in functional limitations

The third research question pertains to the degree to which lifestyle and psychosocial resources explain cohort-specific educational differences in functional limitations. Preliminary descriptive analyses (not shown) indicate that lifestyle factors and psychosocial resources are significantly correlated with functional limitations. People with one or more functional limitations have a higher BMI, a lower level of physical activity, a smaller network size (only for men), less emotional support, lower feelings of mastery and more instrumental support (only for women) compared to people without functional limitations.

Tab. 4 presents the odds ratios of educational level and cohort and the interaction terms of education and cohort in the logistic regression analyses among men. Model 1 shows that men with low and middle levels of education have higher odds of one or more functional limitations than well-educated men (OR = 4.20 and 1.88 respectively). There is no significant direct cohort effect, and the non-significant interaction effect (Model 2) confirms that educational differences in functional limitations are estimated to be equal in both cohorts. Model 3 and Model 4 show that in part, unhealthy behavior and psychosocial resources explain educational differences in functional limitations. The odds ratio of low and middle educational level decreases in both models, but remains statistically significant. Even in Model 5, including all the predictors, the odds of low and middle educational levels remain statistically significant (OR = 2.62 and 1.60 respectively).

Model 1, Tab. 5 shows that poorly educated women have significantly higher odds of functional limitations than well-

Table 3. Characteristics by educational level and cohort for women (n = 1000).

	55–65 years in 1992				55–65 years in 2002			
Level of education	**Low n = 201**	**Middle n = 245**	**High n = 43**	**p**	**Low n = 114**	**Middle n = 331**	**High n = 66**	**p**
Age (years, mean)	60.6	60.1	59.8	0.08	60.1	59.9	59.7	0.07
One or more functional limitations (%)	24	21	23	0.79	54	32	19	0.00
BMI (%)				0.04				0.04
– Normal (<25)	24	36	39		27	32	41	
– Overweight (25–<30)	45	34	47		30	36	38	
– Obese (≥ 30)	18	20	12		31	26	11	
– Missing	13	9	12		12	6	11	
Physical activity (%)				0.85				0.02
– Low activity level (0–2)	4	5	7		14	7	2	
– Moderate activity level(3–4)	60	60	67		55	48	55	
– High activity level (≥5)	36	34	26		27	43	36	
– Missing	0	1	0		4	2	7	
Smoking (%)				0.47				0.00
– Never smoked	41	40	28		16	34	20	
– Once smoked	26	32	35		42	38	61	
– Smokes	23	20	26		31	22	18	
– Missing	10	7	12		11	5	11	
Alcohol consumption (%)				0.15				0.00
– Does not drink	23	18	9		21	8	10	
– Drinks moderately	66	72	77		65	84	72	
– Drinks excessively	1	2	2		4	2	8	
– Missing	11	7	12		11	5	10	
Partner status (% with partner)	76	79	56	0.01	80	80	66	0.05
Network size (0–75, mean)	14.5	16.4	17.6	0.02	12.6	16.6	19.8	0.00
Instrumental support (0–36, mean)	14.1	13.9	15.1	0.48	14.3	14.9	14.9	0.70
Emotional support (0–36, mean)	23.4	24.4	27.7	0.00	22.3	24.7	27.8	0.00
Mastery (5–25, mean)	17.4	17.8	18.6	0.08	17.0	17.9	18.7	0.01
Employed (%)	16	20	44	0.00	20	30	57	0.00

Chi^2 values have been computed for categorical variables and F ratios for interval variables.

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educated women (OR = 2.67). A significant effect of cohort indicates that women in the late cohort are more likely to have functional limitations (OR = 2.17). Including the interaction terms of education and cohort in Model 2 improves the model fit and a significant interaction effect of low level of education and cohort is observed (OR = 5.32). This interaction effect implies that the difference between poorly and well-educated women is larger in the late than the early cohort and confirms the observation from the descriptive analyses. Model 3, adjusted for lifestyle, shows that part of the interaction effect between a low level of education and the cohort is due to differences in lifestyle (OR decreases to 3.86). In Model 4, adjusted for psychosocial factors, the interaction effect of Model 2 decreases to OR = 4.83, showing that differences in psychosocial resources explain less of the interaction effect than lifestyle differences. In Model 5, the interaction effect still remains statistically significant (OR = 3.33), revealing that even if an unhealthy lifestyle and low psychosocial resources are taken into account, poorly educated women in the late cohort more often report functional limitations than poorly educated women in the early cohort.

Table 4. Men's odds ratios (OR) and 95 % confidence interval (CI) for one or more functional limitations by educational level and cohort (n = 928).

	Model 1		Model 2		Model 3		Model 4		Model 5	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Level of education										
– Low	4.20	2.65–6.66	4.81	1.03–22.44	3.52	2.17–5.71	3.11	1.91–5.06	2.62	1.57–4.37
– Middle	1.88	1.25–2.84	1.56	0.38–6.41	1.78	1.16–2.72	1.66	1.08–2.54	1.60	1.60–2.50
– High (ref.)	1.00		1.00		1.00		1.00		1.00	
Late cohort (vs. Early cohort)	1.21	0.89–1.65	1.16	0.56–2.43	1.23	0.89–1.71	1.30	0.94–1.80	1.32	0.94–1.86
Interaction education x cohort										
– Low level education x cohort			0.91	0.36–2.32						
– Middle level education x cohort			1.13	0.49–2.62						
– High level education x cohort (ref.)			1.00							
Model Chi^2 (df)	41.2 (4)		41.6 (6)		103.8 (12)		121.4 (10)		182.0 (18)	

All the models have been adjusted for age. Model 3 has been adjusted for lifestyle factors. Model 4 has been adjusted for psychosocial factors. Model 5 has been adjusted for lifestyle and psychosocial factors.

Table 5. Women's odds ratios (OR) and 95 % confidence interval (CI) for one or more functional limitations by educational level and cohort (n = 1000).

	Model 1		Model 2		Model 3		Model 4		Model 5	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Level of education										
– Low	2.67	1.60–4.65	0.19	0.04–1.08	0.25	0.04–1.58	0.13	0.02–0.81	0.20	0.03–1.39
– Middle	1.64	0.99–2.74	0.36	0.07–1.92	0.39	0.07–2.36	0.26	0.05–1.53	0.32	0.05–2.13
– High (ref.)	1.00		1.00		1.00		1.00		1.00	
Late cohort (vs. Early cohort)	2.17	1.60–2.86	0.71	0.28–1.83	0.88	0.32–2.38	0.80	0.30–2.14	1.05	0.37–2.98
Interaction education x cohort										
– Low level education x cohort			5.32	1.84–15.40	3.86	1.25–11.96	4.83	1.59–14.65	3.33	1.02–10.87
– Middle level education x cohort			2.53	0.91–7.00	2.20	0.75–6.47	2.41	0.83–6.97	2.02	0.65–6.25
– High level education x cohort (ref.)			1.00		1.00		1.00		1.00	
Model Chi^2 (df)	41.3 (4)		52.4 (6)		173.6 (14)		139.3 (12)		237.3 (20)	

All the models have been adjusted for age. Model 3 has been adjusted for lifestyle factors. Model 4 has been adjusted for psychosocial factors. Model 5 has been adjusted for lifestyle and psychosocial factors.

Discussion

The main objective of the study has been to gain insight into educational differences in functional limitations among 55–65-year-olds in 1992 and 2002. The first observation is that educational differences in functional limitations persist for men and significantly increase for women. In men and women alike, an increase in the percentage of people with a higher level of education is observed. In men, the educational difference in health does not change. The men's results show that with an increase in the absolute number of well-educated people, the relative inequality does not necessarily change accordingly.

It is more striking, however, that the percentage of poorly educated women is reduced by nearly half from 1992 to 2002. Many women born from 1938 to 1947 are able to take advantage of the increased educational opportunities after World War II and complete some sort of secondary school. It is of even greater interest that the women of the late cohort with only elementary school, if that, report more frequent functional limitations than women with higher levels of education, resulting in increased educational differences in health. With the rising levels of education among older women, the socio-economic gradient in health has become steeper.

These results among 55–65-year-olds corroborate trend studies in other populations showing that the lowest socio-economic groups more often report poorer health in recent decades, i.e. high disability levels and unhealthy life expectancy or mortality rates[5,7]. Other studies do not observe changes in the size of the socio-economic health inequality in older people[9,10], but they do not analyse men and women separately and they use occupational level as an indicator of socio-economic status. Future studies on trends in the socio-economic gradient of health should differentiate by gender and use several indicators of socio-economic status.

In addition to differences in educational level and functional limitations, our study shows that the lifestyle of men and women has become less healthy, with higher rates of obesity, more smoking (by women) and greater alcohol consumption. No significant differences are observed in psychosocial resources, except the work status. The men and women in the late cohort are more often employed. We use indicators of general social resources, but cohort changes may appear in more specific aspects of social integration such as contact and support from family and friends, religious attendance and community participation[19]. A more thorough theoretical and empirical analysis of how psychosocial resources change over time and affect health differences is called for, but is beyond the scope of this article.

Over time, educational differences in lifestyle have decreased among men and increased among women. Again, these findings are indicative of the disadvantaged position of poorly educated women in the late cohort. In addition to poor health, these women also report an unhealthier lifestyle and fewer psychosocial resources than better educated women, and the differences increase in the late cohort. The multivariate regression analyses show that the relatively unhealthy lifestyle and limited psychosocial resources of poorly educated women in 2002 compared to 1992 do indeed partly explain their poor health. Our study confirms that for men as well, lifestyle factors and psychosocial resources play a major role in explaining socio-economic health differences[12].

We examine lifestyle and psychosocial resources as explanations for educational differences in health, but other pathways still remain to be examined in future studies. Possible options might be to explore material resources, living conditions, health care, childhood experiences and coping with stress[11,12,28]. All these factors have been related to educational status and health and may change over cohorts, providing additional explanations for the increasing educational differences over time.

This study can be improved in several ways. It is based on two cohorts only ten years apart. Societal changes such as the increasing number of singles or the banning of smoking in public places can take some time before they start to affect the characteristics of the general population. More observations are also needed to make it possible to draw conclusions about trends in educational differences in health. Observing two points in time enables us to draw conclusions about the differences between two time periods but strictly speaking, drawing conclusions about trends in differences requires at least three or more observations. In addition, the results suggest that 55–65-year-olds in the 1990s differ from people that age at the beginning of the 21st century. We have not gained any insight into whether aging in the 1990s was a different experience than in the new millennium. A cohort-sequential design is needed to study whether educational differences in the onset and progression of health decline are similar for both cohorts.

The results of this study provide evidence of persisting educational differences in functional limitations among 55–65-year-old men. Increasing educational differences in functional limitations have been observed among women in the same age group. A major concern for policy-makers is the position of poorly educated older people, particularly women. Women's unhealthier lifestyle explains a substantial part of the increasing educational differences. Increasing attention is being devoted to certain population subgroups in health policy in the Netherlands, but more interventions should be focused on

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low socio-economic status groups and specific age groups[29,30]. Interventions to improve lifestyles may be useful in lowering the risk of poor health in old age, particularly among poorly educated women.

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References

1. Bassuk S, Berkman LF, Amick III BC. Socioeconomic status and mortality among the elderly: Findings from four US communities. Am J Epidemiol 2002;155:520–33.

2. Grundy E, Glaser K. Socio-demographic differences in the onset and progression of disability in early old age: A longitudinal study. Age Ageing 2000;29:149–57.

3. Huisman M, Kunst AE, Mackenbach JP. Socioeconomic inequalities in morbidity among the elderly: A European overview. Soc Sci Med 2003;57:861–73.

4. Marmot MG, Shipley MJ. Do socioeconomic differences in mortality persist after retirement? 25 Year follow up of civil servants from the first Whitehall study. Brit Med J 1996;313:1177–80.

5. Crimmins EM, SaitoY. Trends in healthy life expectancy in the United States, 1970–1990: gender, racial, and educational differences. Soc Sci Med 2001;52:1629–41.

6. House JS, Lantz PM, Herd P. Continuity and change in the social stratification of aging and health over the life course: Evidence from a nationally representative longitudinal study from 1986 to 2001/2002 (Americans' Changing Lives Study). J Gerontol 2005;S15–26.

7. Schoeni RF, Martin LG, Andreski PM, Freedman VA. Persistent and growing socioeconomic disparities in disability among the elderly: 1982–2002. Am J Public Health 2005;95:2065–70.

8. Sulander T, Martelin T, Sainio P, Rahkonen O, Nissinen A, Uutela A. Trends and educational disparities in functional capacity among people aged 65–84 years. Int J Epidemiol 2006;35:1255–61.

9. Ahacic K, Parker MG, Thorslund, M. Mobility limitations 1974–1991: Period changes explaining improvement in the population. Soc Sci Med 2003;57:2411–22.

10. Fors SF, Lennartsson C, Lundberg O. Health inequalities among older adults in Sweden 1991–2002. Eur J Public Health 2008;18:138–43.

11. House JS. Understanding social factors and inequalities in health: 20th century progress and 21st century prospects. J Health Soc Behav 2002;43:125–42.

12. Van Lenthe FJ, Schrijvers CTM, Droomers M, Joung IMA, Louwman MJ, Mackenbach JP. Investigating explanations of socio-economic inequalities in health. The Dutch GLOBE study. Eur J Public Health 2004;14:63–70.

13. Kubzansky LD, Berkman LF, Glass TA, Seeman TE. Is educational attainment associated with shared determinants of health in the elderly? Findings from the MacArthur Studies of Successful Aging. Psychosom Med 1998;60:578–85.

14. Lantz PM, Lynch JW, House JS, et al. Socioeconomic disparities in health change in a longitudinal study of US adults: The role of health-risk behaviours. Soc Sci Med 2001;53:29–40.

15. Siegrist J, Marmot M. Health inequalities and the psychosocial environment— two scientific challenges. Soc Sci Med 2004;58:1463–73.

16. Kawachi I, Subramanian SV, Almeida-Filho N. A glossary for health inequalities. J Epidemiol Commun H 2002;56:647–52.

17. Freedman VA, Martin LG. Commentary: Dissecting disability trends-concepts, measures, and explanations. Int J Epidemiol 2006;35:1261–63.

18. Visser M, Pluym SF, Van der Horst MHL, Poppelaars JL, Seidell JC, Deeg, DJH. [Lifestyle of Dutch people aged 55–64 years less healthy in 2002/2003 than in 1992/1993]. Ned Tijdschr Genees 2005;194:2973–78. [Article in Dutch]

19. Ajrouch KJ, Akiyama H, Antonucci TC. Cohort differences in social relations among the elderly. In: Wahl H-W, Tesch-Römer C, Hoff A, eds. New dynamics in old age: Individual, environmental, and societal perspectives. Amityville, NY: Baywood, 2007:43–63.

20. Ross CE, Wu C. The links between education and health. Am Sociol Rev 1995;60:719–45.

21. von dem Knesebeck O, Verde PE, Dragano N. Education and health in 22 European countries. Soc Sci Med 2006;63:1344–51.

22. Guralnik JM, Fried LP, Salive ME. Disability as a public health outcome in the aging population. Annu Rev Publ Health 1996;17:25–46.

23. Deeg DJH, Van Tilburg TG, Smit JH, De Leeuw ED. Attrition in the Longitudinal Aging Study Amsterdam: The effect of differential inclusion in side studies. J Clin Epidemiol 2002;55:319–28.

24. Van Sonsbeek J. Methodological and substantial aspects of the OECD indicator of chronic functional limitations. Maandbericht Gezondheid (CBS) 1988;88:4–17.

25. Heiat A, Vaccarino V, Krumholz HM. An evidence-based assessment of federal guidelines for overweight and obesity as they apply to elderly persons. Arch Intern Med 2001;161:1194–1203.

26. Van Tilburg TG. Losing and gaining in old age: Changes in personal network size and social support in a four-year longitudinal study. J Gerontol 1998;313–23.

27. Pearlin LI, Schooler C. The structure of coping. J Health Soc Behav 1978;19:2–21.

28. Adler NE, Rehkopf DH. US disparities in health: Descriptions, causes and mechanisms. Annu Rev Publ Health 2008;29:235–52.

29. De Hollander AEM, Hoeymans N, Melse JM, Van Oers JAM, Polder JJ. [Care for Health. Public Health Forecast 2006]. Bilthoven: RIVM 2006. [Report in Dutch]

30. Mackenbach JP, Bakker MJ. Tackling socioeconomic inequalities in health: analysis of European experiences. Lancet 2003;362:1409–14.

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