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The online version of this article can be found at
http://ebcj.mums.ac.ir/article_9463.html

Evidence Based Care Journal 2017 07:45 originally published online 01 October 2017
DOI: 10.22038/ebcj.2017.14130.1577

Online ISSN: 2008-370X

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Evidence Based Care Journal

Original Article

OPEN ACCESS JOURNALS

Design and Psychometric Evaluation of Coping Scale in Recipients of Kidney Transplant

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Received: 19/08/2017
Accepted: 07/10/2017

Evidence Based Care Journal, 7 (3): 45-53

Abstract

Background: Although there are different tools in a coping context, lots of them are general and not applicable in every stressful situation such as transplant.

Aim: The aim of this study is to develop and psychometrically evaluate a coping tool with kidney transplant in the Iranian context and culture.

Method: In this sequential exploratory study, based on theoretical and practical definitions of constructs for the concept of coping, the initial pool was extracted with 93 items. Face and content validity qualitative and quantitative were calculated. In order to assess the construct validity, exploratory factor analysis was applied. Using Cronbach's alpha and retesting, the consistency of the questionnaire was calculated

Results: In the quantitative face validity, all the items whose item impact was more than 1.5 were retained. Seven items were merged during the qualitative content validity since they overlapped each other, making the number of items equal to 80 at this stage. The quantitative content validity was determined by calculating the content validity index (CVI) as 0.9 and factor analysis was performed for all the 80 items. The items decreased to 69 using factor analysis and were classified under 5 categories of understanding the necessity of self-care, intelligent acceptance of changes, conscious enduring of problems, understanding supportive encouragements and spiritual enduring. Finally, the reliability of the questionnaire equaled 0.94 using Cronbach alpha.

Implications for Practice: This tool, with understanding and careful testing of the coping degree of transplant patients, could help health service providers to present their services and play their preventive, caring and therapeutic roles to patients.

Keywords: Coping, Kidney transplant, Psychometry, Tool

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Introduction

Renal transplant is an elective treatment for patients with end stage renal disease (1). Two million people are suffering from this disease around the world and 5 to 7 percent is added to this statistic annually (2). In Iran where renal disease is increasing (3), its annual prevalence is 53 patients in every million of the population and 49 percent of these patients are treated with transplantation approaches (3, 4). Although transplant is the beginning of a new life for patients and increases life expectancy, patients undergoing transplant experience different levels of physical, mental and social stress (1, 5). Transplant, as a surgical intervention, is a new stressful situation and critical for patients and their family (6). Thus, patients interpret this stressful situation as a threat in a way that, these problems can affect their coping with the new situation and consequently, the results of the treatment during every stage of the transplant.

For these patients, the ability of coping with stress and resilience to the previous situation is an important factor in disease management, hence identifying the degree of their coping with these problems is one of the most important data needed for health service providers including nurses to deliver caring services (7). In order to obtain coping status, valid and reliable tools are needed (8). Each tool should match each stressful situation as they create different status for individuals (9). Karver (1989) who criticized the famous coping tool of Lazarous and Folkman, considered it as not having any focus on existence or absence of coping (10). Another important point is that the development of these tools dimensions is only based on general theories like that of Lazarous (11). Moreover, the existing coping tools are not applicable in every stressful situation. Important issues like cultural properties should be taken into consideration while applying and constructing a tool. The reason is that a developed tool for a special social or cultural group is not reliable and applicable for another group with different culture (5).

Considering the above realities, it is obvious that despite the dynamicity and context sensitivity of the coping concept in nursing clients, nurses usually use tools designed according to general theories of stress to measure this concept (5, 12- 14).

Thus, considering the difference of the type and nature of kidney transplant and the necessity of applying a valid and reliable tool to investigate the degree of coping in this very special situation, designing and psychometrically evaluating a suitable tool that matches the situation and culture of the patient appear to be inevitable

Methods

This study was a report from the quantitative part of a sequential-exploratory mixed study. In order to design tools, Waltz (2010) 4 steps approach was used, based on which the intended concept should be first defined. One way to explain a concept is to use qualitative methods and understand the meaning of the concept based on experiences of those who experienced it (15).

In order to explain the meaning of coping, van Manen's phenomenological hermeneutic research approach was used, which was described in detail in a separate article. Accordingly, the meaning of coping with kidney transplant is intelligent acceptance of changes, understanding the necessity of self-care, enduring, and understanding supportive encouragements. Determining goals is another significant step. The purpose of measuring is to determine the conscious and targeted attention of transplant clients in 4 constructs of the concept of coping with transplant. The third step is designing maps in order to initially estimate the items. Accordingly, 93 items were extracted.

The forth step includes extracting and psychometric evaluation of coping concept items.

The initial pool of items was given to the research team to correct, edit or delete some repetitive items. After reaching consensus on the experts' comments, repetitive items were deleted, overlapping items were merged, and some items were corrected. Considering the fact that each structure measures a special goal, three spectra of Likert scale were used in this study including: "strongly disagree, disagree, neither agree nor disagree, agree, strongly agree", "very much, much, somewhat, a little, very little", and "always, usually, often, seldom, never".

After preparing the initial pool of items, the psychometric testing began.

In order to obtain the face qualitative validity of the questionnaire, it was distributed among 10 renal transplant patients and they were asked to score the items based on their clarity, simplicity and comprehensibility criteria (15). In the next step, the face quantitative validity as an item impact method was used to discard disproportionate and non-significant items. Thus, the items were scored

by the mentioned patients based on a five-point Likert scale including "very important, important, moderately important, of little importance, unimportant"; finally, the items with equal scores or above 1.5 were retained (15).

The qualitative content validity was determined based on the experts' judgments. The tool was sent to 10 experts including 5 renal transplant experts, 4 nursing faculty professors, and a tool designer expert. The experts were asked to write their corrective comments according to the proper words selection, clarity and simplicity criteria. In the quantitative method of determining the content validity, the content validity ratio and index were applied. To determine the content validity ratio, the experts judged all items in the tool using a three step spectrum, which included "the phrase is necessary", "the phrase is useful but not necessary", "the phrase is not necessary" (15, 16, 17). After collecting the experts' comments, the content validity ratio was calculated using Lawshe's formula. The minimum acceptable value of the content validity ratio (CVR) was 0.62 when the number of experts was 10 (17).

To determine the content validity index (CVI), Waltz validity index was used. The questionnaire was delivered to 10 experts who were asked to score the items based on relevance from 1 to 4. The scores higher than 79% indicated that the items were accepted, while the items with the score between 70%-79% needed correctness; the other items with the scores lower than 70% were not acceptable (15).

In order to assess the construct validity, exploratory factor analysis was used. In factor analysis, the number of needed subjects is usually checked in relation with the number of measuring variables. Some scholars have proposed the items ratio rule to responders, which is 3 to 4 persons for every item and can increase to maximum 10 (18). In this study, the minimum number of samples (3 times of the number of items) was used. Therefore, the questionnaire was delivered to 240 renal transplant recipients who were admitted to two specialized kidney transplant centers at Montaserieh Hospital in Mashhad as well as at Golestan Hospital in Ahwaz, were eligible to take part in this study (aged over 18 years, did not have transplant rejection history, at least two months had elapsed since transplant) and were selected using convenient sampling method.

In factor analysis, Kaiser-Meyer-Olkin (KMO) test, Bartlett's sphericity test, unrotated and rotated correlation matrix and scree plot were used to determine the factors.

The next step was the reliability evaluation of research tool, which indicated the tool consistency in measuring the target property (16). Cronbach's alpha and retesting were the methods used in this study to assess the reliability.

This study was approved by the ethical committee of Ahvaz Jondishapour University of Medical Sciences (1392.335). The participants voluntarily filled out the questionnaire after the goals of the study were explained to them.

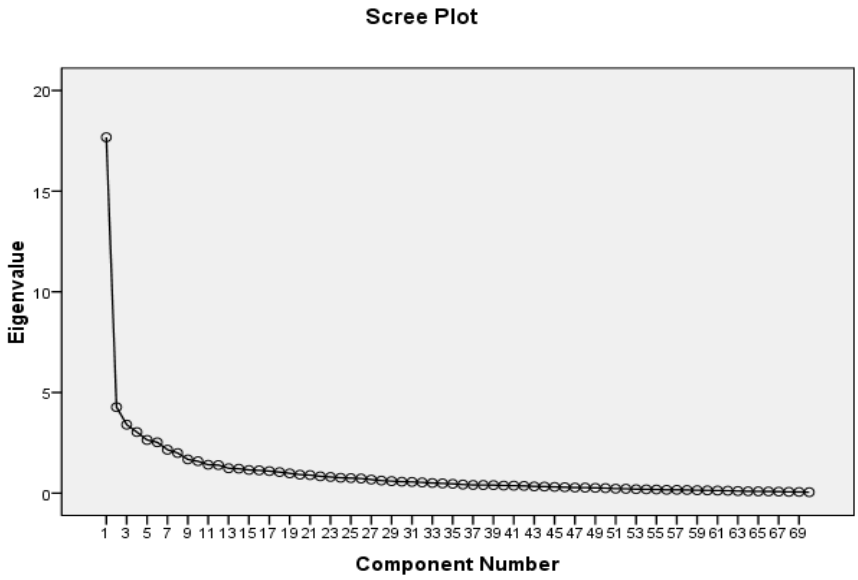

Figure 1. The graphical view of the number of questionnaires

Results

According to theoretical and practical definitions of constructs for the concept of coping, the initial questionnaire of the coping with transplant was designed.

After applying the research team comments and removing repetitive items, the first questionnaire changed from 93 items to 87 final and confirmed items. Finally, the questionnaire was ready for psychometric evaluation with 87 items classified in the 4 constructs of coping with renal transplant. In the stage of the face qualitative validity, 28 items were reviewed to check the formulation of the items phrases. All the items were acceptable after determining the item impact since their item impact was more than 1.5. While assessing the qualitative content validity, 7 items were merged into one as they overlapped, thus reducing the total number of items to 80 in this stage. The items whose CVRs were more than 0.62 were retained. Although 20 items had CVRs less than 0.62, they were also kept since reducing the items was not only based on assessing a single property, but estimating the validity; thus, as the research team decided, the item impact factor and CVI value were considered so that the items with high CVI scores and impact factor were retained.

Furthermore, the total scale content validity index (S-CVI) was calculated. The SCVI value was 0.89, which was confirmed since its standard value is 0.8. Furthermore, the SCVI/Ave value was 0.9, which was in the standard range.

Factor analysis was carried out on the 80-item questionnaire for sampling adequacy proportion and entrance permission to analysis. Considering the high value of the KMO index factor (0.814), sampling adequacy was confirmed since the KMO value was over 0.5, which was the necessary condition for confirming sampling adequacy. Significances of Bartlett's sphericity test (0.0001), which confirmed the correctness of the factor analysis model, proved that this test could be used for data; hence, the condition of entering into factor analysis was satisfied (Table 1).

Before doing the exploratory factor analysis, each item common variance was also assessed with the other items. Considering the minimum value of the loading factor (0.3), the items with the loading factor more than 0.3 were retained, while the other items with the loading factor less than 0.3 were discarded. Accordingly, 10 items were omitted and the 70-item questionnaire entered into the factor analysis phase. Subsequently, 18 factors with eigenvalue of more than 1 were found after the 70-item questionnaire variables underwent factor analysis. However, considering the scree plot, which showed diffraction from the factor 8, factor analysis was re-performed with 8 factors.

Because of improper dispersion of phrases among the factors, factor analysis was again carried out with the factors 5, 6 and 7. Since the logical arrangement of the items among the factors was congruous to the qualitative analysis results, it appeared that 5 factor solution is the best method to justify the distribution of items in factors. Thus, analysis was re-performed with 5 factors (Table 2).

According to Table 2, 44.3% of the total variance was related to the first 5 factors. In other words, among the 70 items of the questionnaire, there were 5 factors indicating 44.3% eigenvalue changes of the phrases in the tool.

Considering the items with high loading factor, a name was given to the factors. Accordingly, after factor analysis was performed, the questionnaire of coping with renal transplant was constructed in 5 categories including understanding the necessity of self-care with 25 items, intelligent acceptance of

Table 1. The KMO index and results of Bartlett's sphericity test

Items	Bartlett's sphericity test		KMO test
	significance	K2	
1-80	0.001	1282	0.814

Table 2. The total degree of covered variance by 5 factors of the coping questionnaire

Factor	Cumulative variance	Variance percentage
1	17.870	25.168
2	31.428	6.026
3	36.272	4.844
4	40.574	4.302
5	44.301	3.727

changes with 18 items, conscious enduring of problems with 12 items, understanding supportive encouragements with 9 items and finally, spiritual enduring with 5 items.
Therefore, after factor analysis with Varimax rotation was performed, the items with the loading factor less than 0.3 were omitted and the number of factors was determined. Ultimately, the questionnaire with 5 factors and 69 items entered the stability performance or tool consistency as the final step.
The Cronbach's alpha coefficient was calculated for each of the questionnaire factors both individually and in total. Estimating the Cronbach's alpha factor for the questionnaire items proved that the maximum Cronbach's alpha value was 0.948. Therefore, no items were deleted in this phase since the calculated Cronbach's alpha coefficient for the total questionnaire of coping with renal transplant was 0.948 and the omission of items had no effect on it. The alpha value for the factors was between 0.88 and 0.94 (Table 3). The results of re-test based on extracted values from first and second test and their significance (P<0/0001), in addition of the high Pearson's correlation coefficient (./96) showed the repeatability of the test.
Thus, the questionnaire of coping with renal transplant had high consistency based on the mentioned results.

Table 3. Determining internal consistency: Cronbach's alpha coefficients for each factor and for the total questionnaire of coping with transplant in kidney transplant recipients

	Factors	Cronbach's alpha coefficient
Category 1: Understanding the necessity of self-care	To keep the transplanted kidney, I have to act according to my physician's instructions.	0.880
	According to my physician's recommendation, I have to adhere to some dietary restrictions.	
	I should not use foods that I am not certain whether they may harm my health	
	I should not go into crowded and polluted places as far as possible.	
	I must take periodic tests to ensure my kidney health.	
	I should refer to my doctor as soon as I feel uncomfortable because of kidney-related complexities.	
	I should regularly go to the doctor's for taking periodic examinations.	
	On polluted days, I should entertain myself at home instead of leaving home.	
	I should use simple and healthy home dishes.	
	I should not do heavy exercises.	
	I should use more low-salt and low-fat foods.	
	I should use my own personal belongings.	
	By developing symptoms related to kidney problems, I should perform urea and creatinine tests.	
	Instead of eating outdoors, I should use healthy home-made foods	
	Instead of doing heavy exercises, I should do light exercises like trekking.	
	I should always wash my hands before eating.	
	I must be careful not to forget to take my medicines.	
	I need to avoid getting close to people with communicable diseases.	
	I should drink a lot.	
	I should use more fruits and vegetables in my diet.	
	I only go to my doctor in the event of a disease.	
	I should not lift heavy objects.	
	I should take my medication on time.	
	I should less eat ready-made (fast) foods.	
	I should less eat frying foods.	

Table 3. (Continued)

Category 2: Intelligent acceptance of changes	My health status is different from that of healthy people.	0.921
	I should regularly go to clinics and visit physicians for taking periodic examinations.	
	I cannot completely regain my state of health before the disease.	
	There is always a need for me to avoid being in busy and polluted places.	
	Problems such as the inability to lift heavy objects still exist for me.	
	I still have limitations in doing some of my religious duties (fasting, etc.).	
	Difficulties such as taking medication continue to last until the end of my life.	
	Continuing my life is dependent on taking medications.	
	My health condition has changed compared to before getting sick.	
	Transplant means the release from living in the closed and limited prison of dialysis.	
	Transplant means getting back to life.	
	Transplant is better than dialysis because its problems are more tolerable than those of dialysis.	
	I am accustomed to the unpleasant odor of medicine because of the smell of life.	
	Taking medicine has become a normal behavior and part of my life's schedule.	
	Care activities such as taking drugs, performing follow-up tests and going to the doctors have become part of my daily routine schedule.	
	Transplant is better than dialysis because its problems are less compared to those of dialysis.	
Category 3: Conscious enduring of the problems	I tolerate the side effects of medication because of fear of transplant rejection and returning to dialysis.	0.90
	I tolerate the problems of taking medicine to maintain my health status.	
	To relieve the suffering of dialysis, I tolerate post-transplant complications (such as taking medicines/physical complications/ performing repeated experiments/periodic visits of the doctor, etc.).	
	I tolerate the difficulty of taking experiments repeatedly to maintain my health status.	
	To compensate for the difficulties that my family have endured (parents/spouse/siblings) during dialysis and transplant, I endure the post-transplant difficulties and problems.	
	I tolerate taking the medicine for fear of transplant rejection.	
	I tolerate the bad odor of the drug to maintain my health status.	
	I tolerate post-transplant precautions to reach comfort.	
	Because of the fear of transplant rejection and returning to dialysis, I endure the difficulty of post-transplant cares.	
	I tolerate the severity of the side effects of the drugs for maintaining health status.	
	I tolerate difficulties of frequent visits to the doctor to maintain my health status.	
	I tolerate the difficulty of observing dietary restrictions to maintain my health status.	

Table 3. (Continued)

Category 4: Understanding supportive encouragements	My family helps me in doing my transplant care practices.	0.827
	Family support has always been with me and helped me.	
	My family provided me to the extent possible with the necessary facilities needed for living after transplant.	
	I should take my medications to prevent risks like transplant rejection.	
	The attention and acceptable sensitivity of my physician to the problems of transplantation have created a good feeling for me.	
	My physician has a good relationship with me.	
	Access to the physician when problems occurred helped me to easily endure difficulties.	
	I have minimized drinking in my diet.	
	I easily discuss transplant problems with my medical practitioner.	
Category 5: Spiritual enduring	Believing in God's goodness and occurrence of every event in life has made it easy for me to endure difficulties.	0.827
	I use the help of the Imams (AS) in enduring hardships.	
	Devotion with God makes it easy and comfortable to endure difficulties.	
	Trust in God makes.it easy for me to endure post-transplant difficulties.	
The total scale		0.948

The final step in developing and designing the tool was to write scoring rules for items so that respondents could use the tool. Items scoring rules depend on the type of the applied scale. When the total score is going to be obtained from sub-constructs, the simplest way is to sum up the scores (15). For this tool, in which the 5 parts Likert scale was used, the minimum and maximum score of each item was 1 and 5, respectively. Thus, the minimum total score was 69 while the maximum was 335. The minimum and maximum scores showed the lowest and highest value of coping among renal transplant patients.

Discussion

The questionnaire of coping with transplant in kidney transplant recipients with 5 categories (understanding the necessity of self-care, intelligent acceptance of changes, conscious enduring of problems, understanding supportive encouragements and spiritual enduring) and 69 items was designed and psychometrically evaluated.

As it was expected and stated in the problem identification, this specified questionnaire, which was designed on the basis of specific stress and situation, was different from and comparable with general questionnaires in meaning and construction. The first and most well-known questionnaire of coping ways was designed by Folkman and Lazarus in 1960, which has 66 items in two categories of "focused on the problem" and "focused on emotions". Lazarus extracted these two categories on the basis of general and total stresses (19). In fact, the formation of these two classes was the result of considering the nature of stresses similar to each other in defining the concept of coping. He had a total view of natures of stresses and ignored the difference between incidents and stressful situations, which can be different naturally and make different responses. He considered all coping reactions of people to stressful situations, which generally led to formation of two classes or total constructs including problem based and emotional constructs. However, the five defined constructs in this study cannot be placed in these two classes, especially in the emotional – oriented class.

Parker and Endler (1992), in criticizing the coping questionnaire of Folkman and Lazarus, expressed that the number of extracted factors was different from one stress to another. Thus, the number of the questionnaire factors was different based on the type and nature of stresses and an identical look at the coping phenomenon in different stresses like what Folkman and Lazarus did was not suitable. Unlike the general tool of Folkman and Lazarus, in this study, the coping measurement tool was formed in 5 constructs with 69 items because of a specific attention to the coping and construct extraction on the

basis of live experiences of renal recipients. To confirm this conclusion, Carver and his coworkers, like Lazarus, mentioned two categories in coping; however, they confessed that two categories cannot inspect coping differences between various kinds of stress. Therefore, they presented the COPE questionnaire with 4 categories to investigate coping ways (21).

Other noteworthy differences in the formation of different categories of the concept of coping construct are the differences between evolutionary stages of individuals. In relation to this, Patterson and McCubbin (1987) reevaluate the psychometric properties of the COPE questionnaire to investigate stress management coping strategies among teenagers and renamed the questionnaire as 4A-COPE. This tool, which is different from the 4-category COPE and this study's tool, has 12 classes that able to investigate various dimensions of teenagers' coping strategies according to their evolutionary stages (22). The reason for the difference between the domains of this tool and those of the tool developed in this study is a specific look, which was considered while forming the tool classes. Hence, the difference between coping needs in teenagers and adults led to different classes to be developed.

Cultural and social differences appear to be another factor in developing different categories in the tool in this study as well as in other tools. Vafaie et al. (2007) evaluated the psychometric properties of the coping responses questionnaire (5-CRI-a) for adults in the Iranian context. Factor analysis of the CRI-A confirmed 7 factors including religious coping, problem solving, avoidance recognition, positive reassessment, seeking support and guidance, and seeking reward and acceptance. One of the most important differences between the categories of this questionnaire and those of the main questionnaire like the one used in this study is religious coping since in Iranian culture, which has a powerful religious context, religious coping plays an effective role in health positive results and well-being (23).

Finally, regarding the mentioned studies, reasons like the foundation for developing constructs of the coping concept, identical assumption of the type and nature of stress, cultural and social differences, individual's personality traits, and focus on evolutionary stages can be considered as leading to formation of different categories in the tool developed in this study as well as in other tools. Since the coping concept was extracted on the basis of a qualitative study, the tool is limited in generalization to other cultures.

Implications for Practice

Nurses of in transplant departments should be familiar with the concept of coping and the transplant questionnaire since one of the most important reasons of longevity in kidney transplant recipients is the ability of coping with changing situations. Thus, using this questionnaire, coping disorders are identified in different areas of coping so that the patient can receive the necessary care and counseling.

Acknowledgments

I would like to thank Ahwaz Jundishapur University of Medical Sciences for its assistance in this project and also, the manager and staff in the kidney transplant centers at Montaserieh Hospital in Mashhad and Golestan Hospital in Ahvaz for their contribution in conducting this study.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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