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ORIGINAL REPORT

LIFE SATISFACTION IN SPOUSES OF STROKE SURVIVORS AND CONTROL SUBJECTS: A 7-YEAR FOLLOW-UP OF PARTICIPANTS IN THE SAHLGRENSKA ACADEMY STUDY ON ISCHAEMIC STROKE

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Objective: **To investigate life satisfaction in spouses of middle-aged stroke survivors from the long-term perspective and to identify factors that explain their life satisfaction.**

Design: **Cross-sectional, case-control study.**

Subjects: Cohabitant spouses of survivors of ischaemic stroke aged < 70 years at stroke onset (*n* = 248) and spouses of controls (*n* = 246).

Methods: **Assessments were made 7 years after inclusion to the study. Spouses' life satisfaction was assessed with the Fugl-Meyer's Life Satisfaction Check-List (LiSAT 11). Stroke-related factors were examined with the National Institutes of Health stroke scale, Mini-Mental State Examination, Barthel Index and modified Rankin Scale.**

Results: **Spouses of stroke survivors had significantly lower satisfaction with general life, leisure, sexual life, partner relationship, family life, and poorer somatic and psychological health than spouses of controls. Caregiving spouses had significantly lower scores on all life domains except vocation and own activities of daily living than non-caregiving spouses. Spouses' satisfaction on different life domains was explained mainly by their age, sex, support given to the partner, and the survivor's level of global disability, to which both physical and cognitive impairments contributed.**

Conclusion: **Seven years after stroke, spouses of stroke survivors reported lower life satisfaction compared with spouses of controls. Life satisfaction in stroke survivors' spouses was associated with spouses' age, sex, giving support, and the stroke survivors' level of global disability.**

Key words: partner; family caregiver; health; cross-sectional study; patient.

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Many stroke survivors experience stroke-related impairments that also restrict their spouse, who may be unable to resume the life they lived before their partner's stroke. The spouse's life situation as caregiver up to 3 years after stroke has been well studied (1–3). Stroke may have an impact on spouses' health, with increased risk of development of anxiety and depression (4). Spouses of stroke-survivors report having less time for leisure activities, relaxation, hobbies and social relationships (3, 5). Moreover, work-related activities (5) and finances (6) may be affected. All these life aspects are related to general life satisfaction, i.e. a subjective, overall judgment about life as a whole. Life satisfaction is considered to be relatively stable throughout an individual's lifetime, but can be changed by major life events (7). Consequently, we and others have shown that, during the first years after stroke, the new life situation for spouses may affect their life satisfaction (1, 2).

There is a lack of studies concerning the long-term consequences of stroke beyond the first years. Such studies are important, especially with respect to spouses of young and middle-aged stroke survivors, as both spouses and stroke survivors in this age group have a long life expectancy (8). Moreover, recent reports show a world-wide increasing prevalence of young and middle-aged stroke survivors (9), related to the increasing incidence and low case-fatality in this age-group. From the Sahlgrenska Academy Study on Ischemic Stroke (SAHLSIS), we recently reported impaired health-related quality of life (HRQoL) (i.e. perceived physical and mental health and impact on life 7 years after stroke) among spouses (10), with a poorer life situation among spouses of stroke survivors who had depressive symptoms, cognitive impairments, and functional dependence. These results indicate that the negative effects on spouses as caregivers are long-lasting, and that long-lasting support for the stroke-affected families is an important challenge (10).

Studies of the spouses' general life satisfaction as well as satisfaction within important life domains may contribute more detailed knowledge about the spouses' experience of the negative and difficult aspects of their life. Such knowledge is essential for the development of targeted interventions. Previous research up to 3 years after stroke has shown that the spouses' life satisfaction is influenced by the stroke

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survivors' cognitive, physical, and self-care abilities (1, 11), as well as the spouses' physical, intellectual, and psychological capacities (1), life experience, and life expectations (12). However, as all of these factors can change over time, the impact of stroke on spouses' life satisfaction from the long-term perspective represents a gap in current knowledge. Therefore, the aims of this study were: (*i*) to explore general life satisfaction as well as satisfaction within important life domains in spouses of stroke survivors 7 years after stroke onset compared with spouses of healthy subjects, and (*ii*) to identify explanatory factors for life satisfaction based on sociodemographic and stroke-related variables.

METHODS

Study design and subjects

This is a cross-sectional, exploratory case-control study. The study population consists of spouses of stroke survivors and spouses of healthy control subjects from a 7-year follow-up of participants in SAHLSIS (13). SAHLSIS comprises 600 patients with ischaemic stroke before the age of 70 years and 600 control subjects. The patients were recruited at 4 acute stroke care units in western Sweden between 1998 and 2003 (13). For each patient, one healthy subject who was matched for age (± 1 year), sex, and geographical area of residence was randomly selected from participants in a population-based health survey or the Swedish Population Register. Inclusion and exclusion criteria of SAHLSIS are described elsewhere (13).

Surviving participants and their cohabitant spouses were invited to a follow-up study 7 years after inclusion, as described in detail elsewhere (10). The spouses were invited after approval by the stroke survivors or by the controls. At the 7-year follow-up, 299 cohabitant stroke survivors and 344 cohabitant controls were available for the study. In total, 248 spouses of stroke survivors and 246 spouses of control subjects agreed to participate. Analysis of the drop-outs between index stroke and the 7-year follow-up has been presented elsewhere (10). In brief, among patients lost between baseline and the 7-year follow-up, there were more severe strokes and more males (10). Of the remaining participants, 20 stroke survivors and 46 controls did not give consent for the researchers to contact their spouses. Thirty-one spouses of stroke survivors and 53 spouses of controls declined to participate. There were no statistically significant differences regarding age, sex, or stroke-related variables between those who were included in the study and those who declined to participate (10).

Procedure and assessments

Spouses. Sociodemographic data of the spouses including age, sex, occupation, and education, and assessments of support given, as well as life satisfaction, were obtained via a postal self-administered questionnaire.

Spouses' perception of whether they gave support was assessed with the question "does your partner need support and help from you?" The answer categories were: "no, not at all" and "yes, partially or completely". The question did not cover the amount or type of support given.

Spouses' satisfaction with life was assessed with Fugl-Meyer's Life Satisfaction Check-List (LiSAT 11) (14). The instrument has been used for studying life satisfaction in healthy subjects in Scandinavia. The LiSAT consists of 11 domains: general life satisfaction, satisfaction with vocation (including housework), economy, leisure, contacts with friends and acquaintances, sexual life, satisfaction with personal activities of daily living (ADL), family life, partner relationship, somatic health, and psychological health (14). The response categories vary from 1 =" very dissatisfying" to 6 ="very satisfying" and can be dichotomized into "not satisfied" (categories 1–4) and "satisfied" (categories 5–6) (14). LiSAT 11 has been shown to have an acceptable test-retest reliability, specificity, and sensitivity (14).

Stroke survivors. Data from stroke survivors were collected by face-to-face assessments performed by a research physician and a research nurse. Cognitive impairments were screened using the Mini Mental State Examination (MMSE) (15). Stroke-related neurological deficits were studied with the National Institutes of Health Stroke Scale (NIHSS) (16, 17); the score range is 0–42, where 42 indicates severe neurological impairments (16, 17). For practical reasons, data on these impairments could only be obtained from participants living close to the Sahlgrenska University Hospital, i.e. those recruited at this hospital (n=170). Home visits were made by the research nurse and the research physician to those who were not able to travel to the hospital. The stroke survivors' basic daily life activities were assessed with the Barthel ADL Index (BI) (18). Level of global disability was assessed according to the modified Rankin Scale (mRS) (19), with scores from 0 to 6, where 0 indicates no symptoms and 6 indicates death (19). Both BI and mRS were assessed in a face-to-face interview by the research nurse among those recruited at the Sahlgrenska University Hospital, whereas telephone interviews were conducted by the research nurse among those recruited at the other hospitals.

Controls. Data from controls were collected using a postal self-administered questionnaire including questions about sociodemographic features (10).

Written, informed consent was obtained from all participants, who also approved merging of data from the different groups. The study was approved by the Regional Ethical Review Board in Gothenburg (reference number 413–04, 622–06).

Statistical analysis

Data were analysed with SPSS (version 21, SPSS, Inc., Chicago, IL, USA). Categorical variables are presented as number, percentage, and 95% confidence interval (CI) for the percentage, and continuous variables are shown as mean, median, SD, and Q1–Q3. The Life Satisfaction Checklist's 11 domains were dichotomized into "not satisfied" (categories 1–4) and "satisfied" (categories 5–6) (14).

Most of the variables had a skewed distribution; therefore, non-parametric statistical tests were used. For comparison between 2 independent groups, a Mann–Whitney *U* test was used for continuous variables and χ^2 test for dichotomous variables. Spearman's rank correlation test was used to investigate correlation between the domains of the LiSAT 11 and spouses' age, education (full scale), as well as patient-related variables such as mRS, MMSE, NIHSS, and BI. Mantel-Haenszel χ^2 test was used to find associations between ordered categorical variables and binary variables, such as spouses' sex and support given.

Stepwise logistic regression analysis was applied to identify the explanatory factors for the dichotomized spouses' life satisfaction. A regression model was built for each domain of the LiSAT 11. The range of BI scores (0–100) and spouses' age (21–82 years) was wide; therefore, the scores were divided by

10 to facilitate the interpretation of odds ratios (OR). First, significant explanatory variables were identified by analysing each of the independent variables for each dependent variable, using univariate logistic regression. Then, all significant ($p<0.05$) variables were included into a stepwise forward logistic regression model using only data from the Sahlgrenska University Hospital population ($n=170$). If the final model included only independent variables available for the entire study population ($n=248$), the model was re-analysed for the entire study population. The area under the receiver operating characteristic (ROC) curve is given as a description of the goodness of the predictors. All significance tests were 2-sided and conducted at the 5% significance level. No adjustments were made for multiple comparisons.

RESULTS

Study population

Sociodemographic data for the participants and stroke-related features for stroke survivors at 7-year follow-up are shown in Table I. There were no statistically significant differences between the 2 groups of spouses regarding demographic features, nor were there any statistically significant differences between stroke survivors and healthy subjects with regard to sex and education. However, more spouses of stroke survivors gave support compared with spouses of controls. Furthermore, stroke survivors were slightly younger and less likely than controls to be employed full- or part-time.

Life satisfaction of the spouses. Most spouses of stroke survivors (>70%) were satisfied with their personal ADL, family life, partner relationship, and psychological health (Table II). A lower proportion (56–67%) were satisfied with their life as a whole, vocation, economy, leisure, as well as their somatic health. Only one-third of the spouses of stroke survivors were satisfied with their sexual life. However, compared with the spouses of controls, the spouses of stroke survivors

Table I. Characteristics of the study population

	Spouses of stroke survivors ($n=248$)[a]	Spouses of control subjects ($n=246$)[a]	Stroke survivors ($n=248$)[a]	Control subjects ($n=246$)[a]
Sex, male, *n* (%)	86 (35)	85 (35)	163 (66)	162 (66)
Age, years[b], mean (SD)	63 (11)	64 (9)	64 (11)	65 (9)
Median (range)	64 (21–82)	65 (30–80)	66 (26–77)	67 (27–77)
Education, *n* (%)				
Secondary or less	96 (39)	71 (29)	92 (37)	83 (34)
High school	77 (31)	90 (37)	87 (35)	87 (36)
University or more	75 (30)	85 (34)	68 (27)	74 (30)
Occupation, *n* (%)				
Employed full-/part -time	105 (42)	97 (39)	64(26)	104 (42)
Student full-/part-time	4 (2)	0 (0)	2 (1)	1 (1)
Sick-leave full-/part-time	3 (1)	6 (2)	4(2)	2 (1)
Sick compensation full-/part-time	12 (5)	14 (6)	51 (21)	6 (2)
Retired	126 (50)	132 (54)	148 (60)	147 (60)
Job-seeker	5 (2)	6 (2)	2 (1)	3 (1)
Other	14 (6)	12 (5)	12 (5)	9 (4)
Supporting a partner, *n* (%)[c]				
Yes	79 (32)	8 (3)	–	–
No	168 (68)	237 (97)	–	–
Gets support, *n* (%)				
Yes	13 (5)	–	–	–
No	122 (50)			
Not relevant	111 (45)			
Stroke-related variables, median Q_1–Q_3				
NIHSS[d]	–	–	0 (0–2)	–
MMSE[d]	–	–	28 (26–29)	–
BI	–	–	100 (95–100)	–
mRS	–	–	2 (1–2)	–
Stroke survivors without support from their spouses, median Q_1–Q_3				
NIHSS[d]			0 (0–0)	
MMSE[d]			28 (27–29)	
BI			100 (100–100)	
mRS			2 (1–2)	
Stroke survivors with support from their spouses, median Q_1–Q_3*				
NIHSS[d]			3 (1–9)	
MMSE[d]			26 (21–27)	
BI			90 (65–100)	
mRS			3 (2–4)	

[a]Sum may vary due to missing data. The sum is not equal to 100% due to multiple alternative answers. [b]Statistically significant difference between stroke survivors and control subjects. Controls were significantly older than stroke survivors ($p=0.010$). [c]Statistically significant difference between study and control groups ($p<0.05$). [d]Patients recruited at Sahlgrenska University Hospital ($n=170$). *Statistically significant differences ($p<0.001$) between stroke survivors without support from their spouses and those with support from their spouses.
NIHSS: National Institutes of Health Stroke Scale, MMSE: Mini-Mental State Examination, BI: Barthel Index, mRS: modified Rankin Scale; Q: quartile.

scored significantly lower on life satisfaction in most of the life domains except vocation, economy, social contacts, and personal ADL.

The spouses of stroke survivors who reported giving support to their partners were less satisfied in all of the LiSAT domains except economy and personal ADL than the spouses who did not give support (Table III).

There were no differences between the male and the female spouses of controls on any of the LiSAT domains. In contrast, compared with the male spouses, the female spouses of stroke survivors were significantly less satisfied with their partner relationship (70% vs 86%, $p<0.01$) and psychological health (68% vs 85%, $p<0.01$); however, they were more satisfied with their personal ADL than were the male spouses (97% vs 87%, $p<0.001$). When comparing the spouses of stroke survivors vs the spouses of controls, the female spouses of stroke survivors were significantly less satisfied than the female spouses of controls concerning satisfaction with life as a whole (63% vs 83%, $p<0.001$), leisure (55% vs 74%, $p<0.001$), sex life (31% vs 44%, $p=0.028$), family life (77% vs 90%, $p=0.002$), partner relationship (7% vs 88%, $p<0.001$), somatic health (57% vs 68%, $p<0.001$), and psychological health (65% vs 85%, $p<0.001$). The male spouses of stroke survivors were less satisfied with their personal ADL than the male spouses of controls (87% vs 96%, $p<0.05$).

Factors associated with the life satisfaction of spouses of stroke survivors

The life satisfaction of the spouses was associated with their demographic characteristics. As shown in Table IV, (*i*) younger age was associated with a higher degree of satisfaction with life as a whole, sexual life, their ability in personal ADL, somatic and psychological health; (*ii*) older age was associated with satisfaction with economy and social contacts; and (*iii*) the higher the spouses' education, the less satisfied they were with social contacts and partner relationship.

Stroke-related variables were mainly associated with the following LiSAT domains: (*i*) satisfaction with life as a whole was related to the level of cognitive impairment and stroke severity in the patient; (*ii*) satisfaction with leisure and with partner relationship was related to the level of global disability in the patient; (*iii*) satisfaction with sexual life was related to the level of cognitive impairment and global disability of the stroke survivor; and (*iv*) satisfaction with psychological health was related to the level of cognitive impairment in the stroke survivor (Table IV).

Table II. Proportion of spouses of stroke survivors and spouses of control subjects satisfied with different Fugl-Meyer's Life Satisfaction Check-List (LISAT-11) life domains

	Spouses of stroke survivors ($n=248$)		Spouses of controls ($n=246$)		
Satisfied with	*n* (%)	95% CI	*n* (%)	95% CI	*p*-value[1]
Life as a whole	161 (66)	60–72	196 (80)	75–85	**<0.001**
Vocation	158 (65)	59–71	164 (68)	62–74	0.52
Economy	165 (67)	61–73	181 (74)	68–79	0.11
Leisure	143 (59)	52–65	181 (74)	68–79	**<0.001**
Contacts	153 (62)	56–69	172 (70)	65–76	0.07
Sexual life	73 (31)	25–37	100 (42)	36–49	**<0.05**
ADL	229 (94)	91–98	235 (96)	93–98	0.30
Family life	191 (79)	74–84	219 (90)	86–94	**<0.01**
Partner relationship	184 (76)	70–81	218 (90)	86–94	**<0.001**
Somatic health	136 (56)	49–62	168 (69)	63–74	**<0.01**
Psychological health	181 (74)	68–79	205 (84)	68–79	**<0.01**

[1]Statistics: Pearson χ^2 test, 2-tailed. Bold text shows statistically significant differences between spouses of stroke survivors and spouses of control subjects.
ADL: activities of daily living; 95% CI: 95% confidence interval, counted for the observed percentage.

Table III. Proportion of spouses satisfied with specific Fugl-Meyer's Life Satisfaction Check-List (LISAT-11) life domains, according to support given to stroke survivor

	Does not support ($n=168$)		Supports ($n=79$)		
Satisfied with	*n* (%)	95% CI	*n* (%)	95% CI	*p*-value[a]
Life as a whole	128 (77)	72–84	32 (41)	30–52	**<0.001**
Vocation	120 (74)	67–81	37 (47)	36–58	**<0.001**
Economy	117 (71)	64–78	47 (60)	49–71	0.16
Leisure	118 (72)	65–79	24 (30)	20–40	**<0.001**
Contacts	117 (71)	64–80	35 (44)	33–55	**<0.001**
Sexual life	66 (42)	59–73	7 (9)	2–15	**<0.001**
ADL	157 (96)	93–99	71 (90)	83–97	0.20
Family life	142 (87)	82–92	48 (62)	51–73	**<0.001**
Partner relationship	139 (85)	80–91	45 (58)	47–69	**<0.001**
Somatic health	105 (64)	57–71	30 (38)	27–49	**<0.01**
Psychological health	136 (82)	76–88	44 (56)	45–67	**<0.001**

[a]Statistics: Pearson χ^2 test, 2-tailed. Bold text shows statistically significant differences between spouses who supported stroke survivors and those who did not.
ADL: activities of daily living; 95% CI: 95% confidence interval, counted for the observed percentage.

Explanatory factors for the life satisfaction of spouses of stroke survivors

The stepwise logistic regression analysis included both sociodemographic variables of the spouses, such as spouses' age, sex, education, support to stroke survivor and stroke-related variables, such as BI, mRS, MMSE and NIHSS. The results are given in Table V. Support to the stroke survivor was an independent explanatory factor for life satisfaction as a whole and most satisfaction domains except for vocation and economy. Furthermore, spouses' higher age increased the odds of being satisfied with economy, but decreased the odds of being satisfied with sexual life and personal ADL. Being a woman decreased the odds of being satisfied with partner relationship and psychological health. Higher education decreased the odds of being satisfied with contacts and partner relationship. Concerning mRS and BI, the results showed that spouses

Table IV. Association between life satisfaction of spouses of stokes survivors, their demographic data, and stroke-related variables (shown as Spearman's rank correlation coefficient and *p*-value)

Spouses LiSAT	Age (spouses)	Education (spouses)	mRS	MMSE	NIHSS	BI
Life as a whole	**−0.18**	0.03	**−0.27**	**0.35**	**−0.33**	**0.26**
	0.004	0.68	**<0.001**	**<0.001**	**<0.001**	**<0.001**
Vocation	−0.09	−0.07	**−0.18**	0.12	−0.13	**0.15**
	0.18	0.29	**0.006**	0.12	0.10	**0.028**
Economy	**0.13**	0.06	**−0.17**	**0.16**	−0.08	0.09
	0.040	0.32	**0.010**	**0.039**	0.32	0.16
Leisure	−0.02	−0.10	**−0.34**	**0.24**	**−0.29**	**0.23**
	0.79	0.12	**<0.001**	**0.002**	**<0.001**	**0.001**
Contacts	**0.13**	**−0.19**	**−0.25**	0.14	**−0.25**	0.10
	0.042	**0.003**	**<0.001**	0.07	**0.001**	0.14
Sexual life	**−0.31**	0.01	**−0.31**	**0.35**	**−0.25**	**0.25**
	<0.001	0.84	**<0.001**	**<0.001**	**0.002**	**<0.001**
ADL	**−0.31**	0.06	−0.08	**0.19**	−0.13	**0.20**
	<0.001	0.35	0.23	**0.012**	0.10	**0.003**
Family life	0.06	−0.09	**−0.21**	**0.24**	**−0.25**	0.09
	0.32	0.19	**0.002**	**0.003**	**0.001**	0.16
Partner relationship	0.02	**−0.15**	**−0.30**	**0.29**	**−0.29**	**0.18**
	0.74	**0.017**	**<0.001**	**<0.001**	**<0.001**	**0.008**
Somatic health	**−0.25**	0.08	**−0.20**	**0.26**	**−0.18**	**0.18**
	<0.001	0.23	**0.002**	**0.001**	**0.020**	**0.006**
Psychological health	**−0.16**	0.00	**−0.22**	**0.32**	**−0.22**	**0.14**
	0.013	0.95	**<0.001**	**<0.001**	**0.005**	**0.036**

NIHSS: National Institutes of Health Stroke Scale (0 no symptoms – 42 severe neurological impairments), MMSE: Mini-Mental State Examination (0 severe cognitive impairments – 30 no symptoms); mRS: modified Rankin Scale (0 = no symptoms to 5 = severe disability); BI: Barthel Index (range 0–100, where 100 means independence in mobility and basic self-care); ADL: activities of daily living; LISAT-11: Fugl-Meyer's Life Satisfaction Check-List.

Table V. Explanatory factors for spouses' life satisfaction. Statistics: stepwise logistic regression analysis. Only significant independent explanatory variables are shown

Outcome variable[a]	Independent variables	Adjusted odds ratio[b] (95% CI)	Adjusted *p*-value	Area under ROC curve
Life as a whole	Supports the stroke survivor	0.19 (0.10–0.35)	<0.001	0.63
Vocation	BI	1.35 (1.14–1.64)	0.001	0.56
Economy	mRS	0.68 (0.52–0.88)	0.003	0.66
	Age (spouse)	1.47 (1.22–1.93)	0.005	
Leisure	Supports the stroke survivor	0.31 (0.14–0.67)	0.003	0.72
	mRS	0.67 (0.48–0.93)	0.017	
Contacts	Supports the stroke survivor	0.33 (0.18–0.62)	<0.001	0.61
	Education (spouse)	0.65 (0.47–0.91)	0.011	
Sexual life	Supports the stroke survivor	0.19 (0.08–0.45)	<0.001	0.63
	Age (spouse)	0.73 (0.55–0.96)	0.027	
ADL	Age (spouse)	0.28 (0.11–0.74)	0.011	0.74
Family life	Supports the stroke survivor	0.24 (0.12–0.47)	<0.001	0.64
Partner relationship	Supports the stroke survivor	0.36 (0.15–0.89)	0.028	0.76
	Sex (spouse)	2.98 (1.33–6.68)	0.008	
	Education (spouse)	0.63 (0.43–0.94)	0.022	
	mRS	0.66 (0.45–0.97)	0.035	
Somatic health	Supports the stroke survivor	0.38 (0.21–0.68)	0.001	0.58
Psychological health	Supports the stroke survivor	0.26 (0.13–0.50)	<0.001	0.64
	Sex (spouse)	3.75 (1.68–8.41)	0.001	

[a]LiSAT domains are dichotomized: 0 not satisfied and 1 satisfied.
[b]Adjusted odds ratio (aOR) for being satisfied with each domain of the LiSAT is associated with one unit increase in the independent explanatory variables for spouses' support to the patient (0 no, not at all, 1 yes, partially or completely), sex (0 women, 1 men), survivors' mRS (0 = no symptoms to 5 = severe disability), and spouses' education; 10 units increase in the independent explanatory variables for spouses' age and survivors' BI (range 0–100, where 100 means independence). BI: Barthel Index; mRS: modified Rankin scale; ADL: activities of daily living; 95% CI: 95% confidence interval; ROC: receiver operating characteristic; LISAT-11: Fugl-Meyer's Life Satisfaction Check-List.

of dependent and disabled stroke survivors were less satisfied with economy, leisure, partner relationship, and vocation.

DISCUSSION

This follow-up study 7 years after stroke onset found that spouses of stroke survivors as well as spouses who supported their partners with stroke scored lower on satisfaction in most of the life domains compared with spouses of controls or spouses who did not support their partners. Moreover, spouses' age, sex, support given to their partner, and partner's stroke-related disability were identified as important determinants of life satisfaction.

Two-thirds of the spouses of stroke survivors in the study were satisfied with their lives as a whole, yet they scored lower than the spouses of controls. Previously performed short-term studies (1, 20, 21) have reported somewhat lower proportions of satisfied spouses of stroke survivors compared with the current, long-term, cross-sectional study. Given that satisfaction with life as a whole after the partners' stroke has previously been explained by spouses' coping abilities (2, 22), the adaptation to the new life situation might contribute to the difference between short- and long-term follow-up studies. However, as our study was cross-sectional, it is not possible to draw conclusions about changes in life satisfaction during the 7 years post-stroke. Thus, further longitudinal studies extending over several years after stroke are warranted.

The proportion of spouses who were satisfied with the various LiSAT domains differed according to the specific domain, and the ordering of this was similar in spouses of stroke survivors and controls. In both groups, the spouses were most satisfied with their own ADL and least satisfied with sexual life. The same ordering of the proportion of satisfied persons per domain has been reported previously in a Swedish population (14). Moreover, the proportions of satisfied spouses, especially in the social domains, were lower among spouses of stroke survivors compared with both the controls and Swedish population-based reference values (14).Taken together, our results emphasize that low life satisfaction in spouses remains a challenge 7 years after stroke.

Support given by spouses was the main variable that was associated with the spouses' satisfaction concerning several life domains. At follow-up, 91% of the stroke survivors had neurological deficits corresponding to mild stroke. In spite of this, 32% of the spouses stated that they gave some sort of support. However, given support is a broad concept and can include psychological as well as practical support in

everyday life (23). It has been shown previously that spouses who were prepared to give support and had a good relationship with their partner showed increased life satisfaction from 12 to 24 months post-stroke (20). In contrast, life satisfaction decreased in spouses who experienced giving support as demanding (11). Although the present study does not include data that investigates the spouses' lived experience of giving support, the results are in line with the importance of education and empowerment of the spouses in their caregiver role also from the long-term perspective (24).

Caregiving spouses scored lower on satisfaction on most of the life domains except economy and ADL, compared with non-caregiving spouses as well as spouses of controls. Similar results have previously been reported in studies up to 3 years post-stroke (3, 5, 25). In these studies, satisfaction concerning these life domains was affected because of the stroke survivors' health (25), as well as their activity limitations in everyday life related to impaired cognitive and physical functions (5), which is also comparable to the findings in the present study 7 years post-stroke. As all of the LiSAT domains are important for maintaining health and wellbeing (26), our results support the importance of early and persisting targeted support for the spouses to maintain a balance between these activities in their everyday life.

Satisfaction with different aspects of health was lower in the spouses of stroke survivors compared with the spouses of control subjects. It is well known that caregivers are at risk of reduced psychological health (3, 10, 27, 28), yet there is little evidence that caregivers experience poorer somatic health than non-caregivers. Berglund et al. (29) showed that informal caregiving may affect psychological as well as physical wellbeing 9 months after they have taken on a caregiving role. Moreover, we recently reported reduced psychological as well as physical wellbeing assessed by SF-36 in the present study population (10). Other studies report that being a woman, caregiving strain, as well as decreased ability to participate in meaningful activities and lack of social engagement have all been identified as risk factors for decreased health (26, 29). In addition, it can be assumed that shared lifestyle factors could have an impact on both partners' health from the long-term perspective (3). Thus, an individualized family-centred approach in stroke rehabilitation may be beneficial for promoting spouses' health from the long-term perspective (30, 31).

We found differences in life satisfaction between female and male spouses of stroke survivors concerning partner relationship and psychological health. This deviates from a previous study where no differences were found related to spouses' sex 4 and 12 months post-stroke (1). Furthermore, in the present study the female spouses of stroke survivors scored significantly lower on most of the life domains compared with the female spouses of controls, whereas differences between the males in the 2 groups were solely found for one life domain; personal ADL. Saban & Hogan (32) have shown that female caregivers struggle to cope with multiple family, work, and social demands. It can be assumed that role-related multiple life demands after the partner's stroke (32) as well as sex differences in coping behaviour (33) may play a significant role. It has been reported that caregiving in earlier life negatively affects women's economic well-being in later life (34). In the present study, however, there were no significant differences between the sexs regarding satisfaction with their economic situation 7 years after the partner's stroke. The impact of stroke on the younger caregiver's long-term economic situation needs further study.

Spouses' age, sex, education, support given, and stroke-related functional outcomes were associated with satisfaction in several life domains. These results are consistent with previous studies from 3 months up to 3 years post-stroke (2, 11, 20, 35).The present results show that these factors also remain important from the long-term perspective. In addition, spouses' education was associated with satisfaction with social relationships. It has been shown that high educational level and inability of self-actualization could cause reduced satisfaction with partner relationship (36). Thus, it could be assumed that these aspects may also have an impact on satisfaction with social contacts.

A strength of this study is the well-characterized study group of spouses of stroke survivors and control subjects. The response rate was 80% (10), with a low rate of intern dropouts. As the inclusion of stroke survivors in the study was consecutive, and the participants were recruited from hospitals in urban as well as in rural areas, it could be assumed that the results could be generalized to the population of spouses of young and middle-aged ischaemic stroke survivors 7 years after stroke onset. As the demographic data for the spouses of the stroke survivors and the spouses of controls were similar, it could be assumed that the differences in life satisfaction between the 2 groups are related to the life situation of the spouses of stroke survivors. Stroke survivors' basic daily life activities were assessed with the BI, and level of global disability with the mRS. Both are robust instruments validated for use both in face-to-face interviews and over the phone (37, 38), enabling us to also include stroke survivors who could not participate in face-to-face interviews.

This study has some limitations. As the study was cross-sectional, there was no information about the

spouses' satisfaction with different life domains and general health prior to, or during the first years after stroke. Thus, it is not possible to determine the temporal relationship between life satisfaction and the exploratory variables. There were no statistically significant differences in partners' stroke severity among those spouses who participated in the study and those who declined to participate. However, several of the persons with severe disabilities after stroke died between inclusion and the 7-year follow-up (10). Therefore, it can be assumed that the spouses' satisfaction with the different life domains may be under-estimated regarding the earlier stages after stroke. Another limitation of the study is the lack of detailed information about the amount and the type of spousal support. Furthermore, data about stroke survivors' neurological symptoms (NIHSS) and cognitive abilities (MMSE) were obtained solely from the Sahlgrenska University Hospital population.

In conclusion, the results of this study show that life satisfaction in spouses of young and middle-aged stroke survivors 7 years after stroke onset was lower compared with the spouses of healthy control subjects. Female spouses of stroke survivors were less satisfied with partner relationship and psychological health than were male spouses. Spouses' self-reported support to the stroke survivors was the most important determinant of satisfaction concerning different domains of life. These results highlight the importance of empowerment of spouses in their new role, as well as the importance of person-centred care for enabling spouses' health and wellbeing.

Thus, further long-term longitudinal studies investigating how spouses' satisfaction within different life domains and coping strategies change over time are warranted. For better support of female spouses as well as caregivers in general, it is also important to explore the meaning of the notion of support.

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