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Effectiveness of a positive psychology program for caregivers of stroke survivors: A pilot study

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ABSTRACT

Objective: The physical and emotional burden of long-term caring for a stroke survivor is high. The aim of the present study was to evaluate the effectiveness of the Fortaleza Program (FP) for stroke caregivers, based on positive psychology. **Method**: A quasi-experimental design with a placebo control group and an intervention group was implemented. Pre- and post-treatment measures were administered to both groups. Eighty-one family members currently caring for stroke survivor participated and completed five questionnaires (SF-36, CD-RISC10, SWLS, Zarit and HADS). Data analyses included independent samples *t*-test, Mann-Whitney *U*, paired samples *t*-test and Wilcoxon signed-rank. **Results**: The FP was effective as it significantly improved resilience, life satisfaction, depression, anxiety and distress burden scores and mental health dimensions such as health-related quality of life. **Conclusions**: The telepsychology version of the FP activates a positive emotional focus that improves their mental health, making it a useful tool for health prevention and promotion in rehabilitation contexts.

Keywords: Family caregivers; chronic illness; mental health; health-related quality of life; resilience; burden.

Efectividad de un programa de psicología positiva en cuidadores familiares de sobrevivientes de accidente cerebrovascular: Estudio piloto

RESUMEN

Objetivo: Cuidar de un familiar superviviente de un accidente cerebrovascular durante un periodo prolongado tiene un alto costo físico y mental. El objetivo del presente trabajo fue determinar la efectividad del Programa Fortaleza (PF) fundamentado en psicología positiva, para cuidadores familiares y adaptado a modalidad de telepsicología. **Método**: diseño cuasiexperimental, con grupo control placebo y grupo de intervención, con evaluación pre-post en fase de tratamiento. 81 cuidadores respondieron cinco cuestionarios (SF-36, CD-RISC10, SWLS, Zarit y HADS). Los análisis estadísticos incluyeron: prueba de *t* para muestras independientes, *U* de Mann-Whitney, *t* de muestras pareadas y rangos con signo de Wilcoxon. **Resultados**: el PF mejoró resiliencia, satisfacción con la vida, depresión, ansiedad y sobrecarga, y las dimensiones de salud mental de la CVRS. **Conclusiones**: la versión telepsicológica del PF activa una focalización positiva emocional y cognitivo-conductual que mejora la salud mental del cuidador, por lo que se podría considerar una herramienta útil para la promoción de la salud en contextos de rehabilitación.

Palabras clave: Cuidadores familiares; enfermedad crónica; salud mental; resiliencia; sobrecarga

Introduction

Stroke is characterized by its unexpected nature and sequelae, which imply dependency due to the permanent or temporary disability that patients typically

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experience and the need for support and care, both for the management of the health condition and for the performance of daily living activities (Chirveches-Calvache, 2016). According to the World Health Organization (WHO) and the Pan American Health Organization (PAHO), stroke is the second leading cause of death worldwide, with serious consequences in 25% to 40% of cases (WHO & PAHO, 2006). By 2019, stroke was the third leading cause of years of life loss and the fourth leading cause of disability-adjusted life years in the Americas (PAHO, 2021). Stroke prevalence increases in people over 60 years of age, and it is considered a growing health problem that can also generate social and economic problems for affected patients and caregivers (Piloto-Cruz et al., 2020).

According to the social organization of care, such support for stroke care represents a service that is socially assigned to family care mechanisms, implying material, physical and psychological costs for the family, which often translates into the appearance of symptoms associated with mental health disorders, deterioration of the quality of life and well-being of family caregivers (Cerquera-Córdoba et al., 2017). The incidence of mental health disorders in primary caregivers of stroke patients may be equal to or higher than that of the patients themselves (Hu et al., 2018). There is a consensus that, regardless of culture, family caregivers of people who are dependent due to illness or disability tend to experience a high burden related to care. This burden, which can be subjective but also objective, is a result of the unforeseen circumstances, the additional work that constitutes caregiving, the prolonged caregiving hours, and the poor psychosocial resources they have (Fernandes, 2017; Mandowara et al., 2020; Masoudian et al., 2019; Pendergrass et al., 2017; Yousaf et al., 2019).

The effectiveness of psychological interventions for stroke caregivers was analyzed by Panzeri et al. (2019), who reported that some cognitive behavioral therapy (CBT) techniques were effective in reducing depression, anxiety and burden in stroke caregivers (e.g. coping skills training and problem-solving skills training). For example, King et al. (2007) proposed a two-month program including relaxation and reframing of negative thoughts, and Ward et al. (2016) proposed a five-month program that included motivational activities, socialization, and development of adaptive thinking. In other cases, the implementation of CBT techniques was enhanced by physical and occupational therapy techniques (Kootker et al., 2019), multicomponent programs (Wilz & Barskova, 2007; Elsheikh et al., 2020), and flexible and adaptable applications using different delivery modes (e.g., individual, group, virtual synchrony, telephone call or home visit), which may make a difference in effectiveness (King et al., 2007). Intervention programs for family caregivers of stroke survivors that have demonstrated to have an effect on negative health indicators have emotional, cognitive and behavioral components including relaxation techniques (Draper et al., 2007; King et al., 2007; Wilz & Barskova, 2007), training to develop positive thinking, communication skills, or problem reframing (King et al., 2007; Pfeiffer et al., 2014; Ward et al., 2016), and emotional control (Ward et al., 2016).

The role of connecting with positive emotions from the past (e.g. forgiveness and gratitude) and amplifying positive emotions during the intervention has also been implemented by several studies (Draper et al., 2007; Félix-Alcántara et al., 2023; Mei et al., 2018; Pfeiffer et al., 2014; Ward et al., 2016). There is also evidence of the protective role of resilience in coping with the emotional impact of illness and developing personal strengths, reducing anxiety, depression, and caregiver burden (Palacio et al., 2020; Senturk et al., 2018). Resilience is an important topic considering its association with better mental health, health-related quality of life (HRQoL), and life satisfaction among caregivers (Palacio et al., 2020; Sandstedt et al., 2018; Yi-Frazier et al., 2017). The effectiveness of these activities may vary according to the frequency and duration of the intervention, the characteristics of the individual, and the adjustment to their preferences; likewise, the variety of activities also seems to play an important role in avoiding monotony and abandonment of the practices, which would be more effective if sustained over time (Lyubomirsky & Layous, 2013).

Although the efficacy of CBT techniques for anxiety, depression and burden in stroke caregivers has been established, the implementation of interventions complemented by positive psychology strategies, including the measurement of positive mental health indicators, has not been sufficiently evaluated. Bearing this in mind, the aim of the current study was to analyze the effectiveness of a novel version of the Fortaleza Program (FP) adapted for caregivers of stroke survivors and delivered via telepsychology. The FP is a resilience empowerment program for health promotion and maintenance that was designed and validated with samples diagnosed with rheumatoid arthritis (Quiceno et al., 2011), and subsequently manualized by Quiceno et al. (2016). The psychological techniques included in the FP were cognitive behavioral in nature, based on positive psychology and were designed to train resilience by focusing on self-esteem, self-efficacy and self-control.

The present study aimed to analyze the effects of the intervention on positive and negative indicators of caregiver health. This study hypothesized that PF would lead to significant improvements in positive mental health indicators (health-related quality of life dimensions: vitality, emotional functioning, mental health, and mental health dimension; resilience; life satisfaction) and significant reductions in negative mental health indicators (caregiver burden, anxiety, depression) among family caregivers of stroke survivors compared to a control group.

Method

Participants

Eighty-one family members who had been the primary caregivers of stroke survivors in the past year, were selected to participate in the study. There was an information control group (ICG; *n* = 39) and an intervention group that received the FP (FPG; *n* = 42). Caregivers in both groups were mostly female, married or cohabiting (ICG = 56.4%; FPG = 66.7%), often daughters (ICG = 30.8%; FPG = 33.3%) or spouses of the stroke survivor (ICG = 30.8%; FPG = 28. 6%), and their occupation (besides caring for their relative) was either domestic work (ICG = 1%; FPG = 47.6%) or formal employment (ICG = 25.6%; FPG = 21.4%). Most of the families belonged to the lower middle class of the Colombian social stratification proposed by DANE (2018; ICG = 87.2% FPG = 69.1%). These caregivers had assumed the role of caring for their family members since the onset of the stroke, and the average time spent caring for their relative was 8 months, for approximately 11 hours per day. Table 1 presents a comparison of the two groups regarding the type of care received, the time spent on caregiving, and socio-demographic variables. No statistical analyses were performed for this descriptive comparison.

Instruments

Health Related Quality of Life Questionnaire (SF-36; Ware & Sherbourne, 1992). The Spanish version by Lugo et al. (2006) was used. It measures HRQoL and consists of 36 items, grouped into eight dimensions with a Likert-type scale that varies between items, each subscale containing two to ten items. The subscale scores were converted into percentages so that they range from 0 to 100, with a score of 0 corresponding to maximum impairment and a score of 100 indicating the absence of any reported impairment. Cronbach's alpha for the subscales included in this study were as follows: vitality: α = .78, emotional functioning: α = .82, mental health: α = .82, and mental health summary dimension: α = .91.

Connor-Davidson Resilience Scale (CD-RISC-10; Connor & Davidson, 2003). The Spanish version by Riveros-Munévar et al. (2016) was used. It measures co-

Table 1. Sociodemographic and caregiver role characteristics of the control and treatment groups

Characteristics	ICG (*n* = 39)					FPG (*n* = 42)				
	Mean	*Range*	*SD*	*fr*	%	*Mean*	*Range*	*SD*	*fr*	%
Age (years)	45.1	22-69	12.9			47.2	25-70	12.6		
Sex										
Male				9	23.1				4	9.5
Female				30	76.9				38	90.5
Time spent caring for the family member (months)	8.7	2-13	3.6			8.3	2-12	2.7		
Daily time dedicated to caring for the family member (hours)	10.3	2-16	3.94			11.3	4 – 24	4.6		
Type of care										
Personal care	33		84.6			37		88.1		
Physical mobility	37		94.9			35		83.3		
Following medical instructions	28		71.8			26		61.9		
Activities outside the home	34		87.2			36		85.7		
Patient dependency reported by the caregiver										
Moderate				13	3.3				11	26.2
Severe				24	61.5				21	50
Major				2	5.1				10	23.8

Note. FPG: Fortaleza Program Group; ICG: Information Control Group; *SD*: standard deviation; *fr* : frequency ping, resistance to stress, and/or the ability to successfully adapt to adversity and consists of 10 items structured in a Likert-type summative scale (0 = not at all, 1 = rarely, 2 = sometimes, 3 = often and 4 = almost always) grouped into a single dimension. The scale ranges from 0 to 40, has no established cut-off point, and the higher the score the greater the resilience. Cronbach's alpha was α = .78 for the present study.

Satisfaction With Life Scale (SWLS; Diener et al., 1985). We used the Spanish version (Vázquez et al. (2013) validated in a Colombian sample (Vinaccia-Alpi et al., 2019). It is a self-report life satisfaction scale, consisting of five items that are answered according to the degree of agreement with each statement on a 7-point Likert scale (from 1 = strongly disagree to 7 = strongly agree). The total score ranges from 5 to 35 points. Higher scores indicate higher life satisfaction. A Cronbach's alpha: α = .75 was obtained for this study.

Zarit's Caregiver Perception of Burden Interview (ZARIT; Zarit & Zarit, 1983). The Spanish version by Barreto-Osorio et al. (2015) was used. It is a self-report questionnaire designed for usual caregivers, which detects situations of burden related to the performance of social services. It has a 5-point Likert-type scale with the following options: never, rarely, sometimes, quite often and almost always. Its total score can range from 22 to 110. Includes 22 items that assess the negative impact of caregiving on some areas of life (Breinbauer et al., 2009). In this study, an adequate internal consistency was reported for the total test with Cronbach's alpha: α = .75.

Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983). The Spanish version by Hinz et al. (2013) was used. It was developed to detect anxiety and depression disorders in an agile way in a non-psychiatric hospital setting or in primary care. It consists of two subscales of 7 items interspersed with a total of 14 items with a Likert-type scale ranging from 0 to 3, describing feelings experienced during the past week. Reliability data reported for this study showed acceptable Cronbach's alpha: α = .82 for the total score, for anxiety α = .79 and for depression α = .82.

Expectations Questionnaire. Developed according to Villamarín (1987) to assess outcome expectations through self-report, scoring on a scale of 1 to 10 on three aspects: logic and order of the program, confidence in the program's effectiveness in improving well-being, and recommending the program to others.

Procedure

This study was conducted with available subjects from four rehabilitation services at healthcare institutions in Colombia. Inclusion criteria were as follows: family caregiver living with a stroke survivor, who had suffered a stroke in the previous 12 months, any type of stroke as the primary condition and without cognitive deficit according to Mini-Mental State Examination (Folstein et al., 1975), over 18 years of age, with at least basic formal education and with connectivity through a videoconferencing platform. A total of 118 caregivers of stroke survivors were invited to participate by telephone, given general information about the project, and informed that they would be randomly assigned to a group and that, at the end of the study, they would have the right to participate in the program being tested if it proved to be more effective (if assigned to the control group). An informed consent form was distributed and 93 caregivers signed the consent form (25 were not interested).

Subsequently, participants were assigned to one group or the other according to the order in which they consented to participate; participants were blinded to assignment. Pre-treatment assessment interviews were conducted via synchronous videoconference and lasted 35 to 40 minutes. Both groups were invited independently to an initial 30-minute meeting during which the general presentation of the objectives, contents, and characteristics of the program were socialized according to the assigned group. They then answered a questionnaire about their expectations. Eighty-one participants completed the program (12 did not complete the assigned program). All pre- and post-treatment evaluations were conducted by the same professional who was blinded to group assignment. All interventions in the ICG and the FPG were conducted by the same professional (one different from the first).

The fieldwork was conducted between the months of May and December 2021. Five groups of 8 to 11 caregivers each received the FP, while three groups of around 13 to 17 caregivers received the information program (IP). In both cases, the program started one or two weeks after the pre-treatment evaluation, and the post-treatment evaluation was carried out one or two weeks after the end of the six-weeks intervention. The minimum required to be considered as having completed the program was 85% of the sessions.

The present study took into account the ethical aspects of research on human subjects, as established in the declaration of Helsinki and in Resolution 8430 of October 4, 1993 of the Colombian Ministry of Health, as well as the conditions of data confidentiality and others corresponding to the development of psychological research, as established in article 52 of Law 1090 of 2006 and in the deontological and bioethical code for the practice of psychology in Colombia. The procedures of the present study were evaluated and approved by the ethics committee of Clínica Fátima.

Information control group (ICG)

A total of six content messages were sent weekly via WhatsApp to caregivers assigned to the control group. These messages were informative about aspects like those addressed in the FP, including resilience, caregiving, and self-care, but without guidance or the possibility of performing any guided exercises. The following topics were addressed: caregiver sense, caregiver well-being, caring for the stroke survivor, self-esteem, self-care, caregiver skills, self-efficacy and interpersonal behavioral styles. Participants assigned to this group were informed of the date and time when they would start receiving the materials and were encouraged to read and reflect on the information provided. At the end of the information program, participants were invited to participate in the FP.

FP treatment group (FPG)

The intervention consisted of the FP, a manualized and empirically tested program designed to train and strengthen resilience for health promotion and maintenance (Quiceno et al., 2011). For this study the FP was adapted to telepsychology using a videoconferencing platform (Zoom or Meet) to conduct six group sessions (including 8 to 15 people) of two hours duration with weekly frequency. The sessions were structured and included administrative activities and intervention activities, such as: full natural breathing, relaxation/breathing, mantra meditation, interpersonal behavioral styles, gratitude, expressive writing, achievement and personal interests. (Table 2).

The FP was also adapted to the context of the COVID-19 pandemic. Two key aspects of the adaptation of the program were: a) the use of videoconferencing services to

Table 2. Fortaleza Program (FP) sessions structure

Program Phase	Aspects that are considered
Phase 1. Summary	Prepare the sequential list of session activities to be presented at the beginning.
Phase 2. Session Resources	Prepare the list of materials or equipment needed to conduct the session.
Phase 3. Session Introduction	Previous reading and appropriation of the text with the theoretical argument and the objective of the session.
Phase 4. General orientation	The session begins with two parts: Reading the summary Attendance list
Phase 5. Initial emotional state assessment	Measurement using the Visual Analog Scale (VAS)
Phase 6. Evaluating the results of the commitments	Free participation space where participants share experiences and feelings related to the activities or exercises suggested in the participant booklet and completed between sessions.
Phase 7. Intervention activities	They are the core of each session, supported by the three pillars: self-esteem, self-efficacy, and emotional self-control, and linked from one session to the next. Instructions for each activity are detailed in the facilitator's manual and participant's booklet. Intervention activities: · Complete natural breathing · Breathing/relaxation · Mantra meditation · Interpersonal behavioral styles · Gratitude · Expressive writing · Personal achievement and interests
Phase 8. Allocation of commitments.	Psychophysiological, reflective, and writing activities completed by participants between sessions and described in the participant booklet.
Phase 9. Session feedback	Free participation space to express learning, achievements and concerns about the program.
Phase 10. Evaluation of the final emotional state	Measurement using the Visual Analog Scale (VAS).

Note. Adapted from Chapter 5, *Sesiones del Programa Fortaleza*, by Quiceno et al. (2016b). Manual Moderno. Reproduced with the author's permission.

deliver the group sessions, and b) the use of personalized telephone calls to follow up between sessions, maintain motivation, and monitor adherence. Participants assigned to this group received a physical participant booklet by mail or through their rehabilitation service; this booklet was an informative resource for caregivers to guide their engagement throughout the program.

Statistical analysis

Independent samples *t*-tests were used to assess between-group differences when normality and homoscedasticity assumptions were met; otherwise, Mann-Whitney *U* tests were used. Within-group changes were assessed using paired samples *t*-tests under the same distributional assumptions; when violated, Wilcoxon signed-rank tests were applied. Shapiro-Wilk (SW) tests were performed to assess sample normality. Non-parametric distributions were observed in the pre-treatment measures of FPG for emotional functioning, the mental health dimension, and depression; and in the ICG for emotional functioning and the mental health dimension. The same was observed for the post-treatment FPG measures of emotional functioning, mental health dimension, mental health, resilience, and anxiety, and the ICG for emotional functioning.

To examine baseline differences between groups, independent-samples Student's *t*-tests were used for resilience, life satisfaction, vitality, mental health, caregiver burden, and anxiety, based on prior confirmation of homoscedasticity and normality. Given deviations from these assumptions for emotional functioning, mental health, and depression, Mann-Whitney *U* tests were used. Independent samples of Student's *t*-tests were conducted for post -treatment comparisons for vitality, caregiver burden, life satisfaction, and depression. Mann-Whitney *U* tests were used for emotional functioning, mental health, resilience, and anxiety. Within-group changes from pre- to post- treatment were assessed using paired samples *t*-tests for vitality, caregiver burden, and life satisfaction in the FPG and for vitality, mental health, resilience, caregiver burden, life satisfaction, anxiety, and depression in the ICG. Wilcoxon signed-rank tests were used for emotional functioning, mental health, and resilience in the FPG and for emotional functioning and mental health in the ICG. Specific test statistics are detailed below.

Expectations were analyzed using the non-parametric Mann-Whitney *U* test, with the null hypothesis that the underlying distribution of the FPG sample is identical to that of the ICG sample. This non-parametric test was used because the assessment of program expectations was administered using three ordinal items that were not aggregated on a single scale. The results of this analysis revealed no significant differences between the group means on program expectations. These findings are supported by the following *p*-values: logic and order of the program (*p* = .77), confidence in the program´s

Table 3. Differences between the two groups before receiving treatment according to t-tests and Mann Withney U tests for positive and negative health indicators

Instruments	FPG (*n*=42)			ICG (*n*=39)									
	M	*SD*	*Mean rank*	*M*	*SD*	*Mean rank*	*df*	*t*	*Z*	*U*	*p*	*1-β*	*d*
SF-36													
Vitality subscale	56.5	17.8	-	61.7	18.9	-	79	-1.26	-	-	.21	.23	.27
Mental Health subescale	61.5	16.3	-	64.1	16.5	-	79	-0.71	-	-	.48	.10	.15
Emotional Functioning subscale	-	-	34.20	-	-	48.32	79	-	-2.83	533.5	.00*	.83	.77
Mental Health summary subscale	-	-	34.35	-	-	48.17	79	-	-2.64	539.5	.00*	.74	.70
CD-RISC-10	28.4	6.0	-	31.0	5.6	-	79	-1.99	-	-	.05	.50	.44
SWLS	24.0	6.0	-	25.4	4.7	-	79	-1.19	-	-	.24	.21	.26
ZARIT	53.9	14.0	-	53.7	11.7	-	79	.04	-	-	.97	.50	.00
HADS			-										
Anxiety subscale	9.9	3.7	-	9.2	2.9	-	79	.94	-	-	.35	.15	.20
Depression subscale	-	-	43.31	-	-	38.51	79	-	-0.92	722.0	.36	.14	.20

Note. FPG: Fortaleza. Program Group; ICG: Information Control Group; SF-36: Health Related Quality of Life Questionnaire 36 Item Short form survey; CD-RISC-10: 10 Item Connor-Davidson Resilience Scale; SWLS: Satisfaction With Life Scale; ZARIT: Zarit's Caregiver Perception of Burden Interview;
HADS: Hospital Anxiety and Depression Scale *M:* mean; *SD:* standard deviation; *df:* degrees of freedom.
* *p* < .05

effectiveness (*p* = .29), and recommending the program to others (*p* = .69).

Statistical analyses were performed with IBM SPSS Statistics version 23 for Windows. Power analyses were conducted using G*Power.

Results

Pre-treatment comparison between groups

For two dimensions of the SF-36 (vitality and mental health), CD-RISC, SWLS, Zarit, and HADS (anxiety and depression), similar pretest results were confirmed between the control and intervention groups, suggesting that the caregiver groups are equivalent at baseline on these indicators. Significant differences between the mean scores of the two groups were found for the variables of the emotional functioning and mental health dimensions of the SF-36. It is noteworthy that the means of these latter variables were higher in the control group before the intervention.

Students' *t*-test was performed using the assigned group as the independent variable and each of the variables that met the criteria of homoscedasticity and normality as the dependent variable. The results of *t*-test and Mann-Whitney *U* test used can be seen in Table 3.

Post-treatment comparison between groups

To determine whether there were significant differences in the positive and negative indicators of caregiver health depending on whether they were treated with FP, independent samples Student's *t*-test or Mann-Whitney *U* tests were performed. The results of the former are presented in Table 4, while the results of the latter are shown in Table 5.

The independent samples *t*-test was used to test homogeneity of variance using Levene's test, which confirmed the assumption and found significant probabilities for all differences between groups in the expected direction: increasing for positive indicators and decreasing for negative indicators. High statistical power (> .80) was obtained for all variables, except for two dimensions of SF-36 (emotional performance [1-β = .78] and summary dimension of mental health [1-β = .49]) and the CD-RISC (1-β = .62), in which case the

Table 4. Differences between the two groups after receiving treatment according to independent samples t-tests for positive and negative health indicators

Instruments	FPG (*n*=42)		ICG (*n*=39)						
	M	*SD*	*M*	*SD*	*df*	*t*	*p*	*1-β*	*d*
SF-36									
Vitality subscale	68.8	18.5	49.2	15.8	79	5.10	.00	.99	1.14
SWLS	28.4	4.4	25.5	5.0	79	2.76	.00	.86	.62
ZARIT	45.9	10.1	52.4	10.4	79	-2.87	.00	.88	.64
HADS									
Depression subscale	4.2	2.9	7.9	3.2	79	-5.51	.00	1	1.22

Note. FPG: Fortaleza. Program Group; ICG: Information Control Group; SF-36: Health Related Quality of Life Questionnaire 36 Item Short form survey; SWLS: Satisfaction With Life Scale; ZARIT: Zarit's Caregiver Perception of Burden Interview; HADS: Hospital Anxiety and Depression Scale *M*: mean; *SD*: standard deviation; *df:* degrees of freedom.

Table 5. Differences between the two groups after receiving treatment according to Mann Whitney U tests for positive and negative health indicators

Instruments	FPG (*n*=42)	ICG (*n*=39)					
	Mean rank	*Mean rank*	*Z*	*U*	*p*	*1-β*	*d*
SF-36							
Emotional Performance subscale	47.06	34.47	-2.59	564.5	.01	.78	0.63
Mental Health subscale	54.49	26.47	-5.37	252.5	.00	.83	1.00
Mental Health Sumary subscale	48.82	32.58	-3.11	490.5	.00	.49	0.72
CD-RISC-10	50.10	31.21	-3.62	437.0	.00	.62	0.85
HADS							
Anxiety subscale	24.44	58.83	-6.60	123.5	.00	.99	1.94

Note. FPG: Fortaleza. Program Group; ICG: Information Control Group; SF-36: Health Related Quality of Life Questionnaire 36 Item Short form survey; CD-RISC-10: 10 Item Connor-Davidson Resilience Scale; HADS: Hospital Anxiety and Depression Scale risk of committing a type II error increases, suggesting an increase in sample size in future studies that include these variables in this population. The effect sizes found were large for all variables; there is evidence in favor of generalizing the results.

Within-group pre-post comparisons

Table 6 illustrates the within-group effects of the intervention by comparing pre- and post-treatment scores for both the control and FP groups. Statistical significance was assessed using paired-sample t-tests, with non-parametric Wilcoxon signed-rank tests applied to variables that did not meet normality assumptions

The information program did not yield significant differences in SWLS, CD-RIC-10, Zarit, and one dimension of SF-36 (emotional performance). Furthermore, some SF-36 dimensions, specifically vitality and mental health, including the mental health dimension, showed significant decreases after the intervention. Similarly, negative indicators of the HADS (anxiety and depression) showed significant increases rather than decreases.

After the FP, significant improvements were observed in positive health indicators, including SWLS, CD-RISC, and four dimensions of SF-36 (vitality, emotional performance, mental health, and mental health dimension). In addition, negative health indicators in caregivers, such as HADS and Zarit, significantly decreased after the intervention. Thus, the FP demonstrated significant effects in improving both positive and negative indicators.

Table 6. Comparison of the mean of positive and negative health indicators among caregivers before and after intervention by group

Instruments	Before		After						
	M	*SD*	*M*	*SD*	*T*	*Z*	*p*	*1-β*	*D*
Information control group (ICG; n=39)									
CD-RISC-10	31.0	5.6	29.8	5.3	4.33	-	.06	.00	0.22
SWLS	25.4	4.7	25.5	5.0	-0.35	-	.72	.07	0.03
ZARIT	53.7	11.7	52.4	10.4	1.87	-	.07	.18	0.12
SF-36									
Vitality subscale	61.7	18.9	49.2	15.8	6.21	-	.00*	.00	0.71
Mental Health subscale	64.1	16.5	55.8	14.2	4.04	-	.00*	.36	0.54
Emotional functioning subscale	60.7	41.1	57.3	39	-	-0.733^{a}	.46	.52	0.08
Mental Health Sumary subscale	67.4	19.3	61.7	17.5	-	-3.831^{a}	..00*	.06	0.30
HADS									
Anxiety subscale	9.2	2.9	10.8	2.9	-5.29	-	.00*	.36	0.54
Depression subscale	6.0	3.5	7.9	3.2	-6.47	-	.00*	.00	0.56
Fortaleza program group (FPG; n=42)									
CD-RISC-10	28.4	6.0	34.2	5.0	-	-5.45^{a}	.001*	.99	1.03
SWLS	24	6.0	28.4	4,3	8.67	-	.001*	.93	0.82
ZARIT	53.9	14.0	45.9	10.1	6.62	-	.001*	.79	0.64
SF-36									
Vitality subscale	56.5	17.7	68.8	18.5	-5.16	-	.001*	.79	0.67
Mental Health subscale	61.5	16.3	77.6	15.2	-	-4.45^{a}	.001*	.99	0.95
Emotional functioning subscale	33.3	39.6	79.4	30.3	-	-4.65^{a}	.001*	.99	1.38
Mental Health Sumary subscale	55.8	19.1	74.2	17.3	-	-5.17^{a}	.001*	.99	1
HADS									
Anxiety subscale	9.9	3.7	5.4	2.6	-	-5.50^{a}	.000*	.99	1.35
Depression subscale	6.8	4.2	4.2	2.9	-	-4.78^{a}	.000*	.81	0.71

Note. *M*: mean; *SD*: standard deviation; SF-36: Health Related Quality of Life Questionnaire 36 Item Short form survey; CD-RISC-10: 10 Item Connor-Davidson Resilience Scale; SWLS: Satisfaction With Life Scale; ZARIT: Zarit's Caregiver Perception of Burden Interview; HADS: Hospital Anxiety and Depression Scale. ^{a} based on positive ranges. * $p < .05$

Discussion

This pilot study examined the effectiveness of a positive psychology program for stroke caregivers. The results in the control group made it clear that a digital information intervention aimed only at providing important information to the caregiver was not effective in improving their health, and that letting things lapse as time passed might be harmful. Lai et al. (2020) found precedent or this on their placebo control group that only received telephone calls, documenting the deterioration of caregivers´ mental health. In the context of the COVID-19 pandemic other authors found evidence against the exclusive use of digital chat or telephone formats and suggested the use of videoconferencing for telemedicine interventions (Guo et al., 2020).

The reported results, while demonstrating observable differences, provide suggestive evidence of the potential benefits of the Fortaleza Program (FP). Caregivers in the intervention group showed a pattern of improved positive health indicators (i.e., HRQoL, life satisfaction, and resilience) and reduced negative indicators (i.e., anxiety, depression, and burden) in contrast to the Information Control Group (ICG) and across the intervention period. These findings raise questions about the effectiveness of information-only programs on these outcomes, particularly given the potential for caregiver well-being to decline during the initial stages of caring for a stroke survivor. Furthermore, despite the significant baseline difference in the emotional functioning and mental health dimension that initially favored the control group, improvements were observed after the FP intervention. The results showed significant differences in favor of the FPG, specifically higher scores on the positive indicators, consistent with the improvement in resilience and mental health dimensions of HRQoL reported by Quiceno et al. (2011) in the short term, and lower scores on the negative indicators, compared to the control group.

The present findings suggest that the FP facilitated the engagement of positive emotions among caregivers, a process not observed in the information control group. Consistent with Quiceno et al. (2011) and Quiceno et al. (2016), the design of the FP appears to effectively enhance resilience and overall mental health by promoting positive emotional experiences through cognitive-behavioral techniques grounded in positive psychology. The FP's operational framework posits that the cultivation of positive emotionality expands perceptual breadth, thereby promoting the development of personal resources, consistent with Frederickson's broaden-and-build theory. Although direct evaluations of the FP or comparable positive psychology-based interventions for stroke family caregivers remain limited, empirical evidence supports the efficacy of cognitive-behavioral techniques, like those incorporated in the FP, in improving the quality of life within this population (Panzeri et al., 2019).

Multiple techniques of intervention programs for stroke caregivers, similar to several of those included in the FP, have been presented in various studies, and the results of this study are consistent with the activation of positive emotions as determinants in the improvement of negative indicators of their health. (Draper et al., 2007; King et al., 2007; Mei et al., 2018; Pfeiffer et al., 2014; Ward et al., 201; Wilz & Barskova, 2007). Wilz and Barskova (2007) used a variety of techniques, including group exercises designed to facilitate emotional expression, thereby reducing isolation and fostering emotional stability. Additionally, relaxation techniques were incorporated, to promote healthy behaviors through increased self-awareness of caregiver burden and acceptance of professional support. Although these techniques were embedded in a multicomponent psychoeducational intervention, their efficacy was demonstrated in improving the mental health dimension of Health-HRQoL among stroke caregivers six months after the intervention. This finding is partially consistent with the results of the current study, as the FP incorporated relaxation and breathing techniques from the second session onward, promoting them as self-regulatory strategies that, with consistent practice, are integrated as healthy habits. Expressive writing was also integrated from the fourth session, providing participants with opportunities for experiential sharing, which, as suggested by Wilz and Barskova (2007), contributes to enhanced self-esteem and social cohesion. Thus, the intensive nature of the FP, coupled with personalized follow-up of relaxation/breathing and expressive writing practices, appears to have facilitated the achievement of short-term improvements in the mental health subscales of HRQoL. In addition, reminiscence therapy, as implemented by Mei et al. (2018), has been shown to increase life satisfaction scores in both stroke survivors and their care partners. This therapeutic approach emphasizes the elicitation of positive emotions from the past, such as forgiveness and gratitude. While it differs from the specific techniques used in the current study, it shares conceptual similarities with the FP in its emphasis on the elicitation of meaningful experiences (through FP exercises) and positive emotions (through gratitude and expressive writing exercises), both of which contribute to the enhancement of self-esteem and self-efficacy. Mei et al. (2018) reported that an eight-week, one-on-one intervention consisting of hourly sessions, a format comparable to the FP, resulted in significant improvements in life satisfaction and perceived caregiver burden at the end of the intervention and at a one-month follow-up. Sitbon et al. (2019) highlight that positive psychology-based interventions in the general population facilitate engagement with positive experiences or emotions, such as gratitude, through the implementation of cognitive-behavioral techniques that have been shown to be effective, especially when motivation for well-being is fostered and adaptations are made according to participants' preferences. In the present study, both motivation and preference considerations were integrated into the adaptation of the FP, thereby addressing known adherence challenges associated with virtual interventions. This approach is consistent with understanding that the effectiveness of such interventions can be enhanced by mitigating monotony and attrition (Lyubomirsky & Layous, 2013)

In the FP, the relaxation/breathing exercise (introduced in session 2) serves as a foundational element for the meditation practice in session 3. Both activities contribute to the development of self-regulatory skills, with meditation in particular, being increasingly integrated into resilience-building interventions. Meditation acts as a stress buffer, promoting emotional self-regulation and the management of intrusive and distorted thoughts (Kwak et al., 2019). While relaxation primarily operates at the physiological level by reducing tension, the subsequent meditative state engages cognitive and emotional processes, enhancing the effectiveness of the intervention. Furthermore, the interpersonal behavioral styles exercise in FP session three functions as an assertive training component, a critical social skill for individuals facing acute or chronic health conditions or caring for an ill family member. Assertiveness facilitates effective communication with healthcare professionals in often stressful situations. This is consistent with Draper et al. (2007), who demonstrated that communication and emotion management techniques in caregivers resulted in sustained reductions in burden and stress at a three-month follow-up. The deliberate emphasis on enhancing positive emotions within interventions (Mei et al., 2018; Ward et al., 2016; Pfeiffer et al., 2014; Draper et al., 2007) highlights the activation of a mechanism analogous to that proposed by the FP, consistent with the findings of the current study. However, the specific contribution of variables such as the integration of alternative strategies (e.g., problem-solving, reminiscence therapy, specific skill development) and methodological variations (e.g., session frequency, duration, modality, setting) to the observed program effects remains unquantifiable. Nonetheless, the findings suggest that psychoeducation alone is not sufficient for inducing substantial behavioral changes. Although psychoeducation is recognized as a fundamental component of psychological interventions, effective programs require the inclusion of practical knowledge and information tailored to the needs of caregivers for optimal disease management. In addition, Elsheikh et al. (2020) emphasize that flexibility, tailored to individual caregiver needs, and consistent personal contact are crucial to achieving health improvements by enhancing adherence. In the present study, although caregivers in the information control group were given the opportunity to contact the professional, a lack of intrinsic motivation and perceived relevance resulted in limited engagement. The written materials provided, while suggesting practices, lacked specific implementation strategies and were not accompanied by follow-up support. In contrast, FP participants received a physical booklet, distributed either directly to their homes or through health care facilities (e.g., hospitals, rehabilitation centers), and were actively encouraged from the first session to incorporate the exercises into their daily routines, supported by regular follow-up. Unlike the control group, FP participants frequently initiated contact with the professional to seek clarification or discuss challenges related to the exercises. Lai et al. (2020) found something similar with caregivers of people with dementia, when they compared two digitally mediated interventions, one with group videoconferencing and another placebo control with telephone calls. There were significant increases in resilience, self-efficacy, mental health dimension of HRQoL and decreased perception of caregiver burden, when they received telemedicine intervention, in contrast to the control group where the same variables even worsened. Lai et al. (2020) also reported analogous findings in dementia caregivers, comparing two digitally mediated interventions: group videoconferencing and a placebo control involving telephone calls. Telemedicine intervention resulted in significant increases in resilience, self-efficacy, and the mental health dimension of Health-Related Quality of Life (HRQoL), as well as a reduction in the perceived caregiver burden. Conversely, the control group showed deterioration in the same variables.

In summary, the effectiveness of the FP in this study can be attributed to several factors beyond the techniques outlined in the manual. These contributing factors are informed and supported by previous research involving stroke caregiver populations. First, the provision of a physical booklet facilitates self-monitoring of exercises, a strategy previously validated by King et al. (2007).

Secondly, consistent telephone follow-up and open communication channels to address caregiver queries promote sustained practice, as demonstrated by Pfeiffer et al. (2014), who combined home visits and phone calls to increase the adoption of problem-solving strategies, resulting in reduced depression and minimal attrition. Thirdly, the use of virtual platforms, such as videoconferencing, has become increasingly relevant, particularly in the context of the COVID-19 pandemic. During this period, home care mandates became a cornerstone of health care and self-care, necessitating that caregivers acquire tools to improve their well-being and the quality of life of their care recipients amidst heightened caregiving demands (Sutter-Leve et al., 2021; Acero et al., 2020)

This study has several limitations. In particular, it did not control for the phase of stroke evolution, patient dependency, and rehabilitation processes, factors that should be rigorously addressed in future research. Such controls would allow the identification of optimal intervention timing for programs like the FP, considering critical transition points such as hospitalization, transition to home, and physical or neurorehabilitation interventions. In addition, the current analysis, which assessed outcomes one-week post-intervention, requires medium- and long-term follow-up studies to assess the durability of the observed effects. Moreover, the various methodologies used in the different groups preclude definitive conclusions regarding the exclusive effectiveness of the FP. Although the reported results provide evidence for the effectiveness of the program, several methodological limitations warrant consideration. Specifically, the lack of randomization and the design of the control group methodology introduce potential sources of bias. Furthermore, significant baseline differences observed in emotional functioning and mental health subscales require caution in interpreting the results.

Future studies using the FP should prioritize flexibility and adaptability to user needs, in line with a prominent recommendation in the existing literature. Increasing program flexibility may not only ensure sustained effectiveness but also promote the durability and generalization of behavioral changes in participants' daily lives. Furthermore, the application of the FP to diverse populations, with or without virtual mediation, is strongly encouraged.

It can be concluded that the telepsychology version of the FP activates a positive emotional focus that improves mental health in caregivers of stroke survivors, making it a useful tool for health prevention and promotion in rehabilitation contexts.

Conflicts of interest

The authors have no conflicts of interest to disclose

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