Enhancing Quality of Life for Hispanic Caregivers of Veterans Post-Stroke Through a Culturally Tailored Problem-Solving Intervention

Original Research

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Abstract

Introduction: Caring for a stroke survivor is physically and emotionally demanding, often leading to reduced quality of life (QoL) for caregivers. Hispanic caregivers, particularly Spanish-speaking individuals, face additional challenges due to language barriers and cultural norms that shape help-seeking behaviors. Although problem-solving interventions can support the transition from hospital to home, few are tailored for this population. This paper reports findings on the impact of a problem-solving intervention on the quality of life of caregivers of Veterans post-stroke.

Methods: A randomized clinical trial was conducted with 210 Hispanic Spanish-speaking stroke caregivers to evaluate the impact of a problem-solving intervention on caregivers' outcomes. Physical and mental health were measured using the Veterans Rand 12 Item Health Survey (VR-12). A generalized least squares regression model for repeated measures compared groups on physical and mental QoL outcomes measured at baseline, 9-weeks, and 21-weeks.

Results: The intervention group demonstrated significant improvement in mental health-related QoL, with scores increasing from 46.0±5.5 at baseline to 49.9±6.0 at 9-weeks and sustaining at 48.4±6.0 at 21-weeks, compared to the standard care group. Significant group-by-time effects were found at 9-weeks (p=.001) and 21-weeks (p=.044). The standard care group showed no change on mental QoL. Physical health–related QoL declined modestly in both groups, with no significant intervention effect.

Conclusions: These findings underscore the value of culturally tailored support, as even brief interventions can lead to meaningful improvements in mental health among Hispanic caregivers. While the intervention improved mental health-related QoL, additional strategies may be needed to address physical health.

Key Words: Cerebrovascular accident, Caregiver, Spanish-speaking, Intervention

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PINNACLE SCIENCE

Introduction

Stroke is a leading cause of long-term disability,[1] often leaving survivors with lasting physical, cognitive, and psychological impairments that range from partial limitations to complete dependence on caregivers.[2] Informal caregivers, typically family or friends, provide essential support for stroke survivors and play a central role during rehabilitation and throughout recovery.[3] Despite their central role, many caregivers feel unprepared,[4] which often lead to significant emotional, financial, and physical strain.[5,6] These challenges are associated with higher rates of stress, depression, fatigue, and reduced quality of life exhaustion.[7,8] Among linguistically and culturally diverse groups, particularly Spanish-speaking communities, the caregiving experience can be even more difficult due to limited access to culturally responsive education, resources, and support services.

Accessible and culturally relevant information is critical to help caregivers understand stroke recovery and effectively care for survivors, yet such resources remain scarce. A need exists for accessible, culturally relevant information to support stroke caregivers, including guidance on stroke survivor's condition and recovery trajectory.[9,10] Inadequate awareness and limited access to stroke-related education may heighten stress and diminish quality of life among caregivers, especially in Hispanic populations. Evidence from studies examining mental health across racial and ethnic groups indicates that Hispanic caregivers experience poorer mental health outcomes compared to other populations. Moreover, Hispanic stroke caregivers frequently report navigating intense emotional struggles, such as conflicting feelings of acceptance and resentment, persistent financial concerns, limited caregiving knowledge, and pervasive guilt.[11] These stressors may worsen the caregiving burden and further erode quality of life,[5,6] making it essential to develop interventions that are both feasible and culturally meaningful.[11]

The demands of caregiving frequently contribute to physical health challenges among caregivers, with fatigue being common.[8] Research consistently demonstrates that Hispanic caregivers experience greater burden than non-Hispanic White caregivers.[7,12,13] Hispanic caregivers report greater physical strain and more difficulty maintaining their own health as a result of caregiving compared with non-Hispanic caregivers.[14] These intersecting factors underscore the urgent need for targeted interventions and culturally sensitive support services, which remain limited in many settings.[15] Understanding both the physical and mental health effects of caregiving is therefore critical for improving caregiver quality of life. These overlapping stressors amplify caregiver burden, making it essential to develop interventions that are both feasible and culturally meaningful. One promising approach involves problem-solving interventions, which teach coping and decision-making strategies that can reduce burden and improve mental health among stroke caregivers.[16-19]

Problem-solving interventions have consistently demonstrated effectiveness in reducing caregiver burden and improving mental health outcomes among stroke caregivers.[17-21] Despite these benefits, the existing evidence base remains limited for Spanish-speaking caregivers, particularly those caring for Veteran stroke survivors. This group faces unique and compounded challenges, including navigating combat-related injuries, service-connected disabilities, and complex post-stroke care needs. Adapting and testing a culturally tailored problem-solving model may therefore help address critical gaps in caregiver support. To this end, this study examines the impact of a telephone and online problem-solving intervention on caregivers' outcomes including the physical and mental health-related quality of life of Spanish-speaking Hispanic caregivers of Veterans with stroke. We hypothesize that Hispanic, Spanish-speaking stroke caregivers who receive the intervention will demonstrate significantly higher quality of life, including physical health and mental health, at 9-weeks post-baseline and 21-weeks post-baseline compared with caregivers receiving standard care.

Methods

We analyze data from a two-arm randomized clinical trial that tested the impact of a culturally tailored problem-solving intervention called Recursos Educativos Sirviendo a Cuidadores en Español (RESCUE en Español). The intervention consisted of eight weekly telephone sessions delivered by a trained interventionist with a health background. During each session, the interventionist and caregiver discussed topics pertinent to the caregiver's situation using resources from the RESCUE en Español website (https://www.stroke.cindrr.research.va.gov/STROKECINDRR/es/). These resources provided information about stroke, caregiving strategies, self-management tools, a curated list of useful resources, and a glossary of medical terms. The intervention was grounded in the relational/problem-solving model of stress developed by D'Zurilla and Nezu[22] and incorporated concepts from Lazarus and Folkman's[23] stress appraisal and coping theory. The core components were organized under the COPE framework (Creativity, Optimism, Planning, and Expert Information),[24] which emphasizes fostering creative thinking, maintaining an optimistic outlook, and applying problem-solving skills supported by expert information. The overarching goal was to empower caregivers by strengthening their problem-solving abilities, providing education, and support tailored to their needs.

Participants

Participants were recruited through patient lists from medical records, and referrals from healthcare providers from three Veterans Health Administration (VHA) facilities in the Southeast United States and the Caribbean. Eligible participants were caregivers of Veterans who received a primary diagnosis of stroke (ICD-10 codes I60.0–I69.998) within the last year and who were receiving VHA care. Inclusion criteria required caregivers to serve as the primary caregiver for a Veteran with at least two deficits in activities of daily living (Stroke Impact Scale-16 $\leq$ 74), [25] have internet access, be reachable by telephone, prefer Spanish communication, report moderate to severe caregiver stress (Spanish Perceived Stress Scale $\geq$ 1),[26] self-identify as Hispanic, and agree to random assignment to either the intervention or standard care group. Caregivers were excluded if the Veteran had a life expectancy of less than six months.

Study Procedure

Informed consent was obtained by phone under a waiver of written consent. Participants assigned to the intervention group received a caregiver workbook with instructions on how to access the RESCUE en Español materials for the intervention, while those in the standard care group received the usual support provided by the VHA medical facility. Randomization was conducted using a balanced procedure, with group assignments concealed in sealed envelopes and revealed by the project coordinator. Investigators and data collectors remained blinded, and only the statistician and coordinator had access to group assignments.

Data were collected on paper and entered in an electronic database stored on a secure VA server, with a second staff member verifying accuracy during data entry. Telephone assessments were conducted at baseline and 9- and 21-weeks post-baseline. Intervention fidelity was ensured through standardized manuals, training, session monitoring, and review of intervention notes, while caregiver adherence was supported through reminder calls.

Approvals were obtained from the Institutional Review Board (IRB) affiliated with each participating site and the local VA Rehabilitation and Development committees: the University of Florida IRB and the North Florida/South Georgia Veterans Health Systems, Research & Development Committee in Gainesville, FL; the VA Caribbean Healthcare System's IRB and the VA Caribbean Healthcare System's Research & Development Committee in San Juan, PR; the Orlando VA Medical Center's IRB and the Orlando VA Medical Center's Research & Development Committee in Orlando, FL.; the University of South Florida, Research Integrity & Compliance, IRB and the James A Haley Veterans' Hospital, Research & Development Committee in Tampa, FL, and conducted in accordance with the Declaration of Helsinki. This study is registered on ClinicalTrials.gov (NCT03142841). Additional methodological details are available in the published protocol. [27]

Demographics

Caregivers and Veterans characteristics were obtained using a demographic form. Caregivers provided information on their age, gender (male or female), marital status (married, divorced/separated, widowed, or single), education (high school degree/lower, some college/vocational, or college degree/higher), employment (full-time, part-time, retired, or unemployed), race (Black, multiracial, Pacific Island Native, or White) ethnicity (Hispanic, non-Hispanic), and relationship to stroke survivors (spouse/partner, child, child, or other).

Quality of Life

To measure caregivers' health quality of life we used the Health-Related Quality of Life: Veterans Rand 12 Item Health Survey (VR-12), a 12-item instrument. The 12 items yield two summary scores— Physical Health Component Score (PCS) and Mental Health Component Score (MCS)— scores ranged from 0 to100, with higher scores indicating better quality of life, based on assessments of physical functioning, role limitation due to physical health mental problems, pain, energy-level, mental well-being, social functioning, and general health. [28] The VR-12 is norm-scored to be comparable to a general U.S. population.[29] The VR-12 has undergone extensive testing and shown to be reliable and valid in ambulatory care patient populations.[28-30]

Statistical Analysis

Generalized least squares (GLS) regression models for repeated measures were used to examine the effects of the intervention over time on physical and mental health-related quality of life outcomes at three time points. The primary effects of interest included a main effect of group assignment (intervention vs standard care), two main effects of time (baseline vs 9-weeks post-baseline, baseline vs 21-weeks post-baseline), and the group-by-time interactions, which tested whether changes in outcomes over time differed between groups.

To aid in interpretation and comparison of effects, we computed standardized regression coefficients by scaling and centering PCS and MCS values and modeling analogous GLS models with these standardized outcomes; these standardized coefficients are presented alongside the original, unstandardized coefficients. The standardized coefficients (β) express effects in standard-deviation units, while the unstandardized coefficients (B) express effects in the original scale of the scored and norm-scored measure. [A5.1]

Covariance structures were evaluated separately for each outcome by comparing an autoregressive covariance structure with heterogeneous variances (ARH[1]) and an unstructured covariance matrix. The ARH(1) structure allows for within-participant correlations across repeated observations while allowing residual variances to differ across measurement time points, whereas the unstructured covariance matrix places no constraints about correlations between time points. For PCS, the estimated correlations followed the expected pattern for an autoregressive process; therefore, the more parsimonious ARH(1) structure was retained. For MCS, however, correlations between time points did not follow an autoregressive pattern (i.e., correlations between adjacent time points were not consistently higher than correlations across longer time intervals), and the unstructured covariance structure provided substantially better model fit. Accordingly, the unstructured covariance structure was used for MCS. Fixed-effect estimates were substantively similar across alternative covariance structures.

Model diagnostics included examination of residual distributions, standardized residual plots, and assessment of potential outliers. These checks did not indicate assumptions violations that would meaningfully affect inference. Missing outcome data at follow-up assessments were handled using likelihood based estimation within the GLS framework. Models were estimated using restricted maximum likelihood (REML), which incorporates all available observations under missing at random (MAR) data assumptions.

Results

Of 875 caregivers screened, 648 were excluded and 17 withdrew before randomization. A total of 211 caregivers met eligibility criteria and completed baseline assessments; one withdrew afterward, leaving 210 participants randomized equally to the intervention (n=105) or standard care (n=105) groups. At 9- and 21-week follow-ups, 156 caregivers completed both assessments (intervention: n=70; standard care: n=86). All available data were retained and analyzed using an intent-to-treat approach. Participants were predominantly Hispanic (99%) and female (88%), with a mean age of 59, 46% were spouses or partners of the Veteran and had a college degree or higher (49%). Caregiver characteristics are presented in Table 1.

Physical Health-Related Quality of Life (VR-12 PCS)

Summary statistics for caregiver physical health-related quality of life, as measured by the VR-12 PCS, are provided in the upper half of table 2. Results from the generalized least squares regression analysis yielded no evidence of a significant difference in physical health improvement between groups; two group-by-time interaction effects (group × 9-weeks vs. baseline, and group × 21-weeks vs. baseline) yielded p=0.183 and p=0.123, respectively (see the upper half of Table 3). Thus, the intervention did not result in a significantly greater improvement in physical health-related quality of life compared to standard care overtime. Notably, the main effect of time for 21-weeks vs. baseline was statistically significant, indicating that overall, there was a significant decline in physical quality of life across both groups.

In the intervention arm, the mean PCS score fluctuated from 42.2±4.6 at baseline to approximately 42.8±5.8 at 9-week posttest and 41.2±5.9 at 21-weeks posttest. The standard care group appeared to show a small overall downward trend, from 43.1±5.6 at baseline to 41.9±6.0 at 9-weeks and 40.2±5.5 at 21-weeks (see Table 2). While the intervention group appears to have shown a smaller decline, the difference between intervention and standard care groups was not significant. Both groups demonstrated minimal clinically meaningful change, as the observed decreases were modest in magnitude.

Table 1. Caregiver characteristics.

Characteristic	Overall N = 210 [1]	Intervention N = 105 [1]	Standard Care N = 105 [1]	*p*-Value [2]
Age	59 (12)	60 (12)	59 (11)	0.3
Gender				0.8
Female	185 (88%)	92 (88%)	93 (89%)	
Male	25 (12%)	13 (12%)	12 (11%)	
Marital Status				0.3
Single	32 (15%)	21 (20%)	11 (10%)	
Married	136 (65%)	62 (60%)	74 (70%)	
Living together with partner	14 (6.7%)	6 (5.8%)	8 (7.6%)	
Divorced or separated	25 (12%)	14 (13%)	11 (10%)	
Widowed	2 (1.0%)	1 (1.0%)	1 (1.0%)	
Refused	0 (0%)	0 (0%)	0 (0%)	
Unknown	1 (0.5%)	1 (0.01%)	0 (0%)	
Ethnicity				0.9
Hispanic	208 (99%)	104 (99%)	104 (99%)	
Not Hispanic	1 (0.5%)	0 (0%)	1 (1.0%)	
Unknown	1 (0.5%)	1 (1%)	0 (0%)	
Race				0.2
Black	18 (9.3%)	13 (13%)	5 (5.2%)	
Multi-racial	61 (32%)	27 (28%)	34 (35%)	
Other	11 (5.7%)	6 (6.2%)	5 (5.2%)	
Pacific Island Native	2 (1.0%)	0 (0%)	2 (2.1%)	
White	101 (52%)	51 (53%)	50 (52%)	
Unknown	17 (8.1%)	8 (7.61%)	9 (8.6%)	
Education				0.046
High school degree or lower	41 (20%)	24 (23%)	17 (16%)	
Some college/vocational	67 (32%)	39 (37%)	28 (27%)	
College degree or higher (e.g., Postgraduate)	102 (49%)	42 (40%)	60 (57%)	
Employment				0.2
Full-time	42 (20%)	15 (15%)	27 (26%)	
Part-time	18 (8.7%)	10 (9.7%)	8 (7.7%)	
Retired	79 (38%)	43 (42%)	36 (35%)	
Unemployed	68 (33%)	35 (34%)	33 (32%)	
Unknown	3	2	1	
Income				0.2
Up to USD 20,000	81 (39%)	46 (45%)	35 (34%)	
USD 20,001–USD 50,000	91 (44%)	43 (42%)	48 (47%)	
USD 50,001 and higher	34 (17%)	14 (14%)	20 (19%)	
Unknown	4	2	2	
Relation to Veteran				0.4
Spouse/Partner	107 (51%)	50 (48%)	57 (54%)	
Child	70 (33%)	35 (33%)	35 (33%)	
Other	33 (16%)	20 (19%)	13 (12%)	

Mean (SD); n (%); Wilcoxon rank sum test; Pearson's Chi-squared test; Fisher's exact test.

Mental Health-Related Quality of Life (VR-12 MCS)

Summary statistics for caregiver mental health-related quality of life, as measured by the VR-12 MCS, are provided in the lower half of Table 2. Results from the generalized least squares regression analysis showed two significant group-by-time interaction effects. First, there was a significant interaction effect for group × baseline-vs-post1 (i.e., the interaction involving the contrast between baseline and 9-weeks), with $p < 0.001$. Second, the group × baseline-vs-post 2 interaction was also significant at $p = 0.044$ (see the lower half of Table 3).

Examination of cell means and Figure 1 clarifies the nature of these interaction effects. The intervention group's mean MCS score was 46.0±5.5 at baseline, rising to 49.9±6.0 at 9-weeks posttest and 48.4±6.0 at 21-weeks. The standard care group started at 44.7±7.5 and decreased to 43.2±6.8 at 9-weeks but then increased to 44.4±6.5 by 21-weeks. The intervention group's score decreased slightly from 9-weeks to 21-weeks, but was still significantly improved relative to baseline, with the 21-weeks score being outside the baseline confidence interval. Thus, the intervention group's significant improvement in mental quality of life was maintained over two post-intervention timepoints. Intervention participants demonstrated significantly higher mental health–related quality-of-life scores at both post-intervention time points compared with baseline and with the standard care group at corresponding assessments. These differences were maintained at 21-weeks post-baseline, indicating that improvements in mental health–related quality of life persisted over time.

Both the intervention and standard care groups showed slight decline in caregiver PCS scores over the 21-week study period, but with no significant evidence that the two groups differed in their PCS trajectories. However, there was a significant group × time interaction for the baseline-to-9-weeks contrast and the group × baseline-to-21-weeks interaction was also significant (*p*=0.044). Thus, while evidence is insufficient for an effect of the telephone and online problem-solving intervention on the Physical Health-Related Quality of Life measure, there is evidence that the intervention yielded an improvement in Mental Health-Related Quality of Life, compared to standard care.

Table 2. Summary statistics for Caregiver Physical (PCS) and Mental (MCS) Health-Related Quality of Life.

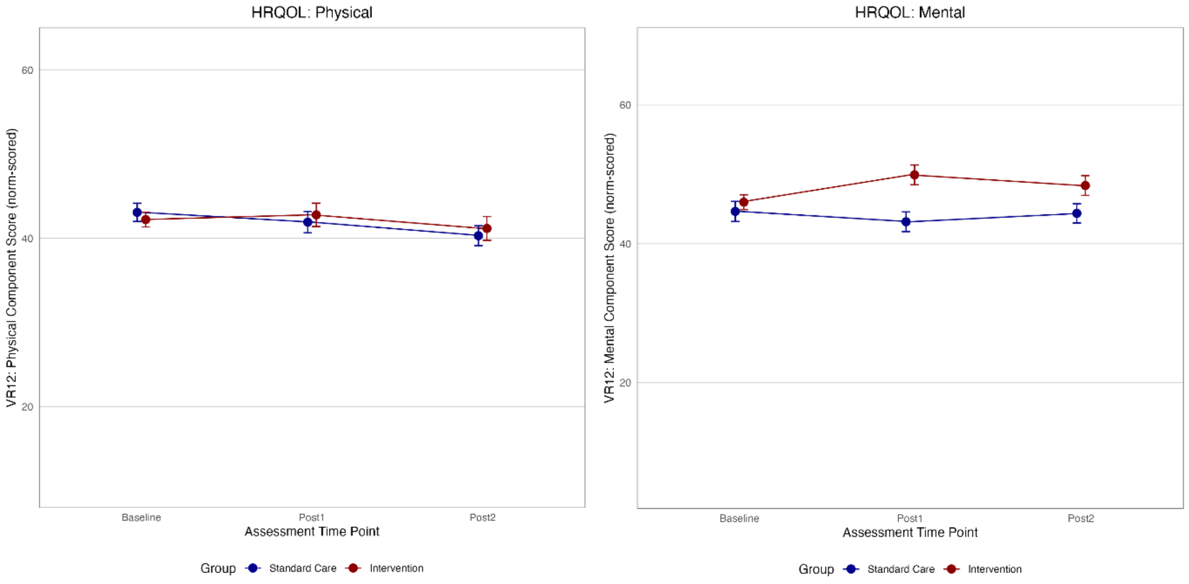
Outcome Measure	Group	Time-Point	N	Mean	SD	SE	95% CI
Physical Component Summary Scores (PCS)	Standard Care	Baseline	105	43.1	5.6	0.5	[42.01, 44.16]
	Standard Care	Post 1 (9-weeks)	90	41.9	6	0.6	[40.66, 43.18]
	Standard Care	Post 2 (21-weeks)	86	40.3	5.5	0.6	[39.13, 41.49]
	Intervention	Baseline	105	42.2	4.6	0.4	[41.34, 43.10]
	Intervention	Post 1 (9-weeks)	71	42.8	5.8	0.7	[41.40, 44.17]
	Intervention	Post 2 (21-weeks)	70	41.2	5.9	0.7	[39.75, 42.59]
Mental Component Summary Scores (MCS)	Standard Care	Baseline	105	44.7	7.5	0.7	[43.21, 46.11]
	Standard Care	Post 1 (9-weeks)	90	43.2	6.8	0.7	[41.75, 44.59]
	Standard Care	Post 2 (21-weeks)	86	44.4	6.5	0.7	[42.99, 45.77]
	Intervention	Baseline	105	46	5.5	0.5	[44.93, 47.05]
	Intervention	Post 1 (9-weeks)	71	49.9	6	0.7	[48.50, 51.35]
	Intervention	Post 2 (21-weeks)	70	48.4	6	0.7	[46.97, 49.81]

N = Sample size; SD = Standard deviation; SE = Standard error; CI = Confidence interval.

Table 3. Fixed effects for the generalized least squares models predicting Caregiver Physical (PCS) and Mental (MCS) Health Related Quality of Life.

Outcome Measure	Effect	*β*	B	SE B	95% CI	*p*-values
Physical Component Summary Scores (PCS)	(Intercept)	0.11	43.12	0.96	[41.24, 45.00]	0
	Group: Intervention vs Standard Care	-0.09	-0.9	1.36	[-3.57, 1.76]	0.507
	Time 1: Baseline vs Post 1 (9-weeks)	-0.13	-1.29	1.04	[-3.34, 0.76]	0.217
	Time 2: Baseline vs Post 2 (21-weeks)	-0.26	-2.64	0.86	[-4.33, -0.96]	0.002**
	Group × Time 1	0.2	2.08	1.56	[-0.99, 5.15]	0.183
	Group × Time 2	0.19	1.98	1.28	[-0.54, 4.49]	0.123
Mental Component Summary Scores (MCS)	(Intercept)	-0.1	44.66	1.11	[42.47, 46.84]	0
	Group: Intervention vs Standard Care	0.12	1.33	1.57	[-1.76, 1.33]	0.399
	Time 1: Baseline vs Post 1 (9-weeks)	-0.14	-1.67	1.06	[-3.76, 0.42]	0.116
	Time 2: Baseline vs Post 2 (21-weeks)	-0.08	-0.9	1.05	[-2.96, 1.16]	0.391
	Group × Time 1	0.48	5.38	1.58	[2.27, 8.49]	0.001**
	Group × Time 2	0.28	3.12	1.55	[0.08, 6.16]	0.044*

β = Standardized Coefficient, B = Unstandardized Coefficient, SE B = Standard Error for Unstandardized Coefficient; CI = Confidence interval for Unstandardized Coefficient, *p<. 05, **p<0.01



(A) (B)

Figure 1. (A) Longitudinal changes in Physical Component Summary (PCS) scores, and (B) longitudinal changes in Mental Component Summary (MCS) scores, stratified by group.

Discussion

This study evaluated the impact of a culturally tailored, telephone- and web-based problem-solving intervention on the quality of life of Spanish-speaking caregivers of Veterans post-stroke. Stroke caregiving is often associated with elevated psychological stress and depression, making accessible interventions to mitigate these adverse outcomes essential.[7] Our findings provide evidence of the intervention's effectiveness with caregivers receiving the intervention demonstrating greater improvements compared to those receiving standard care. However, the intervention did not significantly affect physical health-related quality of life, as both groups experienced modest declines over time. These results partially support our hypothesis and suggest that while the intervention successfully addressed mental health-related quality of life, additional strategies may be needed to alleviate the physical demands and health consequences of stroke caregiving. The problem-solving intervention was designed primarily to reduce caregivers' depressive symptoms, thus improvements in mental health–related quality of life aligns with our findings.

The observed improvements in mental health–related quality of life align with prior research demonstrating the efficacy of similar interventions for stroke caregivers.[31-33] Systematic reviews indicate that interventions incorporating educational and supportive components can significantly enhance psychological outcomes, although the magnitude and durability of these effects vary across studies.[34] Furthermore, problem-solving–based interventions have shown effectiveness in Spanish-speaking Hispanic populations and have been successfully integrated into health programs.[35,36] Culturally adapted problem-solving approaches for Spanish-speaking caregivers of civilian adults with neurological conditions have been associated with reduced caregiver burden, improved depressive symptoms, and strengthened caregiver–recipient relationships.[37]

Mental health gains were sustained at 21-weeks post-baseline (2.4-point increase), suggesting the intervention equipped caregivers with coping strategies that extended beyond the immediate post-intervention period. These findings indicate that interventions with adequate intensity and duration, incorporating evidence-based components such as problem-solving training and caregiver support, can yield meaningful improvements. The significant group-by-time interaction observed in this study reveals that benefits emerged early and persisted, a pattern contrasting with studies where initial gains diminished over time.[17,38] However, while this follow-up demonstrates meaningful short-term maintenance, longer-term impact remains unknown. Given that prior longitudinal research shows caregiver mental health can fluctuate for years post-stroke,[39] more research is warranted to determine whether these benefits are sustained over time.[18]

Despite these mental health improvements, physical health–related quality of life declined modestly in both groups (intervention and standard care), indicating that improvement in mental health does not necessarily translate into physical gains. Given the minimal physical demands of the telephone-based problem-solving intervention, it is unlikely that the program itself contributed to the observed physical declines. Instead, broader contextual or health-related factors—such as disease progression or aging, may have driven similar declines in both groups. These findings also suggest that improvements in mental health do not necessarily translate to gains in physical health, and that mental and physical domains may require distinct intervention strategies.

Evidence shows that culturally adapted digital mental health interventions are effective, well-received, and can improve mental health outcomes, especially for racially and ethnically minoritized populations.[40] While such evidence supports the plausibility of our findings, the mechanisms underlying the observed improvements in mental health–related quality of life in this study cannot be inferred directly. Our results suggest that culturally adapted and tailored, remote interventions can improve mental health–related quality of life for Spanish-speaking caregivers of Veterans post-stroke. Integrating culturally responsive telephone and online problem-solving support to caregiver programs may be a practical way to enhance well-being, particularly for those facing language and access barriers. However, mental health support alone is not enough. Caregivers may also face physical health challenges, so effective programs should combine mental health resources with strategies that address physical strain and promote self-care.

This study has several limitations. First, the caregiver sample consisted primarily of well-educated, Hispanic female spousal caregivers caring for Veteran stroke survivors, which limits generalizability to more diverse caregiver populations. Participation was restricted to those willing and able to engage in a randomized clinical trial, introducing potential self-selection bias. It is possible that stroke caregivers experiencing significant burden and depression may have been less likely to participate. Second, data collection was disrupted by external events, including natural disasters and an island-wide blackout, which delayed timelines and may have affected participant engagement and adherence to the data collection schedule. Third, reliance on caregiver self-report raises the potential for socially desirable responses and underreporting, particularly given cultural differences in the acceptability of disclosing experiences related to mental and physical health-related aspects of life.

Finally, attrition was higher in the intervention group (33%) than in the standard care group (18%), primarily due to time constraints, and perceived limited benefits. Differential attrition could introduce bias if participants who were lost to follow-up differed systematically from those who continued the study. For example, if participants who withdrew from the intervention would have less improvement in quality of life, their absence from later assessments could lead to an overestimation of intervention effects. Baseline comparisons did not indicate differences between completers and non-completers on physical or mental health-related quality of life. Although caregiver education differed between groups at baseline, sensitivity analyses with caregiver education as a covariate showed no evidence that caregiver education level modified the intervention response. Additionally, the longitudinal models used likelihood-based estimation that incorporates all available observations and accounts for treatment group in the estimation process, which helps mitigate bias when data are missing at random (i.e., missingness is conditional on observed variables). Nevertheless, the possibility of attrition-related bias cannot be ruled out. These retention difficulties highlight ongoing barriers to engagement of diverse and understudied populations and underscore the need for flexible, low-burden delivery approaches, early demonstration of intervention relevance, and strengthened outreach strategies to benefit scalability and sustained participation.

Conclusion

These findings have implications for development of culturally relevant interventions to enhance the quality of life of caregivers of Veterans with stroke. Culturally adapted problem-solving interventions can be beneficial for stroke caregivers. Although physical quality of life was not impacted, the mental health benefits underscore the positive impact of caregiver support and education. Interventions that address the various complex needs of caregivers' needs can enhance their quality of life. Future research should build on these findings by designing and testing interventions that overtly address both physical and mental health dimensions of caregiving. Clinically, addressing the mental and physical demands of caregiving may help improve caregivers' overall quality of life.

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