

ORIGINAL REPORT

CHANGES IN LIFE HABITS AFFECTED BY MILD STROKE AND THEIR ASSOCIATION WITH DEPRESSIVE SYMPTOMS

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Objectives: To examine changes in sleep, driving, employment, relationships and leisure in the first year after a mild stroke and explore the association between the presence of depressive symptoms and improvement in participation 6 months later.

Methods: Social participation (LIFE-H 3.1) and depressive symptoms (Beck Depression Inventory-II) were measured in the first month (T0), 6 months and 1 year after mild stroke. Descriptive statistics and logistic regression analysis were used.

Results: There were 186 participants at T0, 149 at 6 months and 138 at 1 year. Mean age at T0 was 63.3±12.5 years and 81/186 (43.6%) were female. All the life habits examined showed an improvement at 6 months and 1 year, except for having a sexual relationship ($p=0.12$) at 6 months, and sleep at 6 months ($p=0.15$) and 1 year ($p=0.07$). A significant association between the presence of depressive symptoms at T0 and reduced participation at 6 months was obtained for driving a vehicle ($p=0.02$), participating in sports or recreational activities ($p=0.01$) and interpersonal relationships ($p=0.003$), but not for holding a paid job ($p=0.06$).

Conclusion: Systematic screening for depression should be carried out upon discharge from hospital in order to better target individuals who have had a mild stroke and are in further need of rehabilitation.

Key words: mild stroke; participation; depression; acute care; rehabilitation.

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INTRODUCTION

Mild strokes and transient ischaemic attacks (TIA) are the most common cerebrovascular pathologies, accounting for 82% of such pathologies (1). The consensus is that stroke is considered mild when motor function or the ability to perform basic activities of daily living are minimally compromised (2).

Mild strokes can cause any type of impairment similar to more severe strokes. Tellier and colleagues reviewed the literature on the impacts of mild stroke (3) and reported that mild

stroke can cause physical impairments, the most common being facial muscle weakness, dysarthria and loss of sensation (4), as well as cognitive deficits. In a qualitative study ($n=15$) fatigue was the most frequently reported symptom, along with memory, attention and concentration problems (5). In a transversal study, the majority of participants ($n=63$, 68% with mild stroke) presented impaired executive processes, when measured with the Mini-Mental State Examination, Stroop Test and Verbal Digit Span Backward Test (6). Another personal factor that may be impacted is mood, as evidenced by anxiety, emotional lability or depression 1 year after mild stroke (5). All these changes can also affect the family and friends of the person who had the mild stroke, including their quality of life (7).

These deficits, interacting with environmental factors, influence the social participation of people (8) who have had a mild stroke. Some studies documented the longer term effects. For example, in a study using a descriptive design focusing on participation in significant activities 6 months after mild stroke (4), mobility problems (as measured with the Stroke-Adapted Sickness Impact Profile) were reported by 45% of the participants ($n=219$), reduced ability to work by 62% and driving less (as measured by the Reintegration to Normal Living Index) by 18%. In addition, physically demanding recreational activities and social activities were abandoned by 41% and 36% of the participants, respectively (Activity Card Sort Interview) (4). These results are consistent with the findings of a descriptive study looking at changes in participation quantitatively and qualitatively in 35 participants 6 months after mild stroke (9). Compared with pre-stroke functional level, reduced participation was reported in daily activities and social roles (measured with the LIFE-H 3.0), especially in driving, community life (effect size (ES)=0.38), employment (ES=0.60) and interpersonal relationships (ES=0.50). In addition, according to the qualitative interviews, the activities most affected were sleep, mobility, driving, employment, leisure, interpersonal relationships and responsibilities (9).

In short, mild stroke can have a variety of physical, cognitive, environmental and emotional consequences. In interaction with environmental factors, all these impairments affect the person's participation (10), and especially mood changes, such as anxiety and depression. Typically, participation is perceived as worst with advancing age and more severe stroke and although no gender difference were found in a recent study ($n=204$), age and gender remain 2 variables important to control for (11).

Since they invade different aspects of the person's life, mood changes can also restrict participation by affecting self-image and the motivation to get involved in activities. Thus, it can be hypothesized that there is an association between depression and social participation in people who have had a mild stroke. Furthermore, in the population with stroke in general, the presence of depression is negatively correlated with the level of social participation (12, 13).

For people with mild stroke, only 2 articles, written by the same research team (14, 15), were found using the key words "Stroke", "Social participation" and "Depression" in MEDLINE and Embase. The first, a descriptive and correlational study, examined the association between functional and psychosocial results, but not with the specific aim of documenting the association between depression and participation (15). The sample was relatively small, i.e. 38 dyads composed solely of male patients who had had a mild stroke ($n=38$) and their partners ($n=38$). The measures were taken upon release from hospital and 1, 2 and 3 months later, which is not very long after the stroke. The measures covered quality of life (Stroke Specific Quality of Life Scale), depression (Beck Depression Inventory-II), recovery (Barthel Index) and functional ability (Modified Rankin Scale); the last 2 not being very sensitive to changes in participation. At 1 month post-stroke, results for depression ($r=-0.37$, $p<0.001$) and quality of life ($r=-0.66$, $p=0.023$) improved while function increased. At 2 and 3 months post-stroke, results for quality of life ($r=-0.495$, $p=0.002$) were correlated with better results for depression ($r=-0.36$, $p=0.027$) (15). The second article used the same measuring instruments to characterize changes in function, quality of life and depression in the same participants as the previous study over the first year after mild stroke (14). The results showed a significant improvement in quality of life ($p<0.001$) and decline in depression ($p=0.017$) in the year following stroke (14).

To summarize, although mild stroke can have various impacts on individuals, their life habits, and family and friends, little attention has been paid to their potential needs in terms of rehabilitation services. In the few studies that documented longer term effects after mild stroke, a reduction in participation in some life habits was noted. Studies on the association between depression and participation are even rarer or they used measuring instruments that are not very sensitive to change. In addition, total participation scores that encompass a range of categories and items are not nuanced (16), which justifies a study that analyses the results for each item.

Study objectives

The objectives of this study were as follows:

- Taking age and gender into account, examine changes in life habits particularly affected by mild stroke (sleep, driving, employment, interpersonal relationships and leisure) in the first year post-stroke and the probability of improvement in participation at 6 months and 1 year, compared with shortly after mild stroke (T0).
- Explore the association between the presence of depressive symptoms shortly after mild stroke (T0) and the probability

of improvement in participation at 6 months, controlling for age and gender.

Hypotheses

For objective 2, it was hypothesized that the presence of depressive symptoms at T0 would be associated with a lower probability of improved participation at 6 months. No hypothesis was posited for objective 1 because of its descriptive nature, not related to age and gender, and the exploratory nature of these analyses.

METHODS

Study design

This study used data from the *You Call-We Call* randomized clinical trial (17) that measured social participation and depressive symptoms in the first month after mild stroke (T0), 6 months and 1 year later. The main purpose of the RCT was to assess whether a multimodal support intervention (WE CALL) offered for 6 months would be effective compared with the availability of a resource person (YOU CALL) for 6 months post-stroke in reducing unplanned use of the healthcare system for adverse events; and in improving quality of life post-intervention (6 months) and at 1 year follow-up. Secondary outcomes included participation level, depressive symptoms, and planned-use of health services for health promotion and secondary prevention. Since no significant difference was found between the 2 groups (*You Call* and *We Call*) for all measures at all times (18), the data from both groups were combined.

Study population

The participants were recruited through 11 acute care hospitals in 4 Canadian provinces. All adults who had had a first mild stroke, with mild defined as a score of $>8.5/11.5$ on the Canadian Neurological Scale (CNS), a Modified Rankin score between 0 and 2 at admission or who were discharged in the first 3 weeks were eligible. Although we used those 3 criteria, the 1 most widely used was being discharged in the first 3 weeks followed by the use of the CNS, whereas the Modified Rankin score was not used by any of the 11 sites as an eligibility criteria. The other inclusion criteria were having access to a phone and being able to understand simple instructions, express one's basic needs and communicate in French or English. Individuals who had moderate or severe cognitive deficits (according to clinical judgement) or had another stroke prior to the first assessment were excluded.

Data collection

Between October 2008 and April 2011, potential participants were identified by a designated nurse at each site. The nurses asked the participants for permission to give their contact information to the research team, who called them in the first month after mild stroke to confirm their eligibility, obtain their consent and administer the initial measures.

Measuring instruments

Social participation was assessed in the first month, 6 months and 1 year after mild stroke with the Assessment of Life Habits 3.1 (LIFE-H 3.1), based on the Disability Creation Process model. This questionnaire covers 12 participation domains (19), comprising daily activities (nutrition, fitness, personal care, communication, housing and mobility) and social roles (responsibilities, interpersonal relationships, community life, education, employment and leisure). Participants are asked about the level of accomplishment of the activity or social role (with or with no difficulty, by substitution or not done) and type of assistance used (no assistance, assistive device, adaptation, human

assistance or a combination). A total score from 0 to 9 is computed for each domain and each item, with higher scores indicating better participation. This instrument has good intra- and inter-rater reliability (19) and validity (10) and is sensitive to change in the population with mild stroke, without showing a ceiling effect (9).

At the same measurement times, depressive symptoms were assessed with the Beck Depression Inventory-II (BDI-II). This questionnaire consists of 21 items answered on a 4-point scale, with the score ranging from 0 to 63 and higher scores indicating more severe depression (0–13=no or minimal depression, 14–19=mild depression, 20–28=moderate depression and 29–63=severe depression) (20). Since there is little emphasis on somatic symptoms, this is one of the most useful tools to evaluate depression post-stroke (21). It also has good psychometric properties and is sensitive to change in the population with stroke (22).

Statistical analyses

The sample is characterized by descriptive statistics (frequency and percentage for categorical variables, mean and standard deviation for continuous variables).

To achieve objective 1, descriptive statistics (frequency and percentage) were used to characterize the results on the LIFE-H 3.1 items that were examined: sleep (item 6), driving a vehicle (item 35), interpersonal relationships category (items 46 to 52), having a sexual relationship (item 52), holding a paid job (item 65) and participating in sports or recreational activities (item 71). Since the distribution of the results was highly asymmetrical, the items were dichotomized between a “perfect” score (9/9) and a “less than perfect” score (8/9 or lower). A “perfect” score indicates that the activity or role was accomplished without difficulty and without assistance (optimal participation), while a “less than perfect” score means that it was accomplished with difficulty, by substitution, not done or done with some type of assistance (less than optimal participation). A repeated measures logistic regression analysis was used to determine whether the probability of having a “perfect” score on the different items was significantly higher at 6 months and 1 year compared with shortly after mild stroke (T0), controlling for age and gender. The variables age, gender, and the factor of moment of repeated measures were entered

in the predictive model to determine the evolution of the dependent variables over time controlling for age and gender. A level of significance of $p < 0.05$ was used to determine the effect of time in the full model. The likelihood ratio test was used to determine the usefulness of the model and a criteria of $p < 0.05$ for this likelihood test was used.

To achieve objective 2, the same statistical approach was used to determine if the probability of having a “perfect” score at 6 months was associated with the presence of depressive symptoms shortly after mild stroke (T0), for the items that showed improvement between the first month and 6 months (items 35, 65 and 71, and mean of items 46 to 52), controlling for age and gender. Depressive symptoms were analysed as a dichotomous variable, i.e. either they were present (score of 14–63 on the BDI-II) or they were absent (score of 0–13 on BDI-II). The variables age, gender, depressive symptoms and the factor of moment of repeated measures were entered in the predictive model to determine the association between the presence of depressive symptoms and the dependent variables controlling for age and gender. A level of significance of $p < 0.05$ was used to determine the effect of depression in the full model. The Likelihood ratio test was used to determine the usefulness of the model and a criteria of $p < 0.05$ for this likelihood test was used.

Ethical considerations

This study was approved by the Research Ethics Committees of all the sites involved.

RESULTS

Participants' characteristics

The number of participants whose data were available was 186 in the first month (T0), 149 at 6 months and 138 at 1 year. The mean age of the participants was 63.3 years (standard deviation 12.5), 44% were women, and nearly half lived with their partner while a quarter lived alone (Table I). In order to determine the bias introduced by attrition, we compared the sample in their characteristics between the 3 measurement times. There

Table I. Participants' characteristics at the 3 measurement times

	T0 (n=186)	6 months (n=149)	1 year (n=138)	p-value
Age, years, mean (SD) (range)	63.3 (12.5) (32–93)	63.3 (11.8) (35–93)	63.7 (11.7) (36–93)	$p=0.95$
Women, n (%)	81 (43.6)	66 (44.3)	62 (44.9)	$p=0.97$
Living arrangements, n (%)				$p=0.82$
Alone	48 (25.8)	37 (24.8)	33 (23.9)	
With spouse	88 (47.3)	76 (51.0)	71 (51.5)	
With family	45 (24.2)	34 (22.8)	33 (23.9)	
Other	5 (2.7)	2 (1.3)	1 (0.7)	
Education, n (%)				$p=0.99$
Primary	19 (10.3)	14 (9.4)	14 (10.1)	
Secondary	69 (37.3)	53 (35.6)	48 (34.8)	
Post-secondary	96 (51.9)	81 (54.4)	75 (54.3)	
Other	1 (0.5)	1 (0.7)	1 (0.7)	
Type of stroke, n (%)				$p=1.000$
Ischaemic	172 (92.5)	138 (92.6)	127 (92.0)	
Haemorrhagic	10 (5.4)	8 (5.4)	8 (5.8)	
Other	4 (2.1)	3 (2.0)	3 (2.2)	
Side of stroke, n (%)				$p=0.97$
Right	76 (42.7)	61 (43.0)	56 (42.8)	
Left	92 (51.7)	74 (52.1)	70 (53.4)	
Bilateral	10 (5.6)	7 (4.9)	5 (3.8)	
Presence of depressive symptoms, n (%)	27 (14.5)	15 (10.1)	12 (8.7)	$p=0.05$

Numbers (n) vary due to missing data.

SD: standard deviation; T0: first month after mild stroke.

was no statistical difference between those who had the 3 contacts ($n=141$) and those who did not ($n=45$) as far as gender ($\chi^2_{1df}=0.804, p=0.370$), age ($z=1.020, p=0.308$), ethnicity ($\chi^2_{25df}=10.293, p=0.067$), living arrangements ($\chi^2_{24df}=7.647, p=0.105$), marital status ($\chi^2_{23df}=1.052, p=0.789$), education ($\chi^2_{23df}=1.603, p=0.901$), side ($\chi^2_{22df}=3.877, p=0.144$) or type of stroke ($\chi^2_{22df}=0.102, p=0.950$). However, the prob-

ability of presenting depressive symptoms was significantly lower at 1 year than in the first month post-stroke (T0) (odds ratio (OR)=0.338, $p=0.045$).

Changes in participation in life habits over time

Table II shows the frequency and percentage of the dichotomous scores ("perfect" for a score of 9/9 vs. "less than perfect"

Table II. Frequency and percentage of dichotomous scores and percentage of "not applicable" responses for life habits at the 3 measurement times

Item ^a	T0 n (%)	6 months n (%)	1 year n (%)
Sleep (item 6)			
Perfect	116 (62.4)	103 (69.1)	99 (71.7)
Less than perfect	70 (37.6)	46 (30.9)	39 (28.3)
Item not applicable (%)	0	0	0
Driving a vehicle (item 35)			
Perfect	75 (46.9)	108 (80.1)	103 (85.8)
Less than perfect	85 (53.1)	26 (19.4)	17 (14.2)
Item not applicable (%)	14.0	10.1	13.0
Maintaining a close relationship with partner (item 46)			
Perfect	119 (90.8)	105 (91.3)	99 (98.0)
Less than perfect	12 (9.2)	10 (8.7)	2 (2.0)
Item not applicable (%)	29.6	22.8	26.8
Maintaining close relationships with children (item 47)			
Perfect	154 (95.1)	127 (97.0)	119 (98.4)
Less than perfect	8 (4.9)	4 (3.0)	2 (1.6)
Item not applicable (%)	12.9	12.1	12.3
Maintaining close relationships with parents (item 48)			
Perfect	62 (89.9)	48 (85.7)	39 (90.7)
Less than perfect	7 (10.1)	8 (14.3)	4 (9.3)
Item not applicable (%)	62.9	62.4	68.8
Maintaining close or social relationships with other family members (item 49)			
Perfect	165 (95.9)	131 (95.6)	123 (96.9)
Less than perfect	7 (4.1)	6 (4.4)	4 (3.1)
Item not applicable (%)	7.5	8.1	8.0
Maintaining friendships (item 50)			
Perfect	171 (95.0)	139 (98.6)	127 (96.2)
Less than perfect	9 (5.0)	2 (1.4)	5 (3.4)
Item not applicable (%)	3.2	5.4	4.4
Maintaining social relationships with people around (item 51)			
Perfect	167 (91.3)	143 (97.3)	134 (97.8)
Less than perfect	16 (8.7)	4 (2.7)	3 (2.2)
Item not applicable (%)	1.6	1.3	0.7
Having a sexual relationship (item 52)			
Perfect	82 (66.1)	81 (76.4)	76 (83.5)
Less than perfect	42 (33.9)	25 (23.6)	15 (16.5)
Item not applicable (%)	33.3	28.9	34.1
Interpersonal relationships (items 46–52)			
Perfect	112 (63.6)	108 (75.0)	106 (82.8)
Less than perfect	64 (36.4)	36 (25.0)	22 (17.2)
Item not applicable (%)	5.4	3.4	7.3
Holding a paid job (item 65)			
Perfect	22 (25.3)	51 (71.8)	49 (87.5)
Less than perfect	65 (74.7)	20 (28.2)	7 (12.5)
Item not applicable (%)	53.2	52.4	59.4
Participating in sports or recreational activities (item 71)			
Perfect	56 (43.8)	62 (64.6)	73 (71.6)
Less than perfect	72 (56.2)	34 (35.4)	29 (28.4)
Item not applicable (%)	31.2	35.6	26.1

^aLIFE-H 3.1 items. T0: First month after mild stroke. Perfect: Optimal participation; activity or role accomplished without difficulty and without assistance (score of 9/9). Less than perfect: Participation not optimal; activity or role accomplished with difficulty, by substitution, not done or done with some type of assistance (score of 8/9 or less). Item not applicable: Activity or role not part of the respondent's daily life.

Table III. Probability of obtaining a perfect score at 6 months and 1 year compared with in the first month after mild stroke (T0), taking gender and age into account

Item ^a	T0 to 6 months OR (95% CI)	T0 to 1 year OR (95% CI)	Sex (men) OR (95% CI)	Age OR (95% CI)
Sleep (item 6) (n=189)	1.6 (0.9–2.8)	1.8 (0.9–3.3)	3.2 (1.4–7.0)	0.99 (0.97–1.03)
Driving a vehicle (item 35) (n=172)	16.7 (6.2–44.7)	27.3 (9.1–81.7)	3.9 (1.4–11.0)	0.98 (0.94–1.02)
Interpersonal relationships (items 46–52) (n=183)	1.8 (1.1–3.1)	3.1 (1.7–5.8)	0.55 (0.31–0.98)	0.99 (0.97–1.01)
Having a sexual relationship (item 52) (n=151)	1.9 (0.9–3.9)	2.9 (1.3–6.6)	1.1 (0.5–2.8)	0.94 (0.90–0.98)
Holding a paid job (item 65) (n=105)	31.9 (6.3–161.5)	130.8 (15.6–1096.8)	2.9 (0.7–11.2)	1.02 (0.96–1.09)
Participating in sports or recreational activities (item 71) (n=155)	3.5 (1.7–7.5)	5.9 (2.7–13.2)	1.7 (0.7–3.8)	0.99 (0.96–1.03)

^aLIFE-H 3.1 items.

Significant *p*-values are shown in bold.

Numbers (*n*) vary due to missing data.

OR: odds ratio; T0: first month after mild stroke; 95% CI: 95% confidence interval for the odds ratio.

for a score of 8/9 or less) and the percentage of the “not applicable” responses (activity or role not part of the respondent’s daily life) for each of the life habits and for the interpersonal relationships category at the 3 measurement times. Maintaining close relationships with parents (item 48) and holding a paid job (item 65) were the life habits with the largest percentage of “not applicable” responses (over 50%).

From these dichotomous scores, the probability of obtaining a perfect score, i.e. optimal participation, was computed for the different life habits over time (first month to 6 months and to 1 year), taking gender and age into account (Table III).

All the life habits had a greater probability of optimal participation at 6 months and 1 year compared with shortly after mild stroke, except for having a sexual relationship (item 52), the probability of which was no higher at 6 months (*p*=0.11), and sleep (item 6), the probability of which was no higher at 6 months (*p*=0.15) or 1 year (*p*=0.07). More specifically, for driving a vehicle (item 35), the probability was 16 times higher at 6 months (*p*<0.001) and 27 times higher at 1 year (*p*<0.001) for participants of the same age and gender. For holding a paid job (item 65), the probability was 30 times higher at 6 months (*p*<0.001) and over 100 times higher at 1 year (*p*<0.001).

Gender did not have a significant effect on the probability of optimal participation for having a sexual relationship (item 52) (*p*=0.77), holding a paid job (item 65) (*p*=0.13) and participating in sports or recreational activities (item 71) (*p*=0.23). However, men were more likely than women to present opti-

mal participation for sleep (item 6) (*p*=0.004) and driving a vehicle (item 35) (*p*=0.01). Men had a lower probability than women of presenting optimal participation for interpersonal relationships (mean of items 46–52) (*p*=0.04).

Age did not have a significant effect on the probability of optimal participation for any of the life habits, except for having a sexual relationship (item 52) where, as age increased, the likelihood of having a perfect score on this item declined significantly (*p*=0.003).

Association between presence of depressive symptoms shortly after mild stroke and the probability of optimal participation at 6 months

The effect of the presence of depressive symptoms in the first month after mild stroke (T0) on the probability of optimal participation at 6 months was measured, considering age and gender, for the life habits that showed an improvement between T0 and 1 year post-stroke (Table IV).

A significant effect between the presence of depressive symptoms at T0 on the probability of optimal participation at 6 months was obtained for driving a vehicle (item 35), participating in sports or recreational activities (item 71) and interpersonal relationships (mean of items 46–52). More specifically, for the participants who presented depressive symptoms at T0, optimal participation at 6 months was nearly 5 times less likely for driving a vehicle (item 35) (*p*=0.02), 3.5 times less likely for interpersonal relationships (mean of items 46–52)

Table IV. Association between presence of depressive symptoms shortly after mild stroke (T0) and probability of optimal participation at 6 months, taking gender and age into account

Item ^a	T0 to 6 months OR (95% CI)	Gender (men) OR (95% CI)	Age OR (95% CI)	Presence of depressive symptoms OR (95% CI)
Driving a vehicle (item 35) (n=170)	11.2 (4.0–33.3)	2.4 (1.0–7.0)	0.98 (0.94–1.02)	0.38 (0.21–0.56)
Interpersonal relationships (items 46–52) (n=183)	1.76 (0.99–2.95)	0.66 (0.38–1.26)	0.99 (0.97–1.03)	0.28 (0.12–0.59)
Holding a paid job (item 65) (n=99)	34.6 (4.5–176.0)	3.03 (0.94–18.53)	1.03 (0.95–1.10)	0.09 (0.01–0.57)
Participating in sports or recreational activities (item 71) (n=143)	2.98 (1.43–6.05)	1.37 (0.69–3.30)	1.00 (0.97–3.30)	0.23 (0.08–0.80)

^aLIFE-H 3.1 items

Significant *p*-values are shown in bold.

Numbers (*n*) vary due to missing data.

OR: odds ratio; T0: first month after mild stroke; 95% CI: 95% confidence interval for the odds ratio.

($p=0.003$) and 4.5 times less likely for participating in sports or recreational activities (item 71) ($p=0.01$), but was not significantly different for holding a paid job (item 65) ($p=0.06$).

For all life habits, age and gender did not have a significant impact on this association (p ranging from 0.06 to 0.79).

DISCUSSION

Although participation in some life habits improved over time compared with shortly after their mild stroke for the majority of participants, up to 30% of participants still did not have optimal participation in all the life habits examined 6 months and 1 year later. While we do not have the data regarding pre-stroke participation level, less than 20% had received rehabilitation services (18). As soon as their condition is considered medically stable and they are able to do basic daily activities, people are usually discharged home without any services other than a medical follow-up. Also, since their hospital stay is very short (18), there is not much time to make a comprehensive assessment. Therefore, difficulties in complex life habits may not be identified. When they return home, people who have had a mild stroke may have difficulty accomplishing complex life habits and may even have to abandon some of them. Changing the level of accomplishment of life habits, and especially their loss, can be detrimental to people's well-being and personal growth (23). Since 55% of the participants were under 66 years of age, the majority were at an age where they could still perform complex life habits without assistance and difficulty such as holding a paid job, and could live for many more years. Therefore, an assessment of life habits in rehabilitation should be carried out for people who have had a mild stroke before being discharged from hospital or, if they were not hospitalized, in the emergency department. Canadian guidelines recommend evaluating the immediate rehabilitation needs of everyone who has had a stroke, even in the emergency department for TIAs and mild strokes (24). In addition, everyone who has had a stroke should have access to rehabilitation when such needs are identified (25). To limit the adverse impact on participation that can occur after even mild stroke, outpatient rehabilitation services should be provided to people with mild stroke who have identified needs.

According to the results of this study, age did not have an impact on changes in participation over time for all the life habits examined, with the exception of sexual relationships, which declined with age, as in the normal population (26). Although age did not have an impact on the accomplishment of life habits, it is widely used as a criterion for eligibility for rehabilitation. Therefore, current eligibility criteria should be reviewed since they could exclude some people who need these services. Since mild stroke can have a negative impact on participation, people who have a mild stroke have the same right to receive rehabilitation as others, especially since age should not be an eligibility criterion. As for gender, it influenced participation in some of the life habits examined,

namely driving and sleep, where men had better participation than women, and interpersonal relationships, where men had poorer participation. No clear explanation could be found for these gender differences.

In addition, the participation at 6 months of people with depressive symptoms shortly after mild stroke will not be as good as those without depressive symptoms, although depressive symptoms tend to decline over time, irrespective of age and gender. When the stay in hospital is short, the presence of depressive symptoms is a critical variable to screen for. Thus, the assessment recommended by stroke guidelines should include systematic screening for depressive symptoms upon release from hospital or in a phone follow-up. Rehabilitation services should be offered to people with mild stroke identified by screening as needing them, which will limit the impact of depressive symptoms on the participation of those individuals.

Study strengths and limitations

This study has various strengths, including the use of measuring instruments with good psychometric properties as well as the collection of data up to 1 year after mild stroke. Also, the large number of participants recruited in different Canadian provinces makes it representative of the population with mild stroke.

Study limitations include the number of life habits with a large percentage of "not applicable" responses and the unavailability of pre-stroke scores, which may have resulted in an overestimation of functional impairment and inflated the stroke-related changes. The findings must be interpreted with caution as this was not a cohort study, but the data also contain valuable information. Since the number of participants at the 3 measurement times differed, it is not known if the missing data influenced the results. However, no significant difference was found for the characteristics of the participants at the 3 measurement times though we can acknowledge that our loss to follow up is larger than that noted by other studies (27). Finally, due to the dichotomous analysis of the results, which was unavoidable because of the data distribution, it was not possible to distinguish between the characteristics of people with differing levels of difficulty in participation.

Conclusion

The few studies that exist on the consequences of mild stroke show that, like other levels of stroke severity, people who have had mild stroke can present various impairments that affect their daily lives. These impairments may also affect their social participation up to 1 year post-stroke, as shown by this study. In addition, a substantial number show depressive symptoms shortly after mild stroke, which are negatively correlated with the level of accomplishment of life habits. Given the effects of mild stroke, rehabilitation services are vital for people identified as needing them. An assessment of life habits and screening for depressive symptoms should be carried out upon discharge from hospital.

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