Development and Validation of the Self-care Agency Scale for Cancer Patients under Treatment

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【Abstract】

Purpose/Objectives: This study was aimed at developing a reliable scale for assessing the self-care agency of cancer patients under treatment.

Design: A cross-sectional study.

Methods: The study involved patients with cancer receiving care on an outpatient basis at 4 hospitals in the Kanto/Shinetsu Districts of Japan. Items on the Self-care Agency Scale for Cancer Patients Under Treatment (SAC) were developed using a qualitative study. The main research variables analyzed were the temporary questionnaire, the Self-Care Agency Questionnaire for Patients with Chronic Illness , and the Functional Assessment of Cancer Therapy General. After item analysis, construct validity was assessed using confirmatory factor analysis , and this was followed by an analysis of the scale's reliability and criterion validity.

Findings: A convenience sample of 303 cancer patients was utilized. The fitness indices for the scale were as follows: Goodness of Fit Index (GFI) = 0.911; Adjusted GFI = 0.878. The Cronbach's α coefficient value was 0.900. The SAC was developed as a secondary factor model that included 3 factors and 15 items. The results of the evaluation from this scale correlated significantly with those of outside standards.

Conclusions: The SAC's construct validity, criterion validity, and reliability were all confirmed.

Key Word : Self-care Agency, Scale, Cancer Patients

Introduction

Under the current healthcare policy of reducing hospital stays,[1] the self-care agency of cancer patients receiving treatment has become important in Japan. Following the introduction of the Diagnosis Procedure Combination (DPC), a healthcare insurance reimbursement system aimed at decreasing healthcare expenditures, the mean hospital stay of cancer patients in Japan decreased in 2011 to 50% of that recorded in the period before the introduction of the DPC. Under this system, patients are required to adjust and to control their physical/mental conditions on their own initiatives after discharge from the hospital. Patients are now practicing various methods of self-care towards the goal of stabilizing their daily lives.[2,3]

Self-care by cancer patients can be defined as "dealing with situations and taking health actions while deciding one's intention through exploration and utilization of information."[3] To ensure that patients can practice and continue such self-care, it is essential for nurses to assess the self-care agency of patients and to provide nursing care in such a manner as to facilitate the self-care agency of individual patients.[4,5]

Orem[6] considered the utilization of self-care agency to be a characteristic of human beings and attached much importance to it. Regarding the use of self-care agency, she described how humans are viewed as advanced when they have learned to take intentional actions under the conditions of human existence and daily living in specific environments. In the case of cancer patients, the utilization of self-care agency is also expected to enable self-care corresponding to the

features of cancer treatment and to stimulate the evolution of patients as humans. To ensure that nurses provide support to cancer patients in such a manner as to promote the patients' self-care agency, it is necessary to develop tools to measure and to assess the self-care agency of individual patients objectively.

Nursing care studies concerning a "self-care agency scale" that were published between 2000 and 2015 include a paper focusing on patients receiving hemodialysis[7] and a paper that focused on psychological aspects.[8] Regarding related papers in Japan, a paper bearing a title containing words similar to those mentioned above and that focused on mentally ill patients living in local communities[9] and a paper concerning patients with knee arthrosis[10] were retrieved during a literature search. These scales were developed based on the features of the patients who were being targeted. Therefore, when these scales are utilized, the characteristics of the targeted diseases, treatments, etc., need to be considered.

For this reason, assessments of the self-care agency of cancer patients require a self-care agency scale that considers the characteristics of cancer treatment and the specific physical, mental, and social aspects of these patients. The self-care agency of patients receiving treatment consists of five elements: (1) agency to check for changes in one's physical condition; (2) agency to make voluntary judgments and to take appropriate health actions; (3) agency to think in a relaxed manner, without being excessively affected by the presence of cancer; (4) agency to keep connected to people and to adjust one's social activities; and (5) agency to review one's way of living and to promote self-development.[4] The development of a

self-care agency scale that covers all of these aspects in a comprehensive manner and that allows objective assessments is needed.

Cancer patients can be characterized as having a high likelihood of experiencing physical/mental stress and treatment-related changes in their daily living, as well as having many concerns.[11] Meanwhile, their agency to think and act actively and positively has also been revealed.[12] The characteristics of cancer patients have also been revealed by studies focusing on cancer treatments and the management of diverse symptoms related to the disease.[13-17] There are also reports stating that self-care interventions are capable of elevating the quality of life (QOL) of patients.[18,19] Thus, the development of a self-care agency scale specific to cancer patients receiving treatment and taking these patient features into account is needed.

The development and utilization of a self-care agency scale for cancer patients is expected to improve the self-care agency and QOL of cancer patients. For objective assessments of the self-care agency of individuals, assessments should be made using a systematically developed scale based on scientific evidence and verified with regard to its reliability and validity. The present study was undertaken to develop a self-care agency scale for cancer patients receiving treatment.

Methods

Operational definitions of terms

Self-care agency of cancer patients receiving treatment: Self-care agency

means the agency to support the implementation of self-care, so that a given patient can lead a better daily life while receiving treatment for cancer. It also encompasses the awareness and attempts at health control acquired through past treatment experiences as well as what the patient has become aware of or learned through contact with healthcare providers.

Self-care: The following definition of self-care by cancer patients was obtained from the concept analysis.[3] Self-care was defined as the intentional or continued implementation of health care control actions by cancer patients receiving treatment with the goal of leading a more stable daily life using their self-care agency. These actions include the implementation of health actions to alleviate symptoms, to deal with adverse reactions or statuses associated with cancer treatment, to explore and to utilize cancer-related information, and to decide on intentions to preserve daily living.

Conceptual model

Before preparing a temporary version of the questionnaire, we prepared a conceptual model (Fig. 1) based on the findings of a concept analysis of "self-care by patients"[3] and "self-care agency of cancer patients receiving treatment,"[4] with reference to Orem's theory[6] of nursing for providing self-care support to patients.

The conceptual model was prepared in Steps 1 through 6,[20] as shown below, and constituted the framework for the study. In Step 1 (selection of concepts and conceptual definition), concepts such as self-care and self-care agency of cancer patients receiving treatment were defined; in Step 2 (relational statement), the

direction and strength of the relationship between self-care and self-care agency were analyzed; in Step 3 (hierarchical statement set), the hypotheses and propositions based on the contents of Steps 1 and 2 were described; in Step 4 (conceptual map assembly), "a conceptual map of self-care agency of cancer patients receiving treatment" was prepared based on Orem's middle-range theory; in Step 5 (construction from existential theories), similarities and differences were identified; and in Step 6, "a conceptual model of the self-care agency of cancer patients receiving treatment" was completed.

As shown in the conceptual model, the utilization of self-care agency by cancer patients leads to the implementation of self-care, eventually allowing the achievement of goals and an awareness of its efficacy. It also seems to enable an improvement in the quality of life of individual patients.

Preparation of temporary questionnaire

The questions to be adopted in the questionnaire were explored, taking into account the categories of self-care agency for patients receiving treatment,[4] ordinary self-care actions for dealing with adverse reactions arising from cancer treatment, and so on. Four factors were adopted for the theoretical subscale, and draft questions for each factor were prepared using expressions that the patients would be able to understand easily.

Then, advice on the validity of the draft questions was received from 10 advisors, including 5 oncology-certified nurse specialists and 5 nursing researchers with experience developing scales. Questions satisfying the criteria

(80% or higher consistency between factor and question) were adopted to ensure the content validity of the thus-prepared temporary questionnaire.

Through these processes, the following 4 factors were adopted for the theoretical subscale: [agency to form health actions], [agency to think in a relaxed manner, without being excessively affected by the presence of cancer], [agency to keep connected to people and to adjust one's social activities], and [agency to review one's way of living and to promote self-development]. Each of the 80 questions in the questionnaire called for a response rated using a five-point scale. In this manner, a temporary questionnaire, the "Self-care agency scale for cancer patients receiving treatment," was prepared, with a higher score indicating a higher level of self-care agency.

Subjects

The candidate subjects for this study were patients aged 20 years or older who were receiving one or more treatments for cancer (chemotherapy, radiotherapy, or hormone therapy) on an outpatient basis at one of four medical facilities in the Kanto/Koshinetsu districts of Japan. Patients who experienced severe mental stress while trying to answer the questionnaire were excluded from the study. After obtaining approval for the study from the Ethics Committee of each of the participating facilities, each candidate subject was informed in writing and orally as to the study objectives, survey design, nature of their participation in the study being at their own discretion, protection of the patient's personal information, etc. Patients who provided consent were enrolled.

Survey Contents

General Background

The survey questionnaire contained questions aimed at obtaining information concerning the subjects' age, gender, family composition, occupation, etc., as background variables.

Tools

The names of subscales were indicated by the use of square brackets, while the names of items were indicated by quotation marks.

Preparation of the temporary questionnaire "Self-care Agency Scale for Cancer Patients Receiving Treatment"

The temporary questionnaire "Self-care agency scale for cancer patients receiving treatment" was composed of the following four factors for the theoretical subscale: [agency to form health actions], [agency to think in a relaxed manner, without being excessively affected by the presence of cancer], [agency to keep connected to people and to adjust one's social activities], and [agency to review one's way of living and to promote self-development]. It contained a total of 80 items calling for responses rated using a five-point scale.

For example, the [agency to form health actions] factor included items such as "Be aware of how to deal with symptoms upon appearance." An example of the [agency to think in a relaxed manner, without being excessively affected by the presence of cancer] factor was the item "Attempt to live with a smile." A sample

item within the [agency to keep connected to people and to adjust one's social activities] factor was "Sometimes feel encouraged by other patients with same disease," while the [agency to review one's way of living and to promote self-development] factor included items such as "Avoid wasting time."

Self-care Agency Questionnaire for Patients with Chronic Illness (SCAQ)

We used the SCAQ developed by Honjo,[21] the reliability and validity of which have been confirmed with an α = 0.91. The SCAQ scale is composed of the following four subscales: [acquiring and continuing health management methods], [adjustment of physical condition], [interest in health management methods], and [acquiring effective support]. It contains a total of 29 items, which are each measured using a five-point Likert scale. The total score can range from 29 to 145.

As an illustration, the [acquiring and continuing health management methods] factor includes items such as "I incorporate things necessary for the maintenance of my health in my daily life." An example of the [adjustment of physical condition] subscale is an item stating, "I pay attention to the effects of therapy, including the side effects." A sample item within the [interest in health management methods] factor is "I pay attention to test results," while [acquiring effective support] includes items such as "I have doctors with whom I can consult."

We obtained written permission from the developer of the SCAQ to use this scale for the present study.

FACT-G QOL Scale for Cancer Patients

We also used the FACT-G developed by Cella,[22,23] the reliability and validity of which have been previously verified. This scale contains a total of 28 items scored using a five-point Likert scale from 0 to 4. It has four subscales that are aligned with four aspects of QOL: [physical aspect], [psychological aspect], [social aspect], and [activity status aspect]. The total possible score ranges from 0 to 112.

The [physical aspect] subscale includes items such as "I have pain," the [psychological aspect] subscale includes items such as "I worry about my disease worsening," the [social aspect] subscale includes items such as "I feel intimacy with my family," and the [activity status aspect] subscale includes items such as "work brings liveliness to my life."

Written permission for its use was obtained from the developer of the FACT-G.

Time of Initiation of Treatment

Information on the time of treatment initiation and transference was obtained from the medical care records.

Survey period

The survey period was from March 2012 until September 2014.

Ethical considerations

The study was performed with the approval of the Ethics Committee at both the Gunma University Hospital and the Gunma Prefectural Cancer Center. The leaflet handed out to the patients stated the objectives of the study, assured them

that anonymity would be maintained, that the decision to participate in the study would be left to the patient's own discretion, that patients who refused to consent to the survey would not be at any disadvantage, and that the patient's personal information would be protected, etc.

When the study was explained to each patient, their physical and mental statuses were sufficiently considered, and detailed information about the study objectives, the fact that the subjects' personal information would be protected, that the decision to participate in the study would be left to the patient's own discretion, etc., was given in a privacy-protected space using a leaflet. The completed questionnaire was re-collected by post.

Analysis

The statistical analysis was performed using IBM SPSS Statistics, Ver. 22, and IBM SPSS Amos Graphics, Ver. 22.

Item analysis

From the mean ± standard deviation (SD) of each item score, the maximum and minimum scores were set; items falling under the ceiling effect and the floor effect were eliminated. Then, the Pearson product-moment correlation coefficient was calculated for the correlation between each pair of items, and one of the items from each pair showing a strong correlation was eliminated.

Assessment of construct validity

An explorative factor analysis with Promax rotation was performed using the principal factor method for all the items that were not eliminated after the item analysis. Items with a low commonality score and items with a low factor load were also eliminated.

Thereafter, the fitness to the model was evaluated using a confirmatory factor analysis. The indicators of fitness that were used included the Goodness of Fit Index (GFI), the Comparative Fit Index (CFI), and the Adjusted GFI (AGFI). A CFI value of 0.9 or greater was set as the standard value of validity.[24]

Assessment of reliability

The Cronbach α coefficient for the entire scale and the Cronbach α coefficient for each factor were calculated as indicators of reliability.

Reliability coefficients were obtained using the Spearman-Brown formula and the split-half method. This method was used because the self-care agency of the subjects varied depending on their physical and mental states, and ensuring stability during a retest was thought to be impossible.

Assessment of criterion validity

Criterion validity was assessed by calculating the Pearson product-moment correlation coefficient, with the SCAQ[21] and FACT-G[22,23] serving as outside standards.

Results

Of the 356 patients who consented to participate in the study, 309 completed the questionnaire (percentage of responders: 86.8%). After excluding the data of 6 incomplete responders, the data from the remaining 303 patients (valid responders: 85.1%) were included in the analysis.

Background variables

The background variables are summarized in Table 1. The mean age of the subjects was 64.7 (SD ± 12.1) years. There were 189 males (62.4%) and 114 females (37.6%). The major medical diagnoses were prostate cancer (136 cases, 45.0%), breast cancer (74 cases, 24.4%), and colorectal cancer (30 cases, 9.9%). The major treatment methods were chemotherapy (98 cases), hormone therapy (110 cases), and radiotherapy (95 cases). The PS was at a level that allowed activity without rest in 157 cases (51.8%). Regarding the family composition, 137 patients (45.2%) were living with their spouse only.

Table 1

Item analysis

Based on the mean ± SD of each item's score in the item analysis, the maximum and minimum scores for each item were set at 4.9 and 1.1, respectively. According to these criteria, 51 items were subject to the ceiling effect or the floor effect. In terms of the Pearson product-moment correlation coefficient, one pair of items showed a strong correlation (r > 0.75), and one item in this pair was eliminated. After the elimination of these 52 items, 28 items remained.

Assessment of construct validity and reliability

Exploratory factor analysis

An exploratory factor analysis was conducted for the 28 items remaining after the item analysis. A total of 3 items with commonality scores of 0.3 or less or with a factor load of 0.4 or less were eliminated. After such eliminations, 25 items remained. These 25 items were then classified according to a 3-factor structure. The α coefficient of the 3-factor structure was 0.902 for the 8 items in the first factor, 0.885 for the 9 items in the second factor, 0.872 for the 9 items in the third factor, and 0.936 for all 25 items.

Confirmatory factor analysis

Based on the results of the exploratory factor analysis, a self-care agency scale for cancer patients comprised of 3 factors and 25 items was created. The scale included 25 items as the observed variables, 3 factors as the primary factors, and the "self-care agency of cancer patients" as a secondary factor. A confirmatory factor analysis was conducted for the 3 factors and 25 items, yielding a GFI = 0.782, an AGFI = 0.742, a CFI = 0.821, and a Root Mean Square Error of Approximation (RMSEA) = 0.097. Thus, the degree of fitness for each indicator failed to reach the acceptable level. For this reason, the model was corrected to enable a concrete assessment of the self-care agency of cancer patients. That is, the factor load within each factor was compared, and items with factor loads of 0.61 or more were adopted. Using this fitness correction procedure,[24] 10 additional items were eliminated.

Finally, a "Self-care Agency scale for Cancer Patients Receiving Treatment

(SAC)" comprised of 3 factors and 15 items was prepared. The cumulative contribution ratio before rotation was 63.95%, and the Spearman correlation coefficients of the 3 factors ranged between .50 and .61, demonstrating significant positive correlations. The fitness of the final model was within the acceptable range,[24] with a GFI = 0.911, an AGFI = 0.878, a CFI = 0.945, and an RMSEA = 0.071. Furthermore, the path coefficients from the secondary factor to the primary factor and from the primary factor to the observed variable were all statistically significant ($P < 0.01$).

Table 2 shows the results of a factor analysis (factor name, factor load, and so on). The primary factor included what the patient was attempting to do daily and his/her agency to positively lead his/her daily life. It was named [agency to adjust one's way of living]. The secondary factor pertained to finding a new way of living and being connected to society and was expressed as the [agency to keep connected to people and to obtain vital power]. The tertiary factor pertained to getting knowledge about cancer treatment voluntarily and to making attempts to take actions based on acquired knowledge and was expressed as the [agency to control one's physical condition].

Reliability

The overall Cronbach α coefficient for the SAC was 0.900. The Cronbach α coefficient value for each factor was 0.883 for the [agency to adjust one's way of living], 0.831 for the [agency to keep connected to people and to get vital power], and 0.795 for the [agency to control one's physical condition]. Internal consistency was confirmed for the whole SAC and for each factor. In addition, the

Spearman-Brown formula using the split-half method provided a reliability coefficient of 0.964, confirming the reliability of the scale.

Criterion validity

Correlation between the SAC scores and the SCAQ scores

The correlation between the SAC scores and the SCAQ scores was analyzed. The Pearson correlation coefficient between the total SAC score and the total SCAQ score is shown in Table 3. A moderate positive correlation was noted between the SAC scores and the SCAQ scores ($r = 0.619$).

Table 3

Correlation between the SAC scores and the FACT-G scores

The correlation between the SAC scores and the FACT-G scores was analyzed. The correlation coefficient between the total SAC score and total FACT-G score is shown in Table 3. A correlation was noted between the SAC scores and the FACT-G scores ($r = 0.46$). Among others, a significant correlation was noted with the score for the SAC's primary factor: [agency to adjust one's way of living] ($r = 0.545$).

Discussion

This study was aimed at developing a reliable scale with sufficient validity that would enable objective assessments of the self-care agency of cancer patients receiving treatment.

Reliability

The overall Cronbach α for the SAC was 0.900, with the α coefficients for individual factors ranging between 0.795 and 0.883. Thus, the Cronbach α coefficient values were 0.7 or higher for both the overall scale and for each factor, demonstrating a good internal coherence of the SAC as a scale.

Validity

To assess the content validity, we attempted to create a theoretical "self-care agency scale for cancer patients receiving treatment." To this end, we took theoretical steps[20] based on previous studies,[3,4] including a past study on Orem's theory,[6] and created a model covering self-care, self-care agency, the QOL concept, and positional relationships related to the concept model. When a temporary questionnaire was prepared, we set theoretical factors and questionnaire items based on the characteristics of the cancer treatment in recent years, the self-care needed for cancer treatment, and the rate of matching answers from experts. The SAC prepared by following these steps has a solid base and a theoretically supportive structure, and its content validity was assured.

The construct validity was clarified using a confirmatory factor analysis. The indicators of fitness, which confirm the overall validity, were favorable. Furthermore, the validity of the 3-factor 15-item composition was confirmed.

The factor structure of the SAC was confirmed to be reasonable when judged based on the Cronbach α coefficient for each factor and the factor load of each item. Three factors were identified: [agency to adjust one's way of living], [agency to keep connected to people and to obtain vital power], and [agency to control one's

physical condition].

The criterion validity was assessed using the SCAQ and FACT-G scores as external criteria. There was a moderate positive correlation between the SAC and SCAQ scores. Correlations were also noted between the SAC and the FACT-G (a QOL scale for cancer patients). Among others, a correlation coefficient of 0.545 was noted between the score for the primary factor of the SAC [agency to adjust one's way of living] and the FACT-G score. Thus, the relationship with these outside standards was confirmed, and the criterion validity of the SAC was endorsed.

The primary factor of this scale [agency to adjust one's way of living] had the highest Cronbach α coefficient (0.883) among the three factors. As a background for this finding, cancer patients tend to act based on their self-thoughts, although they face complicated psychological factors including anxiety, desire, etc. The questionnaire includes questions about the patient's own view of life. This factor contains a spiritual meaning that is not encompassed in the SCAQ,[21] which is designed for patients with chronic lifestyle-related diseases, or in a self-care agency scale for patients with osteoarthritis of the knees.[9] This is a strikingly unique characteristic of this scale. The existing self-care agency scale for cancer patients[4] includes the [agency to review one's way of living and to promote self-development]. This agency is associated with the primary factor of our SAC and may be viewed as an important factor for assessing the self-care agency of cancer patients.

The secondary factor [agency to keep connected to people and to obtain vital

power] can be characterized as the agency to advance with the vital power acquired through emotional support.

The question pertaining to the tertiary factor [agency to control one's physical condition] uses the term "adverse reactions"; this reflects the characteristics of patients receiving cancer treatment, which can cause adverse reactions.

The significance of this scale lies in the fact that it is designed to enable nurses to assess the self-care agency of patients and to provide nursing in such a manner as to facilitate the continued practice of self-care by cancer patients. The three factors of the SAC are consistent with the essential points of past studies on the self-care of cancer patients,[3] and the self-care agency[4] and the validity of the scale in terms of the factor structure were confirmed in the present study.

Suggestions for clinical applications

The present study enrolled about 100 patients who were receiving chemotherapy and a similar number of patients who were receiving hormone treatment or radiotherapy; these three therapies are the major treatment modalities for cancer at present. All the patients were outpatients. Regarding the selection of patients for this study, some selection bias may have occurred because the participating facilities were founded by various organizations and had diverse features and because the numbers of patients constituting the entire population studied and that for each treatment group were relatively large. The SAC, which was developed based on data obtained from these subjects, seems to have great potential for clinical application.

Our SAC is comprised of 15 items. This small number of items enables a simple assessment, thus minimizing stress on the patients. We may therefore anticipate that the SAC is applicable as an easy-to-use scale for both patients and healthcare providers.

The SAC is a scientifically constructed tool, and its reliability and validity have been verified. Therefore, the scale is a reliable tool for the objective assessment of the self-care agency of cancer patients receiving treatment. It may be utilized by nurses as a tool for assessing patients. Furthermore, the SAC is expected to be useful for setting nursing goals and for enabling the provision of concrete nursing support, as well as for nursing studies related to self-care agency. Its contribution to remarkable advances in nursing is also likely.

Limitations of this study and open issues

In the present study, the SAC was developed for patients receiving types of treatment that have often been provided to outpatients in recent years; however, this report did not examine the results of analyses of individual treatment methods, which is a limitation of this study. However, the physical/mental impact of the treatment methods that were used and the differences in their influences on the QOL of patients have been studied previously.[25] Thus, it would be desirable in the future to utilize the SAC for clinical cases with diverse features and to modify it as needed through further analysis.

Although this study revealed the existence of a correlation between the SAC scores and the FACT-G scores, the study was cross-sectional in nature. Therefore,

an analysis of the changes in the SAC and QOL scores after the implementation of nursing care tailored to the self-care capability levels of individual patients is needed. Verifying the usefulness of the SAC from this viewpoint remains an open issue.

Conclusion

The SAC developed in this study is comprised of 3 factors and 15 items. In the assessment of its construct validity, the Cronbach α value was 0.900. A confirmatory factor analysis yielded a GFI = 0.911, an AGFI = 0.878, and a CFI = 0.945. The criterion validity of this scale was also verified. These results suggest that the SAC is applicable to the field of nursing. However, its clinical applicability should be further evaluated through attempts at clinical utilization.

Acknowledgments

Conflicts of Interest

There are no conflicts of interest to declare in relation to this study.

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Table 1. Background variables

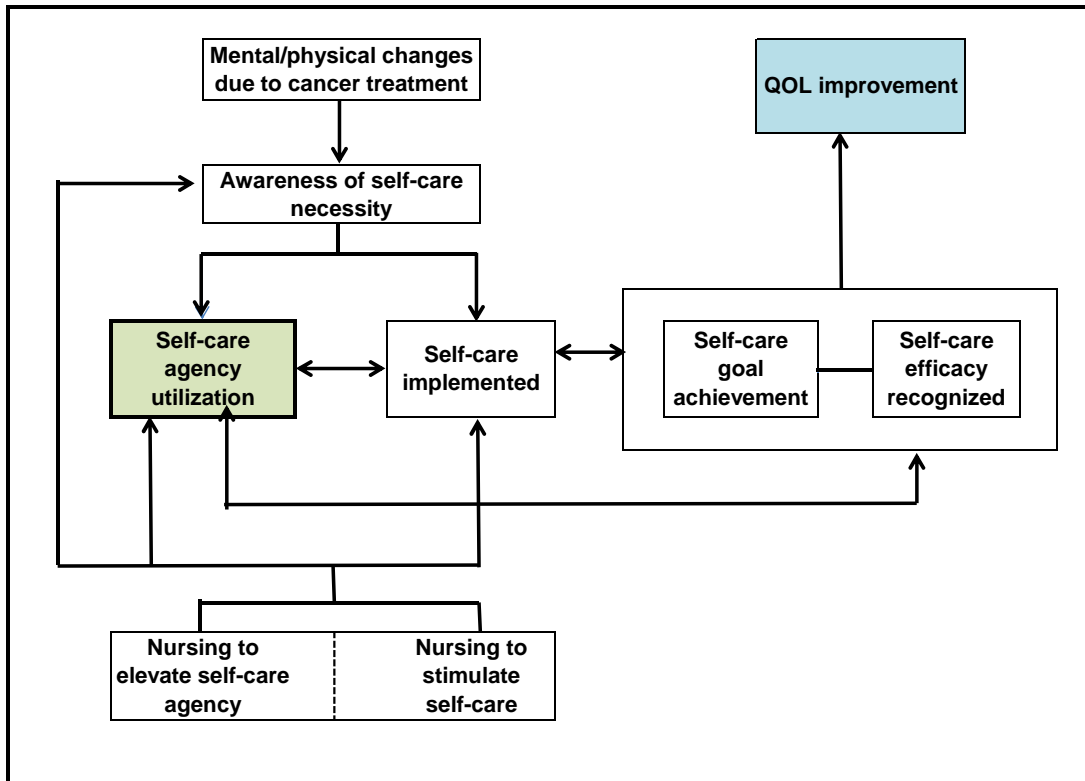| Item	n	%
Gender		
Men	189	62
Women	114	38
Diagnosis		
Breast Cancer	74	24
Colon Cancer	30	10
Malignant Lymphoma	23	8
Lung Cancer	21	7
Gastric Cancer	8	3
Prostate Cancer	136	45
Esophagus	2	1
Larynx/Ear/Nose	5	2
Others	4	1
Current Treatment Method		
Chemotherapy	98	32
Hormone therapy	110	36
Radiation therapy	95	31
ECOG[a] performance status		
0 = Fully active, able to carry on all pre-disease performance without restriction	157	52
1 = Restricted in physically strenuous activity but ambulatory and able to carry out work of a light or sedentary nature; e.g., light housework, office work	122	40
2 = Ambulatory and capable of all self-care but unable to carry out any work activities	14	5
3 = Can take care of oneself to some extent, but often requires assistance and remains in bed for half the day	10	3
Family Structure		
Single	20	7
Couple	137	45
Cohabiting Parents or Children	89	29
Other	57	19
Occupation/Taste (multiple answers possible)		
Full-time employee, self-employee, farmer	113	35
Part-time/temporary job	39	12
On long leave	26	8
Housewife	59	18
Engaged in hobby/local community activity	63	20
Others	23	7

Note. N = 303

Figure 1. Conceptual model of "self-care agency of cancer patients under treatment"
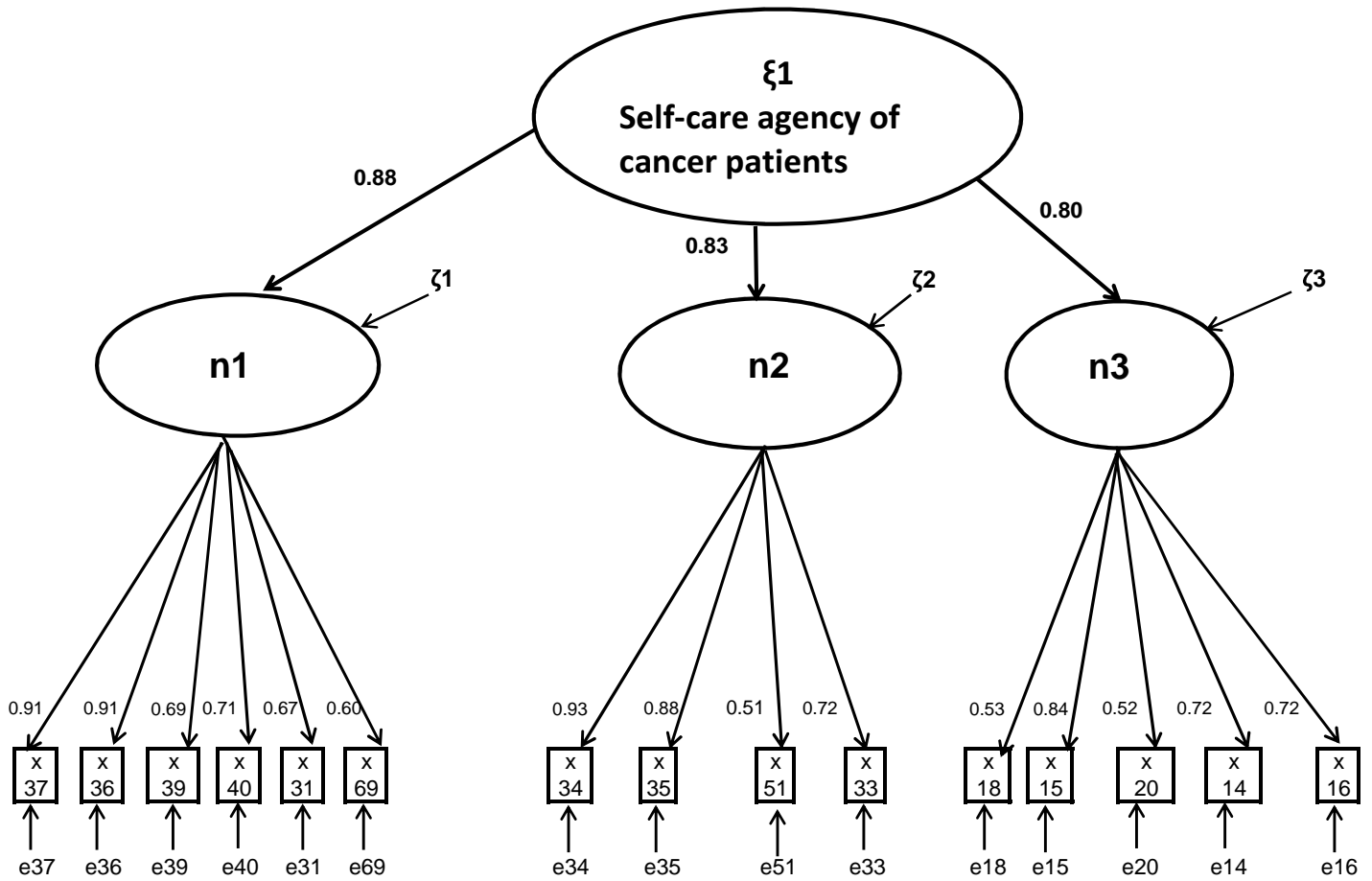
Figure 2. Confirmatory factor analysis of SAC (standardizing coefficient)（N = 303）

GFI = 0.911　AGFI = 0.878　CFI = 0.945　RMSEA = 0.071

ζ: confounding coefficient, e: error coefficient

n1:［agency to adjust one's way of living］
n2:［agency to keep connected to people and to obtain vital power］
n3:「agency to control one's physical health condition」

Table 2. Factor analysis of SAC

[Factor name] Item/factor Cronbach's α coefficient	Factor load		
	1	2	3
Factor 1[[Agency to adjust one's way of living] α = 0.883			
X37 Attempt to live with a smile	**.830**	.096	-.069
X36 Attempt to keep pleasant atmosphere	**.819**	.118	-.087
X39 Have desire for one's future life	**.733**	.022	-.018
X40 Keep in friendly contact with surrounding people (friends/family)	**.699**	.081	-.034
X31 Proactively take refreshing actions	**.698**	-.037	.063
X69 Avoid wasting time	**.551**	-.060	.242
Factor 2 [Agency to keep connected to people and get vital power] α = 0.831			
X34 Speak out one's feelings to avoid pooling of anxiety	.010	**.864**	-.038
X35 Consult surrounding people frankly about concerns	.048	**.785**	-.024
X51 Sometimes feel encouraged by other patients with same disease	-.097	**.660**	.050
X33 Sometimes feel encouraged by surrounding people/objects	.218	**.646**	-.058
Factor 3 [Agency to control one's physical condition] α = 0.795			
X18 Write down the names of the drugs being taken	.001	-.233	**.760**
X15 Actively collect information about things favorably affecting health	.136	-.019	**.722**
X20 Be aware of the adverse reactions that are likely to appear	-.164	.100	**.632**
X14 Be aware of how to deal with symptoms upon appearance	-.028	.183	**.616**
X16 Try out what seems good for health	.129	.025	**.615**

Total SAC Cronbach's α coefficient = 0.900

* Factor structure after Promax rotation using the principal factor method. Values enclosed within the frame indicate the highest factor load for each factor.

Note. N = 303

Table 3. Correlation between SAC and SCAQ/FACTG

	SCAQ		FACT-G	
	Correlation coefficient	p	Correlation coefficient	p
SAC total	0. 619	⟨0. 001	0. 460	⟨0. 001
Agency to adjust one's way of living	0. 448	⟨0. 001	0. 545	⟨0. 001
Agency to keep connected to people and to get vital power	0. 541	⟨0. 001	0. 312	⟨0. 001
Agency to control one's physical condition	0. 562	⟨0. 001	0. 257	⟨0. 001

Note. N = 303