

ORIGINAL RESEARCH

Mediators of the effect of the psycho-educational intervention on the psychological well-being of caregiving daughters and daughter in-laws of stroke survivors

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Abstract

Background: The objective of this study was to determine whether the randomly assigned intervention is associated with a change in the mediators including threat appraisal, coping behaviors, confidence in knowledge, and preparedness which is in turn accompanied by changes in the caregivers' psychological well-being.

Methods: A total of 96 caregiving daughters and daughter in-laws of stroke survivors participated in the study in which 49 cases were randomly assigned to the intervention and 47 to the control group. Data was collected before, immediately after and 12 weeks following interventions.

Results: The results of mixed ANOVA revealed a statistically significant difference in psychological well-being score between intervention and control groups. Our findings from the multiple mediator analyses supported the mediating effect for only two of the five hypothesized mediators. The intervention affected psychological well-being indirectly through changes in threat appraisal and perceived preparedness. Multiple mediator models accounted for 34.3% of the variance in the psychological well-being change.

Conclusion: The results of this study show the importance of mediators' evaluation in interventional studies of stroke survivor caregivers.

Key words

Intervention, Mediators, Caregiver, Stroke

1 Introduction

Stroke is a complicated life-altering events for stroke survivors and their family caregivers ^[1]. The stroke survivors discharged from hospital and transferred their homes usually depend on informal carers for help with activities of their daily living (ADLs) and for managing multiple health care services like care giving in acute state, rehabilitation, and home

care^[2]. Therefore, families experience a variety of anxiety and lack of preparation because of a sudden exposure to stroke victims and the adoption of a new role as a caregiver^[3]. Female caregivers, especially daughters and daughter in-laws, suffer from greatest adverse emotional and physical health consequences of caregiving demands, in addition to their multiple social responsibilities^[4,5]. These negative consequences have been a concern of researchers and policy makers because they interfere with the caregivers' self-care, and their capacity to constantly providing sufficient care to dependent elders^[6]. Despite an overall agreement that caregivers of ill-elders can benefit from caregiving' education and support programs, there is little consensus on the kind and most effective intervention programs^[7]. In a review, greater enhancements were achieved by interventions directed to particular caregivers' needs which were psychotherapeutic, psycho-educational, or multi-component in nature^[8]. However, there is little information about the mechanisms through which these interventions exert their effects, which is due to lacking randomized controlled trials that involve evaluation of mediation variables. The inclusion of interventions in the mediational models clarifies the effect and the mechanisms of intervention^[9,10]. Research that involves a randomly-assigned intervention as the predictor variable provides a particularly powerful tool for drawing conclusions about causal mediational relationships^[9]. Therefore, the present study was planned to test the mediation effect of a hospital-home based transition program on psychological well-being of caregiving daughters and daughter in-laws of stroke survivors in the first month after discharge from hospital in Shiraz-Iran.

1.1 Aim of the study

The aim of this study was to clarify the mechanisms by which a psycho-educational intervention program impacts caregivers' psychological well-being, by focusing on mediating effects of the coping behaviors, threat appraisal, confident in knowledge, and perceived preparedness.

1.2 Research hypotheses

Hypothesis 1: Stroke caregivers receiving need-based psycho-educational intervention will have a better psychological well-being compared to their counterparts who do not receive the intervention.

Hypothesis 2: The randomly assigned intervention is associated with change in the mediators (threat appraisal, coping behaviors, confidence in knowledge, and preparedness) which is in turn accompanied by change in the psychological well-being of caregivers.

2 Method

2.1 Study design

The study design was based on two randomized groups, with data collection before (T1), after training (T2), and at 12 weeks (T3) following the patient's discharge from hospital.

2.2 Setting and sample

The present study was conducted between September 2010 and October 2011 on daughters and DILs caregivers of stroke survivors. The family caregivers were selected from two neurology wards of two larger referral hospitals affiliated to Shiraz University of Medical Sciences (SUMS) in Iran. Using a power of 0.80, with a moderate effect size of 0.50, for a repeated measure within-between interactions, a minimum of 42 participants for each group were calculated by using G*Power 3.1.2 software. An additional 20 subjects were added for draw up and dummy variable, and also to perform multiple regression. However, at the end 96 participants completed the study. Caregivers were randomly assigned to either the psycho-educational intervention (49 cases) or the control group (47 cases). Block randomization with six subjects per block was adapted in this study. The caregiver who aged 18 years or over had to be daughter/daughter In-law of the stroke patients, living in the same house, and undertaking the main caregiving responsibilities. The caregivers of stroke survivors

who aged 60 or over, with severe functional disabilities and first diagnosed with ischemic stroke, were also enrolled in the study.

2.3 Procedure

A total 7 meeting was held to train stroke caregiver, six individual bedside sessions for 1-2½ hours and one family meeting for 1-2 hours during visiting time in the hospital. The three initial sessions were held at the hospital, and followed by four home-based weekly sessions (weeks 1, 2, 3, and 4 after discharges) in the morning or early afternoon depending on caregiver requests. The psycho/educational intervention delivered to 49 carers of stroke survivors under supervision of a clinical psychologist and stroke nurse practitioner (researcher).

2.4 Intervention condition

As shown in Table 1, the intervention program for caregivers of stroke survivors living at home was developed in a separate study and tested by an action research design. The program was entitled “Hospital-Home Transition Program” (HHTP). The content of three initial sessions consisted of providing information, and hands-on training about core activities of daily living (ADLs), self-care training, and financial management. We also held a meeting with family members during hospital visiting time to arrange a plan for sharing caregiving responsibilities. Three last sessions were focused on the key elements of stress management intervention model which was developed by Folkman et al.^[11].

We applied two components of stress management intervention models including appraisal and coping strategies. The intervention was based on three coping strategies that included the problem solving skill training, reframing the meaning of stress, and seeking social support. Problem solving is most suitable when a situation can be changed, whereas reframing is appropriate for handling a painful emotional response linked to unchangeable aspects of an event. Seeking social or emotional support is applicable to both changeable and unchangeable conditions^[11].

In addition the study comprised some ancillary program which included daily telephone availability in the first month after discharge and in-home visit by the physician in emergency situations. Also, an information package was provided for the caregivers which contained a handbook and some individual booklet along with a CD on practical subjects.

Table 1. Overview of the Hospital-Home Transition Program (HHTP)

Sessions	Content
Session 1	Discuss on stroke, post stroke problems and complications Methods for controlling and dealing with emotional and behavioral changes after stroke
Session 2	Hands-on training on the core activities of daily living (ADLs)
Session 3	Family meeting; helping family members to arrange a plan for patient care
Session 4	Help the caregiver to manage finance and investment Self-care training
Session 5	Help the caregiver to express all sources of stress, identify the most stressful item in their care-giving role, and apply the coping strategies suited to the selected stressor
Session 6	Problem-Solving Skill Training (Applying problem-solving steps to the most common care-giving problems).
Session 7	Reframing the meaning of a stressor Seeking practical or emotional help

2.5 Measures

2.5.1 Demographic variables

Caregivers' demographic information including type of relationship, age, education level, marital status, number of children, and perceived health status was measured using demographic data sheet.

2.5.2 Psychological well-being

Caregivers' psychological well-being was assessed based on the score of 18-items index of psychological well-being^[12]. The items were scored on a 6-point Likert scale from (1) strong disagreement to (6) strong agreement. Generally the score is in the range of 18-108 and higher scores indicated superior psychological well-being. In this study, the internal consistency was 0.76.

2.5.3 Caregiver appraisal

In this study revised caregiver appraisal scale^[13] was applied to assess caregiver appraisal. There were two types of items. Firstly, there were questions about the caregiver's feelings with a Likert-type response format of 1-5 (1 greatly disagree to 5 strongly agree). Secondly, there were questions relating to the caregiver's degree of agreement with the caregiving experience. The Likert-type response format ranged from 1 to 5 (1 never to 5 = nearly always). Higher scores revealed a more difficult appraisal. In the present study the Cronbach's alpha = .88 for the scale.

2.5.4 Coping strategies

Coping strategies measured by revised ways of coping which contains 50 statements on a 4-point scale from 1 (not used) to 4 (used a great deal). In this study approach coping (APP) represented the cumulative total of 4 subscales that conceptually designated gravitation toward the problem which included confrontive coping, seeking social support, planful problem solving, and positive reappraisal. In contrast, avoidance coping (AVD) is the total of four subscales such as moving away from the problem that represented distancing, self-controlling, accepting responsibility, and escape-avoidance. The internal reliabilities in this sample (Cronbach alphas) for each of the aforesaid coping strategies varied from 0.72 to 0.83.

2.5.5 Caregivers' preparedness

Caregivers' perceived preparedness was measured by the 8-items Preparedness for Caregiving Scale^[15]. Responses are ranked on a 5 point scale with scores ranging from 0 (not at all prepared) to 4 (very well-prepared). The scale is scored by calculating the mean of all items answered with a score range of 0 to 4. The high score indicated more preparedness for caregiver's perception of caregiving role. The scale indicated acceptable internal consistencies (Cronbach's alpha =0.87) in this sample.

2.5.6 Caregivers' confident in knowledge

A new tool of 14 items was developed for measuring caregiver's confident in knowledge. The questionnaire asked participants to determine how they perceived their own knowledge on stroke and its related issues by rating on a four – point scale (4=fully agree to 1=fully disagree). Higher scores indicated greater knowledge of the caregiver's perception. The scale showed acceptable internal consistencies (Cronbach's alpha =0.92).

2.6 Data analysis

Descriptive statistics (means, standard deviations, percentages) were computed to profile the participants. The equivalence between the experimental and control groups were assessed by chi-squared for categorical variables and independent t-test for normally distributed continuous variables. A mixed between-within subjects ANOVA was performed to measure the treatment effects from pre- to post intervention, and after 3-months follow-up. The multiple mediation analyses introduced by Preacher and Hayes¹⁶ were applied to investigate multiple mediators in one model.

2.7 Ethics

This study was approved by the research ethics committee of Shiraz University of Medical Sciences (SUMS). Moreover, all the participants were informed about the goals and contents of the research and signed the informed consent.

3 Results

3.1 Descriptive results

Caregivers ranged in age from 19 to 62 with a mean age of 37 (SD=10.8) years, 64.6% of caregivers were daughters of stroke patients, while 35.4% were their daughter in laws. Most of caregivers (78.1%) were married, 21.9% were singles (never married, divorced, or widowed). The majority of participants (67.6%) had 0 to 3 children with a mean age of 13.3 years. In terms of education level, nearly more than 33% had secondary level education and a third reported to have a secondary school diploma, while only 8.5 % had no formal education. As for perceived health status, most caregivers declared to be in good (52%) or in very good (36.5%) health.

At the baseline no significant differences were found between the two groups regarding socio-demographic data and study variables (caregivers' psychological well-being, threat appraisal, coping behaviors, preparedness and confident in knowledge). In addition based on the results of bivariate analyses, no significant correlation was found between the type of relationship (daughter or daughter in-law) and caregivers' psychological well-being, $r(96) = -0.040$, $p = .700$ (two-tailed). Therefore further regression analysis was not indicated.

3.2 Intervention effects on caregivers' psychological well-being

A mixed between-within subjects ANOVA was conducted to assess the effect of intervention on caregivers' psychological well-being scores. There was a significant interaction between program intervention and time, Wilks Lambda=0.895, $(F(2, 92) = 5.41, p < 0.05, \eta^2 = 0.105)$ which indicated that the changes in psychological well-being score were different for the two groups over time (see Figure 1).

The main effect, comparing the intervention and control group, was also noteworthy, $(F(1, 93) = 27.8, p < 0.001, \eta^2 = 0.230)$, suggesting a statistically significant difference in psychological well-being score between intervention and control groups. Therefore, this was supportive of hypothesis 2.

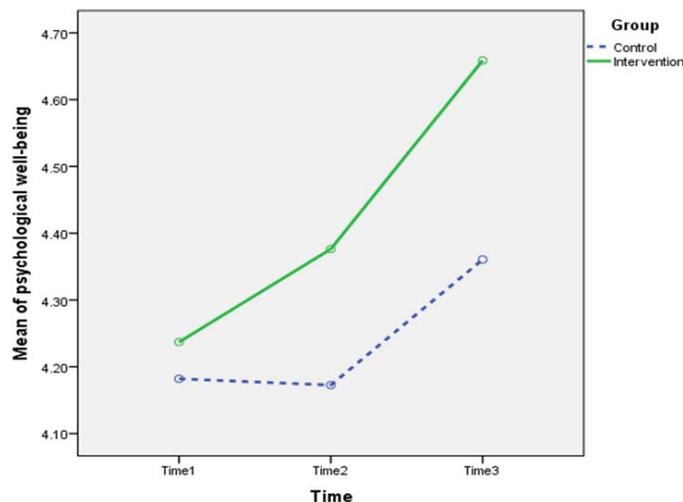


Figure 1. The mean of psychological well-being score of family caregivers with respect to time and group

3.3 Intervention effects on proposed mediators

The results of mixed ANOVA showed a significant interaction between program intervention and time for three of five proposed mediators; threat appraisal $(F(1.72, 162.073) = 10.28, p < 0.01, \eta^2 = 0.099)$, perceived preparedness $(F(2, 93) = 43.53, p < 0.001, \eta^2 = 0.484)$, and confident in knowledge score $(F(1.81, 170.571) = 58.37, p < 0.01, \eta^2 = .383)$. The main

effect, comparing the two groups, was also significant for confident in knowledge ($F(1, 94) = 55.1, p < 0.001, \eta^2 = 0.370$) and perceived preparedness ($F(1, 94) = 36.72, p < 0.001, \eta^2 = 0.281$) (see Table 2). This indicated a statistically significant difference in confident in knowledge and perceived preparedness score between intervention and control groups. Nevertheless, considering the main effect, there was no significant difference in threat appraisal scores between the intervention and control group ($F(1, 94) = 2.64, p = .108, \eta^2 = .027$).

Table 2. Comparing the mean of mediators' variables (caregivers' coping behaviors, threat appraisal, perceived level of preparedness, and confident in knowledge) by time and groups

Variables	Time 1		Time 2		Time 3		Group × Time Interaction	Main Effect
	Mean	(SD)	Mean	(SD)	Mean	(SD)	F Statistic	F Statistic
Approach Coping								
Intervention	2.83	0.475	2.92	0.369	3.2	0.306	2.27	1.01
Control	2.79	0.386	2.87	0.327	3.07	0.346		
Avoidance Coping								
Intervention	2.64	0.457	2.76	0.433	2.76	0.433	0.141	0.754
Control	2.72	0.377	2.69	0.359	2.68	0.354		
Threat Appraisal								
Intervention	2.40	0.379	2.50	0.350	2.41	0.514	10.28***	2.64
Control	2.35	0.410	2.74	0.267	2.59	0.496		
Preparedness								
Intervention	1.91	0.518	2.85	0.564	3.16	0.527	43.53***	36.72***
Control	1.87	0.497	2.14	0.490	2.28	0.482		
Confident in knowledge								
Intervention	1.80	0.415	2.93	0.294	3.15	0.437	58.37***	55.1***
Control	1.89	0.341	2.50	0.331	2.49	0.383		

*F-significant at $p < .05$, ** $p < .01$, *** $p < .001$

Also, the results of mixed ANOVA showed no significant interaction for approach coping (APP) ($F(1.78, 167.707) = 2.27, p = 0.112, \eta^2 = 0.024$) and for avoidance coping (AVD) ($F(1.07, 101.193) = 0.141, p = 0.727, \eta^2 = 0.001$). In addition, there was no significant difference between the two groups in the APP coping score ($F(1, 94) = 0.101, p = 0.315, \eta^2 = 0.011$) and AVD scores ($F(1, 94) = 0.754, p = 0.388, \eta^2 = 0.008$).

3.4 Multiple mediation analysis

The multiple mediator approach recommended by Preacher and Hayes^[16] was performed to simultaneously examine hypotheses regarding multiple mediating conditions. A tolerance cutoff was applied, before performing the multiple mediation analyses, to test the presence of multicollinearity. In our study, the lowest tolerance value achieved was 0.629, which was above the threshold (0.10). For mediator analysis, a bootstrapping procedure ($n = 5000$, with confidence intervals set at 95%) was used for testing the indirect effects (see Table 2). When bootstrapping was used, confidence intervals produced from 5000 resampling were applied (CIBCA=bias-corrected and accelerated confidence intervals with $=0.05$)^[17].

Mediation analyses revealed significant indirect effects between randomly assigned intervention and psychological well-being (ai and bi paths) for only two of five mediators (threat appraisal and preparedness). Controlling for the other mediators, the intervention indirectly affected psychological well-being through changes in threat appraisal ($\beta = 0.1008$ CIBCA = -0.0516 – 0.1726) and preparedness ($\beta = 0.0939$ CIBCA = -0.0103 – 0.2044). The two considered mediators fully explained the effects of psycho-educational intervention on improving caregivers' psychological well-being.

Table 2. Bootstrapping point estimates and 95% confidence intervals (CI) for the total effect of intervention on changes in psychological well-being and the indirect individual effects by each of the five mediators.

Independent variables	Effect	Se	P [#]	Bootstrapping Lower bound †	Bootstrapping Upper bound
ai bi path through:					
Threat Appraisal	0.101	0.035	0.004**	0.052	0.173**
Preparedness	0.094	0.044	0.031*	-0.010	0.204*
Confident in Knowledge	0.001	0.068	0.991	-0.161	0.142
APP Coping	0.003	0.006	0.650	-0.005	0.043
AVD Coping	0.001	0.005	0.905	-0.018	0.028
Total indirect effect	0.199	0.082	0.015*	0.016	0.384*

sobel test, †, Bootstrapping Bounds reflect 95th percentile Confidence Interval. Only confidence intervals not including zero are significant, R2 = 0.3428, Adj R2 = .298, * $p < .05$, ** $p < .01$.

In addition randomly assigned intervention also has a direct influence (c') on caregiver' psychological well-being (see Table 3). The direct intervention effect on caregivers' psychological well-being was reduced to non-significance, after controlling for five mediators ($\beta=0.0049$, $p=0.9596$). The multiple mediator model accounted for 34.3% of the variance in the PWB change ($p < 0.001$).

Table 3. Test of hypothesized mediators of the direct intervention effect through multiple mediator analysis

Independent Variables	Coeff	se	t	p
Threat Appraisal	-0.421	0.098	-4.294	0.000***
Preparedness	0.131	0.059	2.203	0.030*
Confident in Knowledge	0.001	0.096	0.011	0.991
APP Coping	0.064	0.096	0.668	0.506
AVD Coping	0.010	0.084	0.117	0.907
Total direct effect	0.203	0.066	3.080	0.002*
Group	0.004	0.095	0.051	0.959

* $p < .05$, *** $p < .001$.

The total significant effect (the direct intervention effect on PWB change) of 0.2037 (path c) was reduced to an insignificant 0.0049 (path c') when all five variables were included in the regression equation. Thus, all five potential mediators explained 97.6% [(0.203-0.004)/0.203] of the non-standardized effect size of the intervention relationship outcome. These findings confirmed the mediating effect for two of five hypothesized mediators which included threat appraisal and preparedness.

4 Discussion

Based on the results of bivariate analyses, no differences were found between care giving daughters and daughter in-laws in term of psychological well-being as anticipated. Our finding was in agreement with that of Kim's [18] study which demonstrated that the emotional and physical health of DIL caregivers was not poorer than that of caregiving Korean daughters. In terms of mediators of intervention effects, the results suggested that the improvements in appraisal of stressful situation and preparedness by the Hospital-Home Transition Program can be attributed to caregivers' psychological well-being. Family caregivers with better psychological well-being were also shown to be in more favorable preparedness, with more positive appraisal of the situation. King, et al [19] in a study indicated that caregivers with higher threat appraisal experienced greater negative outcomes, including negative life change, greater anxiety, and feeling less prepared for caregiving role. Perception of preparedness for caregiving also mediated the effect of intervention on

caregivers' psychological well-being. Ostwald et al ^[20] in a study demonstrated that preparedness was the strongest predictor of the perceived stress in stroke caregivers, higher preparedness scores was predictive of lower caregiver's stress.

In this study confident in knowledge, APP, and AVD coping approaches were not significant mediators of caregivers' psychological well-being. One explanation is that confident in knowledge may indirectly affect the caregiver's psychological well-being. It may reduce the sense of uncertainty, improve the confidence of caregivers and their sense of control over care-giving tasks. The basic knowledge that caregivers use to make decisions and solve problems provides the foundation for developing and improving practical skills ^[21]. In terms of coping approaches, our results were not consistent with those of other studies, where the use of approach coping (APP) led to a better positive caregiver's health over time ^[22, 23]. However, Williamson and Schulz ^[24] found emotion-focused coping was more effective and problem-focused coping to be ineffective with caregivers of Alzheimer disease patients. There is no clear agreement concerning the most effective type of coping strategy for preserving positive emotional health of caregivers. According to Lazarus and Folkman study, cognitive processes must be taken into account to understand variations among individuals under comparable conditions, that intervene between the different responses to external stimuli as well as factors affecting the nature of this mediation ^[25].

5 Conclusion

This program showed an overall improvement in psychological well-being of daughters and daughter in-laws of stroke patients during the first month after hospital discharge. The study also underlines the construction of an intervention program that help caregivers how to appraise their situations and prepares them for care giving along with regaining control of dismal conditions surrounding care giving process, a situation improving their psychological well-being. Additionally, the results of this study provide a good starting point for focusing on the reasons leading to the success/and or failure of intervention program by testing the mediating factors associated with intervention studies.

6 Study limitations

The process of individual home-based intervention and data collection was time-consuming and particularly arduous ^[25]. Therefore, in future studies, it would be useful to consider other means of conducting interventions at community level including televideo conferencing. This study was performed on the caregivers of stroke survivors with severe disabilities from only two referral hospitals. This is a limiting factor and warrants conducting further investigations, involving additional hospitals.

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