The Effect of Self-Determination on Medical Rehabilitation Adherence with Resilience as a Mediator in Post-Stroke Patients

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ABSTRACT

Recovery in post-stroke patients depends heavily on how consistently they follow their medical rehabilitation program, yet field adherence is frequently low, particularly when patients lack the internal psychological drive to persist. This study examined whether resilience mediates the relationship between self-determination and medical rehabilitation adherence in post-stroke patients. A quantitative approach with a correlational mediation design was used. Participants were 309 post-stroke patients undergoing outpatient medical rehabilitation, recruited through purposive sampling with the following inclusion criteria: a stroke diagnosis confirmed by a neurologist, at least one month post-stroke, aged 25 to 70 years, and able to communicate reciprocally. Data were collected using three instruments: the satisfaction subscale of the Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS) for self-determination, the 10-item Connor-Davidson Resilience Scale (CD-RISC 10) for resilience, and the Stroke Rehabilitation Motivation Scale (SRMS) for rehabilitation adherence. Mediation analysis was conducted with the medmod module in Jamovi using a 5,000-sample bootstrap procedure on standardized scores. Self-determination had a positive and significant effect on resilience ($\beta = 0.616$, $p < .001$), resilience had a positive and significant effect on adherence ($\beta = 0.402$, $p < .001$), and self-determination also had a significant direct effect on adherence ($\beta = 0.380$, $p < .001$). The indirect effect of self-determination on adherence through resilience was significant ($\beta = 0.248$, bootstrap 95% CI [0.182, 0.321]), indicating partial mediation, with roughly 39% of the total effect ($\beta = 0.628$) operating through the resilience pathway. These findings suggest that satisfying patients' basic psychological needs and strengthening their resilience are viable, complementary targets for interventions aimed at improving post-stroke rehabilitation adherence.

Keywords: medical rehabilitation adherence, post-stroke patients, resilience, self-determination, mediation

INTRODUCTION

Patient adherence to medical rehabilitation after stroke is a psychological and clinical problem with a large bearing on recovery and on the quality of life of stroke survivors. Stroke is a medical condition caused by a disruption of blood flow to the brain that produces sudden brain-tissue damage, and it is the leading cause of long-term disability worldwide. The World Stroke Organization [1] recorded that one person dies of stroke every four seconds, with a lifetime risk of one in four. Feigin and colleagues [2] reported roughly 12 million new stroke cases each year worldwide, accounting for about 11% of global deaths. In Indonesia, the 2023 Indonesian Health Survey recorded a stroke prevalence of 8.3 per 1,000 population [3], and earlier national data confirmed a 93.4% increase in prevalence over the preceding decade [4], with two of three survivors experiencing permanent disability [5].

Medical rehabilitation is a therapeutic intervention encompassing physiotherapy, occupational therapy, and speech therapy that work synergistically to optimize recovery. Comprehensive reviews describe post-stroke rehabilitation as an essential multidisciplinary approach because it harnesses neuroplasticity, the brain's capacity to form new neural connections in response to structured, repetitive practice [6]. A national cohort study of more than 10,000 stroke patients found that a higher frequency of rehabilitation therapy was significantly associated with lower long-term mortality (HR = 0.68, 95% CI 0.61–0.76), each additional weekly session lowering mortality risk by 12% [7]. Regular physical training significantly improves motor

function, balance, and mobility [8], and consistent speech therapy improves functional communication in post-stroke aphasia [9], with higher-intensity delivery yielding markedly better language recovery [10].

Despite these benefits, adherence remains low. In Indonesia, 46.7% of post-stroke patients fell into the low-adherence category [11], and elsewhere mean exercise adherence has been reported at only 68.6% [12]. Non-adherence carries serious consequences. Without rehabilitation, neuroplastic processes stall and motor capacity stagnates or regresses [13, 14]; discontinued speech therapy can freeze language recovery, sometimes permanently [15]; and non-adherence and post-stroke depression reinforce one another in a negative loop [16]. Barriers operate at the physical, service, and attitudinal levels [17], and qualitative work characterizes them as multilevel, spanning patient, provider, institutional, and community factors [18]. These barriers are systemic and call for a holistic response.

Motivation has been identified as the strongest predictor of rehabilitation adherence ($r = 0.600$, $p = .021$) [11], signaling that internal psychological dimensions matter more than technical knowledge alone and pointing toward a more fundamental construct: Self-Determination Theory (SDT). SDT posits three universal basic psychological needs, autonomy, competence, and relatedness [19]. Stroke systematically undermines all three needs [20], and SDT-based intrinsic motivation has been shown to raise stroke rehabilitation adherence 2.4-fold (OR = 2.4) [21].

Between self-determination and adherence lies a psychological bridge: resilience, the dynamic process of positive adaptation in the face of adversity [22]. A majority of post-stroke patients show low resilience that manifests as rejection of rehabilitation [23]. A meta-analysis of 23 studies identified self-efficacy ($d = 0.72$) and social support ($d = 0.58$), both closely tied to SDT, as the strongest predictors of resilience in stroke patients [24]. Higher resilience, in turn, supports better long-term treatment adherence in chronic illness [25]. Within a mediation framework, resilience functions as the mechanism that transforms internal drive into sustained adaptive behavior: SDT supplies the motivational foundation, but without adequate adaptive capacity that motivation is not always actualized in behavior. Raising self-determination without strengthening resilience therefore risks a suboptimal effect on adherence.

Although SDT, resilience, and rehabilitation adherence have each been studied, no study has tested the integrated mediation model, whether resilience mediates the effect of self-determination on medical rehabilitation adherence in post-stroke patients, on an Indonesian post-stroke population. Prior work tends to stop at descriptive identification of barriers [17, 18, 12], examines motivational predictors without an integrated SDT frame [11], or treats SDT and resilience as separate constructs without linking them in a mediation model [20, 21, 24]. The present study addresses this gap by testing the model X (self-determination) → M (resilience) → Y (adherence) empirically, using culturally adapted instruments. Four hypotheses were examined: (H1) resilience mediates the effect of self-determination on adherence; (H2) self-determination positively affects resilience; (H3) resilience positively affects adherence; and (H4) self-determination directly and positively affects adherence.

METHOD

Design

This study used a quantitative approach with a correlational design, specifically a mediation model, to test whether the relationship between self-determination and medical rehabilitation adherence is mediated by resilience. A mediation design was chosen because it explains the underlying psychological mechanism more completely than a set of separate bivariate tests [19, 24]. Data were collected by survey using three validated scales, and analyses were conducted in Jamovi 2.6.44.

Participants

The target population comprised adult patients (25–70 years) diagnosed with stroke by a neurologist and undergoing outpatient medical rehabilitation at health facilities in the Sidoarjo region, East Java, Indonesia. Participants were selected by purposive sampling. Inclusion criteria were: (a) a neurologist-confirmed stroke

diagnosis; (b) at least one month post-stroke and in an active rehabilitation phase; (c) age 25–70 years; and (d) the ability to communicate reciprocally, verbally or in writing. Patients in the acute phase (< 1 month), with severe pre-existing psychiatric comorbidity, unable to communicate, or declining to participate were excluded. The minimum sample size was estimated with the Slovin formula (e = 0.05), yielding n = 309. A total of 309 participants meeting all criteria were retained for the main analysis.

Measures

Self-determination. Self-determination was measured with the 12-item satisfaction subscale of the Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS) developed by Chen and colleagues [26] and adapted into Indonesian by Abidin and colleagues [27]. The subscale captures autonomy, competence, and relatedness satisfaction (four items each) on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree); total scores range 12–60, with higher scores indicating greater need satisfaction. In the present sample, Cronbach's alpha was .806. One item (BPNSFS_2) showed an item-rest correlation of .265, slightly below the conventional .30 threshold, but was retained on the basis of the instrument's prior cross-cultural validation [27], consistent with the view that substantive and theoretical considerations may justify retaining an item when overall reliability remains adequate.

Resilience. Resilience was measured with the 10-item Connor-Davidson Resilience Scale (CD-RISC 10) [28], adapted into Indonesian by Simamora [29]. The scale is unidimensional and used a 5-point Likert format (1–5); total scores range 10–50. The 10-item structure has demonstrated a cohesive unidimensional factor across samples [30] and sound cross-national psychometric properties [31]. In the present sample, Cronbach's alpha was .890.

Rehabilitation adherence. Adherence was measured with the Stroke Rehabilitation Motivation Scale (SRMS) [32], itself adapted from the Sport Motivation Scale [33], operationalized through the SDT motivational continuum (amotivation, extrinsic regulation, and intrinsic motivation). The instrument was translated and culturally adapted following the standard forward–backward translation procedure [34], including reformatting items into declarative statements and replacing sports references with post-stroke rehabilitation content. Items used a 5-point Likert scale; the amotivation items are unfavorable and reverse-scored. After item-discrimination screening (corrected item-total correlation ≥ .30), two items were dropped, yielding a final 26-item version. In the present sample, Cronbach's alpha was .917. Content validity for all instruments was supported through expert judgment using Aiken's V (criterion ≥ 0.60).

Procedure and Analysis

Before hypothesis testing, classical assumptions were examined. Residual normality was supported by the Shapiro-Wilk test (W = 0.995, p = .435). Linearity was inspected visually via scatterplots, and multicollinearity was acceptable (VIF = 1.61, tolerance = 0.620). The Breusch-Pagan test indicated heteroscedasticity ($\chi^2 = 7.58$, p = .023); accordingly, and consistent with recommended practice for mediation analysis, hypothesis testing used bootstrap confidence intervals (5,000 resamples) as a robust correction [35]. Mediation was estimated with the medmod module in Jamovi on standardized (z) scores, producing the direct effect (c′), path a (X→M), path b (M→Y), and the indirect effect (a×b) that jointly address the four hypotheses.

RESULTS

Participant Characteristics

The 309 participants were predominantly aged 55–64 years (40.5%) and 45–54 years (31.1%); 57.6% were male. Ischemic stroke accounted for the majority (81.9%) versus hemorrhagic (18.1%), and 81.6% experienced a first-ever stroke. Most participants had been in rehabilitation for 1–3 months (43.4%). Demographic and clinical characteristics are summarized in Table 1.

Table 1. Demographic and clinical characteristics of participants (N = 309)

Characteristic	Category	n	%
Age	35–44 years	23	7.4
	45–54 years	96	31.1
	55–64 years	125	40.5
	65–70 years	65	21
Sex	Male	178	57.6
	Female	131	42.4
Education	Primary	44	14.2
	Junior secondary	60	19.4
	Senior secondary	123	39.8
	Diploma	33	10.7
	Bachelor or higher	49	15.9
Stroke type	Ischemic	253	81.9
	Hemorrhagic	56	18.1
Onset	First-ever	252	81.6
	Recurrent	57	18.4
Rehabilitation duration	1–3 months	134	43.4
	4–6 months	94	30.4
	7–12 months	48	15.5
	> 12 months	33	10.7
Therapy type	Physiotherapy only	102	33
	Physiotherapy + occupational	91	29.4
	Physiotherapy + speech	44	14.2
	Integrated rehabilitation	72	23.3

Source: Jamovi 2.6.44 output.

Descriptive Statistics

Descriptive statistics for the three variables appear in Table 2. Mean scores placed all three variables in the moderate range, and category analysis showed that most participants clustered in the medium band: self-determination (medium 64.4%, high 20.1%, low 15.5%), resilience (medium 62.1%, low 20.4%, high 17.5%), and adherence (medium 61.5%, low 20.7%, high 17.8%). Notably, about one-fifth of patients fell into the low band for both resilience and adherence.

Table 2. Descriptive statistics of study variables (N = 309)

Variable	Min	Max	M	Mdn	SD
Self-determination (X)	12	60	43.3	46	12.4
Resilience (M)	10	50	35.2	36	10.8
Rehabilitation adherence (Y)	33	139	99.8	106	25.1

Source: Jamovi 2.6.44 output.

Hypothesis Testing

Mediation was tested with the medmod module using 5,000 bootstrap resamples on standardized scores. Path

and mediation estimates are presented in Tables 3 and 4, and the model is depicted in Figure 1.

Table 3. Path estimates

Path	Label	β	SE	95% CI	p
X → M	a	0.616	0.042	[0.535, 0.700]	< .001
M → Y	b	0.402	0.051	[0.303, 0.503]	< .001
X → Y (direct)	c′	0.38	0.051	[0.280, 0.478]	< .001

Source: Jamovi 2.6.44 output. β = standardized coefficient.

Table 4. Mediation estimates

Effect	Label	β	SE	95% CI	p
Indirect	a × b	0.248	0.036	[0.182, 0.321]	< .001
Direct	c′	0.38	0.051	[0.280, 0.478]	< .001
Total	c′ + a×b	0.628	0.042	[0.543, 0.709]	< .001

Source: Jamovi 2.6.44 output. Bootstrap 95% CI (5,000 resamples).

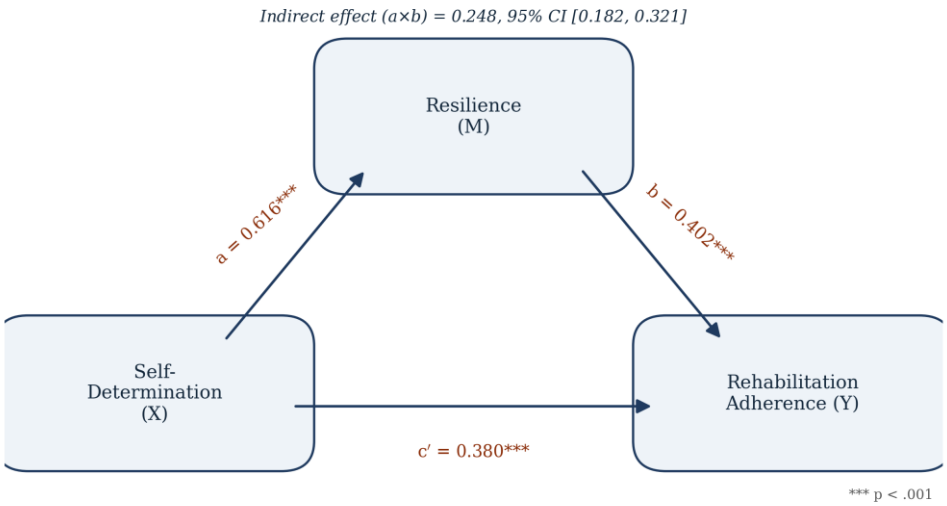


Figure 1. Mediation model of self-determination, resilience, and rehabilitation adherence (standardized coefficients; *** p < .001).

All four hypotheses were supported. The indirect effect of self-determination on adherence through resilience was significant (β = 0.248, bootstrap 95% CI [0.182, 0.321]), so H1 was accepted. Self-determination significantly predicted resilience (path a: β = 0.616, 95% CI [0.535, 0.700], p < .001; H2), resilience significantly predicted adherence (path b: β = 0.402, 95% CI [0.303, 0.503], p < .001; H3), and the direct effect of self-determination on adherence remained significant with resilience controlled (c′: β = 0.380, 95% CI [0.280, 0.478], p < .001; H4). Because both the indirect and direct effects were significant, resilience served as a *partial* mediator. Dividing the indirect effect by the total effect (0.248 / 0.628) indicates that approximately 39% of the total effect of self-determination on adherence operated through resilience.

DISCUSSION

This study tested whether resilience mediates the effect of self-determination on medical rehabilitation adherence in post-stroke patients, and all four hypotheses were supported. Resilience partially mediated the relationship: self-determination influenced adherence both directly and indirectly through resilience, and both pathways were active simultaneously. The two effects are complementary rather than competing. The direct

path (β = 0.380) is a fast route by which need satisfaction moves behavior immediately, while the indirect path (β = 0.248) reflects a slower route that builds adaptive capacity over time. With roughly 39% of the total effect (β = 0.628) channeled through resilience, the mediated pathway is a substantial, but not dominant, component of how self-determination operates.

The path from self-determination to resilience was strong (β = 0.616), consistent with meta-analytic evidence that self-efficacy and social support, close correlates of the SDT competence and relatedness needs, are the strongest predictors of resilience in stroke patients [24]. This quantitatively confirms qualitative observations that stroke simultaneously erodes all three basic needs [20]. Mechanistically, patients who feel that the decision to pursue therapy is their own (autonomy), who feel capable of making progress (competence), and who feel cared for (relatedness) carry greater psychological reserves for withstanding setbacks.

The path from resilience to adherence (β = 0.402) aligns with evidence that resilience supports long-term treatment adherence in chronic illness [25]. Bibliometric synthesis identifies three routes by which resilience supports adherence: buffering against post-stroke depression, sustaining goal orientation over long horizons, and building adaptive coping so that setbacks do not halt participation [36]. The persistent direct effect (β = 0.380) echoes findings that SDT-based intrinsic motivation raises adherence markedly [21] and that autonomy predicts persistence in physical activity even in non-clinical samples [37]. In the more demanding post-stroke context, this direct route is strategically valuable: interventions that improve need satisfaction need not wait for resilience to change before adherence improves.

The model was tested on the full sample without stratifying by clinical condition; the following observations are therefore theoretical framing rather than tests of group differences. Participants were clinically heterogeneous. Evidence on whether ischemic or hemorrhagic stroke recovers better is mixed: one study found no meaningful post-acute difference [38], whereas another reported better functional recovery for hemorrhagic patients once baseline severity was accounted for [39]. Longer time since stroke tends to accompany declining rehabilitation motivation [40], and psychological barriers such as reduced self-efficacy predict poorer outcomes in the chronic phase [41], precisely the context in which resilience is most protective. Integrated multidisciplinary programs may better satisfy the relatedness need and raise perceived autonomy [42], whereas narrower single-modality therapy may limit available psychosocial support. Because these characteristics were not tested as moderators or conditional mediators, they are best read as directions for future work.

The findings carry practical implications. First, the rehabilitation team can shift from a directive communication style to one that supports patient autonomy, explaining the rationale for procedures, involving patients in setting realistic recovery targets, and validating their concerns. Second, psychologists in multidisciplinary teams can design brief interventions targeting all three SDT needs at once, which, because resilience is a robust mediator, should build capacity that sustains adherence beyond the formal program. Third, since roughly one-fifth of patients fell into the low band for resilience and adherence, early psychological screening of self-determination and resilience can identify high-risk patients for timely, targeted intervention.

Several limitations should be noted. Data were self-reported, raising the possibility of socially desirable responding. The cross-sectional design precludes causal inference. Recruitment was confined to the Sidoarjo region, so generalization to all Indonesian post-stroke patients warrants caution. Linearity was assessed visually rather than by a formal statistical test. The model specified resilience as the sole mediator, and clinical subgroups (stroke type, duration, therapy modality) were neither controlled nor tested. Future research using longitudinal or mixed-methods designs, statistical control of clinical confounders, and replication across regions would strengthen and extend these findings.

In conclusion, medical rehabilitation adherence in post-stroke patients is best understood through a partial-mediation model in which self-determination affects adherence both directly and indirectly through resilience. Satisfying patients' basic psychological needs and strengthening their resilience are complementary, actionable targets for improving adherence and, ultimately, recovery.

Ethical Considerations

All procedures involving human participants were carried out in accordance with the ethical standards of the institution and with the principles of the Declaration of Helsinki. Participation was voluntary, and written informed consent was obtained from every participant after the purpose, procedures, and voluntary nature of the study, including the right to withdraw at any time without consequence, had been explained. Responses were anonymized and used solely for research purposes.

Conflict of Interest

The authors declare that they have no competing interests relevant to the content of this article.

Data Availability

The datasets generated and analyzed during the present study are not publicly available in order to protect the privacy and confidentiality of the post-stroke patients who participated. De-identified data may be made available from the corresponding author upon reasonable request and subject to appropriate ethical and institutional approvals.

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REFERENCES

1. World Stroke Organization. (2022). Global stroke fact sheet 2022. World Stroke Organization. https://www.world-stroke.org/assets/downloads/WSO_Global_Stroke_Fact_Sheet
2. Feigin, V. L., Abate, M. D., Abate, Y. H., Abd ElHafeez, S., Abd-Allah, F., Abdelalim, A., ... Owolabi, M. O. (2025). World Stroke Organization: Global stroke fact sheet 2025. International Journal of Stroke, 20(2), 132–144. https://doi.org/10.1177/17474930241308142
3. Kementerian Kesehatan Republik Indonesia. (2023). Survei Kesehatan Indonesia (SKI) 2023: Hasil utama. Kemenkes RI. https://kemkes.go.id/
4. Kementerian Kesehatan Republik Indonesia. (2018). Riset Kesehatan Dasar (Riskesdas) 2018: Hasil utama. Kemenkes RI. https://kesda.kemkes.go.id/
5. Susetyo, R. R. (2023). Literatur review peran dukungan keluarga pada pasien pasca stroke dalam latihan rehabilitasi medik. Detector: Jurnal Inovasi Riset Ilmu Kesehatan, 1(4), 107–116. https://doi.org/10.55606/detector.v1i4.2538
6. Li, H., He, Q., Wang, L., & Rezaei, M. J. (2024). Stroke rehabilitation: From diagnosis to therapy. Frontiers in Neurology, 15, 1402729. https://doi.org/10.3389/fneur.2024.1402729
7. Nam, J. S., Choi, S. R., Yoon, S. Y., Yoo, S. H., & Kim, W. S. (2024). Association between frequency of rehabilitation therapy and long-term mortality after stroke: A nationwide cohort study. Stroke, 55(9). https://doi.org/10.1161/STROKEAHA.123.046008
8. Wahyuni, & Dewi. (2025). Dampak latihan fisik terhadap peningkatan fungsi motorik dan mobilitas pada pasien stroke: Systematic review. Indonesian Journal of Health Science, 5(5), 989–1001.
9. Brady, M. C., Kelly, H., Godwin, J., Enderby, P., & Campbell, P. (2022). Speech and language therapy for aphasia following stroke. Cochrane Database of Systematic Reviews, 5, CD000425. https://doi.org/10.1002/14651858.CD000425.pub4
10. Hilari, K., Behn, N., Balouch, S., Bruce, C., Charalambous, M., Conroy, P., ... Visch-Brink, E. (2025). European Stroke Organisation (ESO) guideline on aphasia rehabilitation. European Stroke Journal, 10(2). https://doi.org/10.1177/23969873251320214
11. Aulya, S. P. (2025). Hubungan pengetahuan, motivasi dan dukungan keluarga dengan tingkat kepatuhan menjalani rehabilitasi medik pada pasien pasca stroke [Doctoral dissertation, Universitas Islam Sultan Agung Semarang].

12. Xing, F., Chen, L., Zhou, Y., Li, X., & Zhang, H. (2025). Adherence to rehabilitation exercise and influencing factors among people with acute stroke: A cross-sectional study. Frontiers in Neurology.
13. Li, S., Zhu, R., Cui, X., & Fu, W. (2023). Stroke recovery is a journey: Prediction and potentials of motor recovery after a stroke from a practical perspective. Life, 13(10), 2061. https://doi.org/10.3390/life13102061
14. Paolucci, T., Agostini, F., Mangone, M., Bernetti, A., Pezzi, L., Liotti, P., ... Saggini, R. (2023). A rehabilitative approach beyond the acute stroke event: A scoping review. Frontiers in Neurology, 14, 1234205.
15. Theofanopoulou, N., et al. (2023). Therapies and challenges in the post-stroke aphasia rehabilitation arena. Medicina, 59(9), 1674. https://doi.org/10.3390/medicina59091674
16. Lutfi, A. K., Rachman, M. E., & Wahidah, W. (2025). Analisis deskriptif faktor predisposisi depresi pasca stroke berbasis sistematik review. PREPOTIF: Jurnal Kesehatan Masyarakat, 10(1), 729–736. https://doi.org/10.31004/prepotif.v10i1.55572
17. Kim, H., et al. (2024). Status and barriers of physical activity and exercise in community-dwelling stroke patients in South Korea. International Journal of Environmental Research and Public Health, 21(3).
18. Zhang, Y., Zhang, X., & Wu, L. (2025). Barriers and facilitators for stroke patients' adherence to rehabilitation in China: A qualitative study based on medical experts. Scientific Reports, 15. https://doi.org/10.1038/s41598-025-12795-w
19. Deci, E. L., Olafsen, A. H., & Ryan, R. M. (2017). Self-determination theory in work organizations: The state of a science. Annual Review of Organizational Psychology and Organizational Behavior, 4, 19–43. https://doi.org/10.1146/annurev-orgpsych-032516-113108
20. Lu, H., et al. (2023). Basic psychological needs satisfaction of stroke patients: A qualitative study. BMC Psychology, 11(1), 64. https://doi.org/10.1186/s40359-023-01107-4
21. Gangwani, R., et al. (2022). Leveraging factors of self-efficacy and motivation to optimize stroke recovery. Frontiers in Neurology, 13, 823202. https://doi.org/10.3389/fneur.2022.823202
22. Herrman, H., Stewart, D. E., Diaz-Granados, N., Berger, E. L., Jackson, B., & Yuen, T. (2011). What is resilience? The Canadian Journal of Psychiatry, 56(5), 258–265. https://doi.org/10.1177/070674371105600504
23. Muhammad Firas, I., Suhadianto, & Noviekayati, I. G. A. A. (2025). Identification of factors causing low resilience in post-stroke patients: A systematic review. International Journal of Research in Social Sciences and Humanities, 9(11), Art. 00505. https://dx.doi.org/10.47772/IJRISS.2025.91100505
24. Wang, Y., et al. (2024). Influencing factors of psychological resilience in stroke patients: A systematic review and meta-analysis. Archives of Clinical Neuropsychology, 39(5), 644–654. https://doi.org/10.1093/arclin/acad107
25. García-Martínez, P., Ballester-Arnal, R., Gandhi-Morar, K., Castro-Calvo, J., Gea-Caballero, V., & Juárez-Vela, R. (2021). Perceived stress in relation to quality of life and resilience in patients with advanced chronic kidney disease. International Journal of Environmental Research and Public Health, 18(2), 536. https://doi.org/10.3390/ijerph18020536
26. Chen, B., Vansteenkiste, M., Beyers, W., Boone, L., Deci, E. L., Van der Kaap-Deeder, J., ... Verstuyf, J. (2015). Basic psychological need satisfaction, need frustration, and need strength across four cultures. Motivation and Emotion, 39, 216–236. https://doi.org/10.1007/s11031-014-9450-1
27. Abidin, F. A., Joefiani, P., Koesma, R. E., Yudiana, W., & Siregar, J. R. (2021). The Basic Psychological Need Satisfaction and Frustration Scale: Validation in Indonesian adolescents. Journal of Legal, Ethical and Regulatory Issues, 24(Special Issue 1), 1–9.
28. Connor, K. M., & Davidson, J. R. T. (2003). Development of a new resilience scale: The Connor–Davidson Resilience Scale (CD-RISC). Depression and Anxiety, 18(2), 76–82. https://doi.org/10.1002/da.10113
29. Simamora, M. R. (2024). Validity of the Indonesian version of the 10-item Connor-Davidson Resilience Scale (CD-RISC) among first-year theological students. ABARA: Jurnal Konseling Pastoral, 2(1), 11–19.
30. Campbell-Sills, L., & Stein, M. B. (2007). Psychometric analysis and refinement of the Connor–Davidson Resilience Scale (CD-RISC): Validation of a 10-item measure of resilience. Journal of Traumatic Stress, 20(6), 1019–1028. https://doi.org/10.1002/jts.20271

31. Aloba, O., Olabisi, O., & Aloba, T. (2016). The 10-item Connor-Davidson Resilience Scale: Factorial structure, reliability, validity, and correlates among student nurses in southwestern Nigeria. Journal of the American Psychiatric Nurses Association, 22(1), 43–51. https://doi.org/10.1177/1078390316629971
32. White, G. N., Cordato, D. J., O'Rourke, F., Mendis, R. L., Ghia, D., & Chan, D. K. Y. (2012). Validation of the Stroke Rehabilitation Motivation Scale: A pilot study. Asian Journal of Gerontology & Geriatrics, 7(2), 80–87.
33. Pelletier, L. G., Fortier, M. S., Vallerand, R. J., Tuson, K. M., Brière, N. M., & Blais, M. R. (1995). Toward a new measure of intrinsic motivation, extrinsic motivation, and amotivation in sports: The Sport Motivation Scale (SMS). Journal of Sport and Exercise Psychology, 17(1), 35–53. https://doi.org/10.1123/jsep.17.1.35
34. Beaton, D. E., Bombardier, C., Guillemin, F., & Ferraz, M. B. (2000). Guidelines for the process of cross-cultural adaptation of self-report measures. Spine, 25(24), 3186–3191. https://doi.org/10.1097/00007632-200012150-00014
35. Hayes, A. F. (2018). Introduction to mediation, moderation, and conditional process analysis: A regression-based approach (2nd ed.). The Guilford Press.
36. Li, Y., Soh, K. L., Jing, X., Wei, L., Rajen Durai, R., & Soh, K. G. (2025). Bibliometric analysis of resilience in stroke from 2000 to 2024 using CiteSpace and VOSviewer. Frontiers in Psychology, 16, 1452249.
37. Szulawski, M., Kaźmierczak, I., & Prusik, M. (2021). Is self-determination good for your effectiveness? A study of factors which promote and undermine effectiveness. PLOS ONE, 16(9), e0256558. https://doi.org/10.1371/journal.pone.0256558
38. Perna, R., & Temple, J. (2015). Rehabilitation outcomes: Ischemic versus hemorrhagic strokes. Behavioural Neurology, 2015, 891651. https://doi.org/10.1155/2015/891651
39. Salvadori, E., Papi, G., Insalata, G., Rinnoci, V., Donnini, I., Martini, M., ... Poggesi, A. (2020). Comparison between ischemic and hemorrhagic strokes in functional outcome at discharge from an intensive rehabilitation hospital. Diagnostics, 11(1), 38. https://doi.org/10.3390/diagnostics11010038
40. Kobylańska, M., Kowalska, J., Neustein, J., Mazurek, J., Wójcik, B., Bełza, M., ... Szczepańska-Gieracha, J. (2018). The role of biopsychosocial factors in the rehabilitation process of individuals with a stroke. Work, 61(4), 523–535. https://doi.org/10.3233/WOR-162823
41. Bai, J., & Chen, K. (2025). Advances in nursing care for post-stroke limb dysfunction rehabilitation. Frontiers in Neurology, 16, 1615500. https://doi.org/10.3389/fneur.2025.1615500
42. Vluggen, T. P. M. M., van Haastregt, J. C. M., Tan, F. E., Verbunt, J. A., van Heugten, C. M., & Schols, J. M. G. A. (2021). Effectiveness of an integrated multidisciplinary geriatric rehabilitation programme for older persons with stroke: A multicentre randomised controlled trial. BMC Geriatrics, 21(1), 134. https://doi.org/10.1186/s12877-021-02082-4