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Beyond survival: Adaptive behaviour and subjective well-being among cerebrovascular accident survivors in a South Indian tertiary care setting

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Abstract:
Cerebrovascular accidents often impair functional independence and reduce subjective well-being among survivors. Therefore, it is of interest to assess the adaptive behaviour, subjective well-being and their association among 60 CVA survivors attending a tertiary care hospital. Adaptive behaviour and well-being were evaluated using the Barthel Index and WHO-5 Well-Being Index, followed by descriptive and inferential statistical analyses. Most participants were functionally independent (76.67%) and reported good well-being (75.00%), with a significant positive correlation between functional independence and subjective well-being ($r = 0.43$, $p = 0.01$), while age, caregiver type and family structure showed significant associations. Thus, data support strengthening self-care training, family-centred support and psychosocial nursing interventions to improve long-term outcomes among CVA survivors.

Keywords: Cerebrovascular accident, stroke survivors, adaptive behaviour, subjective well-being, nursing assessment

Background:
Stroke, medically termed cerebrovascular accident (CVA), is no longer a disease confined to the elderly West; it is a quietly accelerating crisis across South Asia. Globally, an estimated 11.9 million new stroke events occurred in 2021, with 93.8 million survivors and 7.3 million stroke-related deaths each year, making stroke the third leading cause of combined death and disability worldwide **[1].** The American Heart Association has reinforced that stroke prevalence and post-stroke disability continue to rise alongside ageing populations and persistent vascular risk factors **[2].** India alone bears nearly 10% of the global stroke burden, with approximately 1.25 million new cases reported in 2021, a 51% increase compared with 1990 and around 9.4 million people now living with the long-term consequences of stroke **[3].** Surveillance data from the United States similarly show that age-standardised stroke prevalence rose by 7.8% between 2011–2013 and 2020–2022, with the steepest increases among adults aged 18–64 years and those with lower education **[4].** The National Stroke Registry Programme in India reported a pooled crude incidence of 138.1 per 100,000, with ischaemic strokes constituting 79% of all events **[5]** and a nationwide survey from Bangladesh identified a stroke prevalence of 11.39 per 1,000 with hypertension (79.2%) as the leading risk factor **[6].** Such projections demand a re-examination of how survivors, families and nurses can sustain meaningful recovery in the years that follow. Surviving a stroke, however, is only the beginning. Hemiparesis, fatigue and pain often persist for months to years, demanding that survivors learn an entirely new way of moving through the world. Adaptive behaviour, the deliberate, learned actions through which a person reorganises daily routines, sustains an optimistic outlook and re-engages with personal roles has emerged as a central concept in stroke recovery research and a recent validation study confirmed that adaptation can be measured systematically through a three-factor adaptive behaviour scale **[7].** Subjective well-being, covering both hedonic (cheerfulness, calm, energy) and eudaemonist (purpose, self-acceptance, daily interest) dimensions, captures something the Barthel Index cannot. Evidence from a topical review of older stroke survivors indicates that activity limitations correlate only modestly with well-being and that depressive symptoms and participation restrictions weigh as heavily as motor function on the emotional outlook of survivors **[8].** Therefore, it is of interest to assess the level of adaptive behaviour and subjective well-being among CVA survivors attending the Neurology Outpatient Department of a tertiary care hospital in Chennai, to correlate these two variables and to explore their association with selected demographic and clinical characteristics.

Materials and Methods:
A quantitative, non-experimental, descriptive cross-sectional design was employed. The study was conducted in the Neurology Outpatient Department of the Institute of Neurology, Rajiv Gandhi Government General Hospital, Chennai, Tamil Nadu, India, over four weeks. The population comprised all CVA survivors attending the Neurology Outpatient Department; the accessible population was those meeting the selection criteria during the data-collection period. A total of 60 participants were recruited through non-probability convenience sampling. The sample size was estimated using the formula $N = Z^2 \times p(1-p)/(p \times e^2)$ with $Z = 1.96$, an anticipated proportion of 0.623 derived from a previous study on motor alteration in stroke survivors and a relative precision of 20%, yielding a calculated minimum of 58 and a final sample of 60. CVA survivors of either sex attending the Neurology Outpatient Department, willing to provide informed consent, with or without comorbidities were included. Patients critically ill at the time of data collection, those

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participating in another study, those with severe cognitive impairment or aphasia limiting communication and those with significant comorbid mental illness were excluded. Three instruments were used: a structured sociodemographic and clinical proforma, the Barthel Index of Functional Independence and the WHO-5 Well-Being Index. Content validity was obtained from a panel of nursing and medical experts. After Institutional Ethics Committee approval and written permission from the Director, Institute of Neurology, eligible survivors were approached individually. The purpose, voluntary nature and confidentiality safeguards were explained and written informed consent was obtained. Each interview, conducted in Tamil or English as preferred, lasted 10–15 minutes. A pilot study on 10% of the sample preceded the main study; pilot participants were excluded from the final analysis. Data were coded in Microsoft Excel and analysed in IBM SPSS Statistics. A p-value ≤ 0.05 was considered statistically significant.

Results:

Of the 60 participants, the majority (45.00%) were aged 51–60 years; 75.00% were male and 98.33% were married. Informal education was reported by 51.67% and 43.33% had completed primary schooling. Private employment was the primary occupation for 76.67% and 85.00% earned between ₹10,001 and ₹25,000 per month. Most (61.67%) lived in nuclear families, 50.00% resided in urban areas, 80.00% were self-caring and 95.00% reported a strong support system from family or friends. Clinically, 66.66% had stroke onset more than three years previously, 96.67% had ischaemic stroke, the right hemisphere was more commonly affected (60.00%) and 76.67% reported no post-stroke sequelae **(Table 1).** Karl Pearson's correlation revealed a statistically significant moderate positive correlation between Barthel Index and WHO-5 scores ($r = 0.43$, $p = 0.01$), indicating that as functional independence improved, subjective well-being also increased. Age ($\chi^2 = 8.68$, $p = 0.05$) and caregiver type ($\chi^2 = 8.44$, $p = 0.01$) were significantly associated with the level of functional independence, while type of family ($\chi^2 = 5.28$, $p = 0.05$) and caregiver type ($\chi^2 = 6.77$, $p = 0.05$) were significantly associated with the level of subjective well-being. Other variables such as sex, education, occupation, monthly income, residence, support system and time since onset, type of stroke, stroke location and post-stroke sequelae did not show statistically significant associations (**Table 2**). The mean Barthel Index score was 92.17 ± 12.29 out of 100, with the lowest item-level scores observed in transfers (83.33%) and mobility (82.80%). The majority of survivors (76.67%, n = 46) were functionally independent, while 23.33% (n = 14) showed slight dependence; none were moderately or totally dependent. The mean WHO-5 Well-Being Index score was 71.67 ± 24.96 out of 100. Good well-being was reported by 75.00% (n = 45) of participants, poor well-being by 25.00% (n = 15) and none met the criterion for depression.

Table 1: Sociodemographic and clinical profile of the cerebrovascular accident survivors (n = 60).

Variable	Category	n	%
Age (years)	30–40	2	3.33
	41–50	11	18.33
	51–60	27	45
	≥ 61	20	33.33
Sex	Male	45	75
	Female	15	25
Marital status	Married	59	98.33
	Single	1	1.67
Education	Informal	31	51.67
	Primary	26	43.33
	Higher secondary	3	5
Occupation	Private employment	46	76.67
	Government employment	5	8.33
	Self-employed / Homemaker / Daily wages	9	15
Monthly income (₹)	< 10,000	4	6.67
	10,001–25,000	51	85
	25,001–50,000	4	6.66
	50,001–75,000	1	1.67
Type of family	Nuclear	37	61.67
	Joint	23	38.33
Residence	Urban	30	50
	Semi-urban	8	13.33
	Rural	22	36.67
Primary caregiver	Self-caring	48	80
	Spouse	6	10
	Children	6	10
Support system	Strong (family / friends)	57	95
	Moderate	1	1.67
	Weak	2	3.33
Time since stroke onset	6 months–1 year	10	16.67
	1–3 years	10	16.67
	> 3 years	40	66.66
Type of stroke	Ischaemic	58	96.67
	Haemorrhagic	1	1.67
	Transient ischaemic attack	1	1.67
Stroke location	Right hemisphere	36	60
	Left hemisphere	24	40
Post-stroke sequelae	None	46	76.67
	Fatigue	10	16.67
	Pain	2	3.33
	Seizures	2	3.33

Table 2: Association between the level of adaptive behaviour and subjective well-being with selected sociodemographic and clinical variables (n = 60).

Demographic variable	Category	n	Adaptive Behaviour χ^2 (p)	Subjective Well-being χ^2 (p)
Age (years)	30–40	2	**8.68 (0.05)***	3.42 (0.33) NS
	41–50	11		
	51–60	27		
	≥ 61	20		
Type of family	Nuclear	37	1.92 (0.17) NS	5.28 (0.05)*
	Joint	23		
Primary caregiver	Self-caring	48	8.44 (0.01)*	6.77 (0.05)*
	Spouse	6		
	Children	6		

**Statistically significant at p ≤ 0.05; NS = Not significant.*

Discussion:

The present study showed that 76.67% of CVA survivors were functionally independent and 75.00% reported good subjective well-being, with no participant meeting the criterion for depression and a moderate positive correlation between

functional independence and well-being (r = 0.43, p = 0.01). This pattern aligns with the broader evidence that functional and emotional outcomes after stroke move together but are not interchangeable and that the social scaffolding around survivors is a powerful mediator. A community-based randomised trial of an enhanced rehabilitation transition programme reported greater self-rated improvement in daily-activity performance and reduced environmental barriers when home modifications and self-management training were delivered to discharge stroke survivors **[9].** Our cohort, predominantly chronic survivors more than three years post-stroke, displayed comparable levels of independence even in the absence of formal home-based interventions, possibly reflecting the protective effect of strong family support reported by 95.00% of participants and the high prevalence of self-caring (80.00%). A statistically significant moderate positive correlation between adaptive behaviour and subjective well-being (r = 0.43, p = 0.01) was observed in the present study. Comparable inverse relationships between functional decline and emotional outcomes have been reported in longitudinal data from the United States, where 35.3% of mild-to-moderate stroke survivors had depression at three months and 24.9% at six months, with persistence beyond six months in many patients **[10].** The absence of overt depression in our sample contrasts sharply with this trajectory and is likely shaped by cultural framing of suffering, family proximity and selection bias toward survivors well enough to attend an outpatient department. A UK prospective cohort of young stroke survivors further showed that female sex, intracerebral haemorrhage, severe stroke and pre-morbid disability predicted unfavourable six-month outcomes, while younger age and lower stroke severity favoured recovery **[11],** echoing the age-related gradient in functional independence observed in our data. Significant associations of age with functional independence and of caregiver type and family structure with both functional and emotional outcomes were observed in the present study. These findings parallel a Czech FRAILTY working-age cohort in which perceived social support was moderately correlated with health-related quality-of-life domains, although depression strongly diminished this association **[12, 13].** A randomised controlled trial of autogenic relaxation training as an adjunct to physiotherapy among stroke survivors significantly improved both functional independence on the Modified Barthel Index and emotional outcomes **[14]** and a large population-based analysis showed that physical-activity participation enhances subjective well-being partly through perceived social development **[15, 16].** Together, these findings reinforce that for chronic survivors with preserved independence, the family is not merely a social unit but a therapeutic resource. Nurses in tertiary care settings should screen survivors for both functional and emotional outcomes and design interventions, structured self-care training, caregiver education and psychosocial nursing support that strengthen the social scaffolding alongside conventional rehabilitation **[17].** Limitations include a small, single-centre convenience sample, self-reported measures, possible selection bias toward better-functioning outpatients and a cross-sectional design that precludes causal inference; larger longitudinal multi-centre studies are warranted.

Conclusion:
Chronic stroke care must address functional, emotional, social and caregiver needs beyond physical rehabilitation. Nurses can significantly strengthen recovery through individualized assessment, family-centred counselling, self-care education and psychosocial support. A holistic, continuous nursing approach can promote independence, emotional well-being, quality of life and dignified living among stroke survivors.

Ethical approval:
Approval was obtained from the Institutional Ethics Committee, Madras Medical College, Chennai and written informed consent was obtained from all participants.

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Conflicts of interest:
The authors declare no conflicts of interest.

References:
[1] https://pubmed.ncbi.nlm.nih.gov/39304265/
[2] Martin SS *et al. Circulation.* 2025 25 **151:**e41[PMID: 39866113]
[3] Behera DK *et al. Sci Rep.* 2024 **14:**22640. [PMID: 39349946]
[4] Imoisili OE *et al. MMWR Morb Mortal Wkly Rep*. 2024 **73:**449 [PMID: 38781110]
[5] Rangamani S *et al. Lancet Reg Health Southeast Asia.* 2023 **23:**100308. [PMID: 38404513]
[6] Mondal MBA *et al. e Neurological Sci.* 2022 **28:**100414. [PMID: 35769921]
[7] Choi H & Song Y. *Healthcare (Basel).* 2024 **12:**1719. [PMID: 39273743]
[8] Zhou H & Kulick ER. *Int J Environ Res Public Health.* 2023 **20:**7157. [PMID: 38131709]
[9] Bollinger RM *et al. JAMA Netw Open.* 2024 **7:**e2437758. [PMID: 39374016]
[10] Dong L *et al. J Am Heart Assoc*. 2021 **10:**e020494. [PMID: 34184539]
[11] Mussa R *et al. Eur Stroke J.* 2025 **10:**844 [PMID: 39846469]
[12] Gurková E *et al. Health Qual Life Outcomes.* 2025 **23:**8. [PMID: 39871241]
[13] Mohd Nordin NA *et al. Top Stroke Rehabil*. 2025 **32:**573 [PMID: 40778731]
[14] Wei P *et al. Front Psychol.* 2025 **16:**1415158. [PMID: 39917735]

[15] Bhagavathy MG *et al. Belitung Nurs J*. 2022 **8**:405. [PMID: 37554493]
[16] Sharma M *et al. Indian J Palliat Care*. 2019 **25**:18. [PMID: 30820096]
[17] Tiwari S *et al. J Neurosci Rural Pract.* 2021 **12**:680. [PMID: 34737502]

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