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## Original Article

## Translation and validation of Taiwan Chinese version of the self-regulation questionnaire for gynecologic cancer survivors

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## ABSTRACT

**Objective:** To culturally adapt the self-regulation questionnaire to the Taiwan Chinese version (TC-SRQ) and to evaluate its psychometric properties for gynecologic cancer survivors.

**Materials and methods:** A cross-sectional study was employed with a purposive sample of 287 gynecologic cancer survivors. The TC-SRQ was adapted from a Germany version through back-translation to ensure its quality. For construct validity, confirmatory factor analysis (CFA) was used to assess the TC-SRQ measurement model with fit indexes including the  $\chi^2$  test, the root mean square error of approximation (RMSEA), and the normed fit index (NFI), the comparative fit index (CFI), and non-normed fit indices (NNFI). For concurrent validity, the Taiwanese version of the European Organization for Research and Treatment of Cancer's 30-item core quality of life (EORTC QLQ-C30) questionnaire was used as a criterion measure for quality of life (QOL). Reliability was evaluated by internal consistency and test-retest reliability.

**Results:** For a modified measurement model of TC-SRQ, the model fit ( $\chi^2 = 311.23, P = .0; RMSEA = .088; NFI = .97, CFI = .98, NNFI = .97$ ) was acceptable. The evidence of construct validity of TC-SRQ scale was confirmed by the model estimates. TC-SRQ correlated positively with the global QOL, physical, cognitive, emotional, and social functioning domains, and negatively with fatigue and pain domains of EORTC QLQ-C30. For known groups validity, TC-SRQ was correlated with groups attributed by age, family support, health status, and sleep quality. A Cronbach's  $\alpha$  of .91 indicated good internal consistency; the test-retest reliability was .82.

**Conclusions:** TC-SRQ is a valid and reliable instrument for assessing self-regulation in gynecologic cancer survivors.

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## Introduction

Gynecologic cancers, which include endometrioid corpus cancer, cervical cancer, and ovarian cancer, were leading cancer types for women in Taiwan [1,2]. The chance for gynecologic cancer patients reaching permanent survival stage is growing with the

advances of cancer treatment and cancer screening for early detection. However, gynecologic cancer survivors are frequently affected by treatment-induced side effects and other stress, such as continuing to be family caretaker, which is typical in Chinese society. Furthermore, these challenges may persist for more than five years. Self-regulation may hold the key for better quality of life (QOL) for these women [3].

Self-regulation is the ability to satisfy one's needs and achieve physical, psychological, and spiritual well-being through one's own actions [4]. It is related to competence and autonomy under stressful situations to restore well-being, inner equilibrium, and sense of control [5,6]. It helps patients engaging in coping strategies to improve social functioning, emotional distress, and QOL [7,8].

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Recognizing self-regulation may help gynecologic cancer survivors coping with cancer and improve their QOL in cancer survivorship, understand and quantify self-regulation status in this population become critical. The self-regulation questionnaire (SRQ) is an instrument designed to measure autonomous disease coping in cancer patients [9–11]. The 16-item SRQ has good psychometric properties and greater prognostic value than traditional QOL scales in the studies of cancer and chronic diseases [5,12,13].

The aims of this study were to translate the SRQ in Germany into Chinese and to determine the psychometric properties of this Taiwan Chinese version of the SRQ (TC-SRQ). The reason that the SRQ was selected as an instrument to probe self-regulation in gynecologic cancer survivors was under the consideration of measurement instrument development and adaptation process [14].

## Materials and methods

### Study design, setting and sampling

A cross-sectional study design was employed. Gynecologic oncology outpatients and members of gynecologic cancer support groups were recruited by purposive sampling from a medical center in northern Taiwan. The criteria of inclusion were: age  $\geq 20$  years; single diagnosis either cervical cancer, endometrial cancer, or ovarian cancer by a clinical specialist; completion of the first treatment session. The criteria of exclusion: presence of cognitive or communication impairment; diagnosis of multiple cancers; existence of psychiatric disorder. The sample size was estimated by the rule that the respondent-to-item ratio of 10:1 for the SRQ was considering adequate, which made at least 160 samples from the qualified population necessary.

### Ethics statement

Ethical approval for the present study was obtained from the Institutional Review Board (13MMHIS035). Informed consents were provided to all subjects with written information about the purpose of the research and that participation of the research was voluntary and confidential.

### Study procedures

The study procedure employed a two-stage process: the first stage involved the translation of the SRQ; the second stage focused on the validation process, which was to evaluate the psychometric properties of TC-SRQ. In the first stage, permission to translate the Germany version of the SRQ into Chinese was approved by the original author. We followed the steps of Brislin's translation method [15]: (1) SRQ was first translated into Chinese independently by two bilingual translators; (2) the two Chinese translations were then synthesized to produce a combined version with the documentation of the synthesizing process; (3) the combined Chinese translation was back-translated into German by two German-native translators with no prior knowledge of SRQ; (4) a committee with five experts was convened to review the questionnaire in terms of the meaning conveyed, cultural and lifestyle considerations, and idiomatic usage to ensure cross-cultural equivalence, and a preliminary Chinese version of the SRQ was produced from the consensus; (5) a group of potential users were asked to try out the preliminary questionnaire and provide feedback as to relevance and clarity before the translated version was finalized.

In the second stage, the validation process proceeded by content validity, pilot testing, and formal testing. Content validity is to judge the relevance, sufficiency, and clarity of an instrument and whether measuring concepts are adequately represented by its questions

[14]. Five experts were invited to appraise the TC-SRQ items using a 4-point scale: 4 for highly appropriate, relevant, and no change; 3 appropriate, relevant, and minor change; 2 inappropriate, major change; 1 highly inappropriate, irrelevant, removal. The content validity index (CVI) was calculated from experts' ratings. A pilot test was conducted on 37 gynecologic cancer patients to estimate the time for completing the questionnaire, to identify unclear or difficult items, and to improve administration and workflow.

The validation process in the formal testing of the TC-SRQ scale encompassed construct validity, concurrent criterion validity, and reliability. The model fitness of the TC-SRQ model, which is the measurement model of the TC-SRQ scale, was assessed by confirmatory factor analysis (CFA). Convergent validity and discriminant validity were determined by examining the path and correlation values in the TC-SRQ model. Construct validity was supported if both convergent validity and discriminant validity were satisfactory [16]. Concurrent criterion validity was deemed approved if self-regulation measured by the TC-SRQ was correlated with QOL measured by a criterion instrument, the European Organization for Research and Treatment of Cancer's 30-item core quality of life questionnaire (EORTC QLQ-C30), as predicted by earlier studies [7,17,18].

For reliability, internal consistency and test-retest reliability were evaluated. Internal consistency was assessed by Cronbach's  $\alpha$ . Test-retest reliability was Pearson's correlation between two administrations of TC-SRQ involving a small sample of the original participants and the retest interval was set 3 weeks from the initial collection.

### Measurements and instruments

The instruments used in data collection for this study included the SRQ and the EORTC QLQ-C30 as well as the self-reported socio-demographic and medical characteristics.

### Socio-demographic and medical characteristics

The socio-demographic characteristics included: age, marital status, education, religion, and family support. The medical characteristics included: type of gynecologic cancer, cancer stage, survival time, treatment, health status, and sleep quality. The assessment for family support, health status, and sleep quality was self-rated as reported previously [2].

### SRQ (German version)

The original SRQ scale in Germany contains 16 items rating by a 6-point Likert scale ranging from "very weak" for 1 to "very strong" for 6. The score average falls into categories that correspond to strength of self-regulation ranging from very good to very poor [4]. SRQ evidences good reliability in terms of internal consistency (Cronbach's  $\alpha = .948$ ) and test-retest reliability ( $r = 0.80$ ). Two components each with eight items have been identified by exploratory factor analysis: "Ability to change behavior in order to reach goals" and "Achieve satisfaction and well-being" [5].

### EORTC QLQ-C30

The EORTC QLQ-C30 contains a total of 30 items covering: 5 functional groups, including physical functioning, role functioning, emotional functioning, cognitive functioning, and social functioning, with 15 items; 3 symptom groups, including fatigue, pain, and nausea/vomiting, with 7 items; global QOL scale with 2 items; 6 items on symptoms. All items are Likert scales organized into conceptual groups representing different domains of QOL. Scores are computed by summing the items for each domain and translating the raw domain total into a 100-point scale. A higher score would

indicate better functioning in a particular domain, higher QOL, or more severe symptoms, while a lower score would indicate poorer functioning, lower QOL, or mild symptoms. The EORTC QLQ-C30 has demonstrated excellent psychometric properties and existed with the validated Taiwan Chinese version [19–27].

### Statistical analysis

The calculation of TC-SRQ score was based on the method used in the SRQ studies while EORTC QLQ-30 score was based on the EORTC QLQ-30 manual. IBM SPSS ver. 19.0 was used in the calculation of descriptive statistics, univariate analysis, and reliability. LISREL (version 8.54) was used to conduct CFA. The level of significance was set at 5%.

## Results

### Demographics and medical characteristics of participants

A total of 287 patients participated the study, including 246 gynecologic oncology outpatients (85.7%) and 41 members of gynecologic cancer support groups (14.3%). The age of the participants ranged from 22 to 84 years old, with a mean of  $54.02 \pm 10.65$  years. The largest proportion of participants were in the 51–60-year group ( $n = 113$ , 39.4%), and the smallest proportion, in the  $\geq 61$ -year group ( $n = 74$ , 25.8%). With respect to marital status, most of the participants were married ( $n = 189$ , 65.9%). The most common level of education was junior high school or less ( $n = 117$ , 40.8%), and most participants held religious beliefs ( $n = 222$ , 77.4%).

Cervical cancer was the most common ( $n = 121$ , 42.9%), followed by endometrial cancer ( $n = 83$ , 28.9%) and ovarian cancer ( $n = 81$ , 28.2%). Most of the participants had stage I cancer ( $n = 182$ , 63.8%), with stage II being the second most common cancer stage ( $n = 52$ , 18.5%). The mean survival time was  $6.22 \pm 5.60$  years, with the largest proportion of participants surviving five years or longer ( $n = 132$ , 46.3%). With respect to the type of treatment undergone by the participants, the most common was surgery ( $n = 122$ , 42.9%), followed by surgery plus chemotherapy ( $n = 83$ , 28.9%) and surgery plus radiation therapy ( $n = 42$ , 14.6%); the least common type was combined surgery, radiation therapy, and chemotherapy ( $n = 38$ , 13.6%). An average level of disease severity ( $n = 125$ , 43.9%) and sleep quality ( $n = 120$ , 42.2%) was experienced by the largest proportions of participants. Demographic and medical characteristics for the participants were shown in Tables 1 and 4 along with the statistics of TC-SRQ total, which were the total TC-SRQ scores.

### Scores on the TC-SRQ

Table 2 summarized the scores of the individual item and the total and two subscales of TC-SRQ scale. TC-SRQ total ( $M = 69.94$ ,  $SD = 12.76$ ) indicated that overall self-regulation was strong in the participants. The top three items with highest means were: item 14 for “inner satisfaction over and over again by daily activities” with  $4.57 \pm 0.93$ , item 15 “well-being by daily activities” with  $4.56 \pm 0.94$ , and item 16 “behavior gives rise to situations which cause experiences full of relish” with  $4.53 \pm 0.98$ . The item with the lowest mean score was item 9 describing “disappointment: no reason for resignation, but cause to change behavior”. The means of the two subscales were:  $35.66 \pm 6.45$  for “Achieve satisfaction and well-being” and  $34.28 \pm 6.83$  for “Ability to change behavior in order to reach goals”.

### Confirmatory factor analysis

The measurement model of the TC-SRQ scale was evaluated using CFA. The criteria for assessing adequate model-fit included:

$\chi^2$  test with  $P > .05$ ; the goodness-of-fit index (GFI)  $> .90$ ; the root mean square error of approximation (RMSEA)  $< .1$ ; the adjusted goodness-of-fit index (AGFI)  $> .90$ ; the non-normed fit index (NNFI)  $> .90$ ; the normed fit index (NFI)  $> .90$ , the comparative fit index (CFI)  $> .95$ , the incremental fit index (IFI)  $> .90$ , the parsimony normed fit index (PNFI)  $> .5$ , the relative fit index (RFI)  $> .95$ , and the critical N (CN)  $> 200$ .

The TC-SRQ model ( $\chi^2 = 664.64$ ,  $P = 0.0$ ; RMSEA = 0.14; GFI = 0.77; AGFI = 0.70) was less than acceptable. A modified model was explored seeking to lower RMSEA to acceptable level with minimum disturbance to TC-SRQ theoretical structure. Constraints were incrementally added to the TC-SRQ model. Each constraint correlated the residuals of a pair of TC-SRQ items. In all, six pairs were added: items 1 and 2, items 3 and 4, items 3 and 16, items 7 and 8, items 14 and 15, and items 15 and 16. The modified model ( $\chi^2 = 308.76$ ,  $P = 0.0$ ; RMSEA = .088; GFI = .88; AGFI = 0.83) was acceptable with the upper limit of 90% confidence interval (CI) for RMSEA not exceeding 0.10. A comparison of model-fit indices between the original model and the modified model for the TC-SRQ scale was summarized in Table 3.

The path diagram for the original TC-SRQ model was shown in Fig. 1. Convergent validity was supported by examining the factor loadings. All loadings were within the good ( $> .55$ ) to excellent ( $> .71$ ) range. Judging by the composite reliability values ( $> .5$ ) for both factors of the model, convergent validity was deemed supported. Discriminant validity was deemed supported by the fact that the correlation (.87; 95% CI = [.75, .95]) between the two factors not exceeding a value 1.0, which indicated the distinctiveness of the two factors. Consequently, construct validity was supported.

### Known groups validity analysis

As shown in Table 4, age ( $F = 4.44$ ,  $P = .013$ ), family support ( $F = 10.96$ ,  $P < .001$ ), health status ( $F = 13.27$ ,  $P < .001$ ), and sleep quality ( $F = 13.27$ ,  $P < .001$ ) were correlating with TC-SRQ total. Furthermore, TC-SRQ total was higher for age  $\geq 61$  years than for  $\leq 50$  years, for adequate family support than for moderate family support, for good health than for average or poor health, and for average sleep quality than for poor sleep quality.

### Concurrent criterion validity

The correlations between TC-SRQ totals and the EORTC QLQ-30 scale were evaluated to provide evidence that self-regulation was indeed related to health-related QOL. As shown in Table 5, TC-SRQ total was positively correlated with global QOL ( $r = .47$ ,  $P < .01$ ) and with four QOL-related functional domains, physical functioning ( $r = .15$ ,  $P < .05$ ), cognitive functioning ( $r = .30$ ,  $P < .01$ ), emotional functioning ( $r = .32$ ,  $P < .01$ ), and social functioning ( $r = .15$ ,  $P < .05$ ) of EORTC QLQ-30 subscales. Also, TC-SRQ total was negatively correlated with two of the three symptom domains, fatigue ( $r = -.25$ ,  $P < .01$ ) and pain ( $r = -.13$ ,  $P < .05$ ). In addition, TC-SRQ total was negatively correlated with the two questions pertaining to appetite loss ( $r = -.12$ ,  $P < .05$ ) and financial impact ( $r = -.23$ ,  $P < .01$ ).

### Internal consistency

Cronbach's  $\alpha$  values were computed separately for the pilot test and formal testing: TC-SRQ scale (pilot,  $\alpha = .90$ ; formal,  $\alpha = .95$ ), the “Ability to change behavior in order to reach goals” subscale (pilot,  $\alpha = .83$ ; formal,  $\alpha = .92$ ), and the “Achieve satisfaction and well-being” subscale (pilot,  $\alpha = .83$ ; formal,  $\alpha = .91$ ). All  $\alpha$  values were satisfactory ( $> .70$ ).

**Table 1**  
Demographic and medical characteristics and TC-SRQ total for the study participants (N = 287)<sup>a</sup>.

Variable	n	%	M	SD
Education				
Junior high school or below	116	40.8	70.71	14.55
High/vocational school	87	30.3	70.78	13.07
College or above	82	28.9	68.62	11.33
Marital Status				
Not married	96	34.1	68.49	13.48
Married	189	65.9	70.96	13.06
Religiosity				
Not religious	64	22.6	67.63	13.59
Religious	221	77.4	70.86	13.06
Site				
Uterine cervix	121	42.9	71.26	14.71
Uterine corpus	83	28.9	69.77	12.38
Ovary	81	28.2	68.81	11.64
Stage				
I	182	63.8	71.10	13.43
II	52	18.5	69.00	13.58
II	39	13.6	68.82	10.49
Survival Time				
<2 years	72	25.4	69.90	13.36
2–5 years	79	27.5	70.10	12.74
≥5 years	132	46.3	70.66	12.99
Treatment				
Surgery only	122	42.9	70.37	15.13
Surgery + radiation therapy (including radiation therapy only)	42	14.6	71.98	10.39
Surgery + chemotherapy (including chemotherapy only)	83	28.9	70.46	11.08
Surgery + radiation + chemotherapy (including radiation + chemotherapy only)	38	13.6	66.61	13.64
Severity				
High	84	29.6	69.74	12.14
Average	125	43.9	67.38	12.28
Mild	74	25.8	74.43	13.26

<sup>a</sup> TC-SRQ data missing for two participants.

### Test retest reliability

Based on the retest sample of 37 participants randomly selected from the original 287 participants, the Pearson's correlation coefficient between the test and retest TC-SRQ scores was .81.

### Discussion

In this study, we translated and adapted the TC-SRQ from Germany into Chinese through back-translation in order to ensure conceptual equivalence and being culturally appropriate. The

psychometric properties of TC-SRQ in terms of content validity (CVI = 0.92), construct validity, concurrent validity, and reliability were validated through experts' appraisal, CFA, correlating with a criterion measure of health-related QOL (EORTC QLQ-30), and internal consistency and test-retest reliability.

Instead of using exploratory factor analysis as in an early study [5], we adopted the CFA approach, which was deemed of methodological merits in terms of determining the underlying conceptual structure rigorously, to the study of SRQ psychometric properties. However, the cut-offs selected for adequate model fit were liberal criteria especially with RMSEA for the reason that our

**Table 2**  
Item scores and reliability of TC-SRQ Scale for the study participants (N = 287)<sup>a</sup>.

Item	Description	Mean (SD)
	TC-SRQ total ( $\alpha = .95$ )	69.94 (12.76)
	"Ability to change behavior in order to reach goals" subscale total ( $\alpha = .92$ )	34.28 (6.83)
SR4	Expand various activities until states change to total satisfaction	4.23 (1.08)
SR6	Threatening situations: behave to emerge safe	4.22 (1.12)
SR7	Attain most important objectives	4.35 (1.06)
SR9	Disappointment: no reason for resignation, but cause to change behavior	4.19 (1.09)
SR10	Find standpoints/behavior pattern which allow pleasant problem solving	4.27 (1.07)
SR11	Change behavior to reach pleasant outcome	4.32 (1.02)
SR12	New behavior pattern	4.28 (0.96)
SR13	Because of behavior desired proximity and required distance to important others	4.42 (1.05)
	"Achieve satisfaction and well-being" subscale total ( $\alpha = .91$ )	35.66 (6.45)
SR1	Situations/states which motivate	4.41 (1.04)
SR2	Actualize wishes and satisfy needs	4.27 (1.09)
SR3	Situations/states which restore well-being	4.43 (1.07)
SR5	Arrange different areas of life optimal	4.44 (1.13)
SR8	Situations/states which satisfy wishes and needs optimal	4.46 (1.04)
SR14	Inner satisfaction over and over again by daily activities	4.57 (0.93)
SR15	Well-being by daily activities	4.56 (0.94)
SR16	Behavior gives rise to situations which cause experiences full of relish	4.53 (0.98)

<sup>a</sup> TC-SRQ data missing for 2 participants.

**Table 3**  
Model fit indices for the original model and modified model of TC-SRQ scale.

Fit index	Original model	Modified model
Likelihood-ratio Chi-square ( $\chi^2$ )	664.64	308.76
Goodness-of-fit Index (GFI)	0.77	0.88
Root mean square error of approximation (RMSEA)	0.14	0.088
Adjusted goodness-of-fit index (AGFI)	0.70	0.83
Non-normed fit index (NNFI)	0.95	0.98
Normed fit index (NFI)	0.95	0.97
Comparative fit index (CFI)	0.96	0.98
Incremental fit index (IFI)	0.96	0.98
Parsimony normed fit index (PNFI)	0.81	0.79
Relative fit index (RFI)	0.94	0.97
Critical N (CN)	71.80	125.95

**Table 4**  
Analysis of TC-SRQ total with respect to four basic characteristics of study participants (N = 287)<sup>a</sup>.

Variable	n	Mean (SD)	t/F	P	Post hoc comparisons
Age <sup>b</sup>			4.44	.013*	≥61 years > ≤50 years
≤50 years	99	67.56 (12.71)			
51–60 years	112	70.15 (11.60)			
≥61 years	74	73.54 (15.45)			
Family support <sup>b</sup>			10.96	<.001***	Adequate support > Moderate support
Little to no support	16	65.13 (21.93)			
Moderate support	25	59.72 (13.64)			
Adequate (including complete) support	244	71.52 (11.90)			
Health status <sup>b</sup>			13.27	<.001***	1. Good > Poor 2. Good > Average
Poor (including very poor)	26	64.23 (11.635)			
Average	111	66.61 (13.431)			
Good (including very good)	148	73.80 (12.289)			
Sleep quality <sup>b</sup>			13.27	<.001***	Average > Poor
Poor (including very poor)	59	63.47 (14.030)			
Average	120	70.06 (11.455)			
Good (including very good)	106	73.92 (13.287)			

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

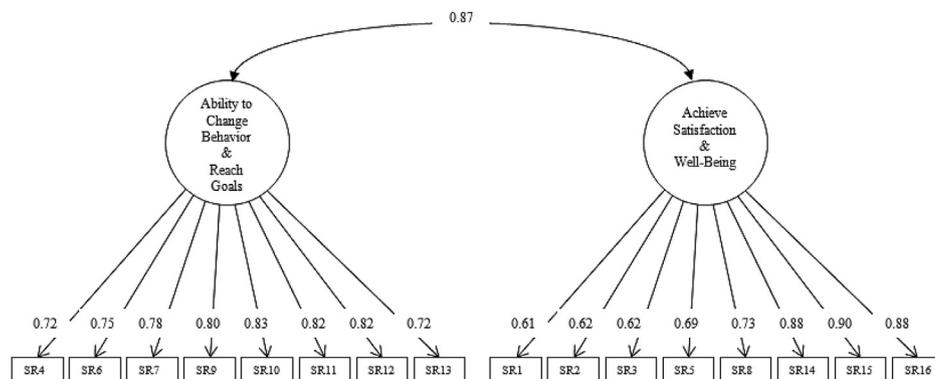
<sup>a</sup> TC-SRQ data missing for two participants.

<sup>b</sup> One-way ANOVA.

sample was coherent and without healthy controls. Nevertheless, the convergent validity and discriminant validity for the two constructs “Ability to change behavior in order to reach goals”, and “Achieve satisfaction and well-being” of the original TC-SRQ model were evidenced.

The sample used in this study presented unique characteristics in the attributes of age, family support, health status, and sleep quality. TC-SRQ scores were generally higher in older groups, indicating greater self-regulation among older than younger gynecologic cancer survivors. This finding was consistent with an earlier study reported that young female cancer patients who were

in midst of multiple responsibility both in family life and professional career often received inadequate help, which reflected in low self-regulation [28]. We also observed greater self-regulation among those with adequate family support than those with only moderate family support. This finding was in agreement with earlier studies that social supports from family members, i.e. children, were essential in coping of cancer and motivating for well-being [29–31]. Our results also showed a correlation between greater self-regulation and better health status, which echoed the findings in various studies regarding negative psychological reactions to cancer in physical, social, and psychological health in



**Fig. 1.** Path diagram of the original measurement model for TC-SRQ scale. Notes: SR1 to SR16 represented the items of TC-SRQ according to item number; all coefficients were standardized and significant statistically ( $p < .05$ ).

**Table 5**  
Correlation<sup>a</sup> between TC-SRQ and EORTC QLQ-C30 in participants (N = 287).

Variable	Ability to change behavior in order to reach goals	Achieve satisfaction and well-being	TC-SRQ total
Physical functioning	.10	.17**	.15*
Role functioning	.08	.13*	.11
Cognitive functioning	.27**	.30**	.30**
Emotional functioning	.28**	.32**	.32**
Social functioning	.12*	.16**	.15*
Global QOL	.42**	.46**	.47**
Fatigue	-.20**	-.26**	-.25**
Pain	-.10	-.15*	-.13*
Nausea and vomiting	-.03	-.08	-.06
Insomnia	-.28**	-.32**	-.32**
Appetite loss	-.09	-.14	-.12*
Constipation	-.03	-.09	-.07
Diarrhea	-.06	-.13*	-.10
Dyspnea	-.06	-.15*	-.11
Financial impact	-.22**	-.21**	-.23**

\* $p < .05$ ; \*\* $p < .01$ .

<sup>a</sup> Pearson correlation.

gynecologic cancer patients [31,32]. With respect to the effect of sleep quality on self-regulation, because the largest numbers of gynecologic cancer cases occur around or after menopausal age, and cancer treatment can induce menopause, sleep problems possibly became a persistent source of distress for gynecologic cancer survivors. We found that those with poor sleep quality had lower self-regulation than those with average sleep quality.

With respect to concurrent validity, we found TC-SRQ to be positively correlated with the global QOL and with five functional domains in physical, role, cognitive, emotional, and social functioning of EORTC QLQ-30, indicating that overall QOL and certain functional domains grew with increasing self-regulation in gynecologic cancer survivors. Two of the highest correlations were the global QOL and the emotional functioning subscales. These findings echoed the general ideas that self-regulation had influence on QOL and emotion [7] and disease coping behaviors contributed to improved QOL for gynecologic cancer survivors [7,8,17].

This study was limited by the use of a sample that consisted of gynecologic oncology outpatients or gynecologic cancer support group members at one medical center in northern Taiwan, resulting in insufficient data richness and representativeness. Future research should expand to include patients with different types of cancer and at different stages of follow-up, and continue the development of the TC-SRQ, in order to demonstrate the applicability of this scale to different cancer diagnoses and establish the scale's sensitivity and accuracy.

Gynecologic cancer survivors have a long road to recovery, and they face many problems during each phase of their illness, from diagnosis to treatment to recovery. Nursing staff, because of their extensive contact with patients throughout the healthcare process, are in a unique position to help gynecologic cancer survivors. Through the use of an effective assessment instrument, nursing staff can detect the self-regulation status of gynecologic cancer survivors and provide them the needed attention and appropriate referrals in a timely manner, thereby easing the stress and anxiety and improving the quality of life of gynecologic cancer survivors.

In summary, TC-SRQ had good validity and reliability and was capable of differentiating levels of self-regulation in gynecologic cancer survivors. With a small set of items, it should be easy to understand and easy to use for the target population. With the evidence of good psychometric properties tested with gynecologic cancer survivors, TC-SRQ could serve as an effective instrument for measuring self-regulation in these women either in clinical and research settings.

### Conflict of interest

The authors have declared no conflict of interest regarding the present study.

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