

Intrapersonal and interpersonal dimensions of cancer perception: a confirmatory factor analysis of the cancer experience and efficacy scale (CEES)

Wai Kai Hou

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Abstract

Purpose Sociocultural factors influence psychological adjustment to cancer in Asian patients in two major ways: prioritization of relationships over individual orientations and belief in the efficacy of interpersonal cooperation. We derived and validated among Chinese colorectal cancer (CRC) patients an instrument assessing cancer perceptions to enable the study of the sociocultural processes.

Patients and methods Qualitative interviews ($n=16$) derived 15 items addressing interpersonal experience in Chinese CRC patients' adjustment. These 15 items and 18 corresponding self-referent items were administered to 166 Chinese CRC survivors and subjected to exploratory factor analysis (EFA) to establish the initial scale structure and reliability. The final 29 items, together with other psychometric measures, were administered to a second cohort of 215 CRC patients and subjected to confirmatory factor analysis (CFA).

Results EFA (63.35% of the total variance) extracted six factors: *personal strain*, *socioeconomic strain*, *emotional strain*, *personal efficacy*, *collective efficacy*, and *proxy efficacy*. CFA confirmed the psychometric structure [$\chi^2(df)=702.91$ (368); Comparative Fit Index=0.95; Nonnormed Fit Index=0.94; Incremental Fit Index=0.95; standardized root mean square residual=0.08] of the six factors by using a model with

two latent factors: experience and efficacy. All subscales were reliable ($\alpha=0.76-0.92$). Appropriate correlations with adjustment outcomes (symptom distress, psychological morbidity, and subjective well-being), optimistic personalities, and social relational quality indicated its convergent and divergent validity. Known group comparisons (i.e., age, active treatment, and colostomy) showed its clinical utility.

Conclusion The cancer experience and efficacy scale is a valid multidimensional instrument for assessing intrapersonal and interpersonal dimensions of cancer experience in Asian patients, potentiating existing patient-reported outcome measures.

Keywords Asians · Colorectal cancer · Interpersonal cancer perceptions · Psychometric evaluations · Sociocultural differences

Introduction

Psychosocial adjustment in Asian cancer patients is different from non-Asian patients due to distinctly different sociocultural backgrounds. Asian cultures prioritize relationships over individual orientations, particularly when dealing with stressful events. Cross-cultural studies have consistently found that in coping with stress, although social support has similar benefits for Asian and European Americans, the former weight more heavily the maintenance of interpersonal emotional well-being and relational harmony over seeking support for personal problems [21, 41]. Second, Asians hold a strong belief in interdependence among close social partners and place less emphasis on Western cultural imperatives of personal agency and accomplishment [10]. While perceived personal control is associated with psychological well-being among Americans in the face of job

W. K. Hou (✉)
Department of Community Medicine and School of Public Health,
Li Ka Shing Faculty of Medicine,
The University of Hong Kong,
Pokfulam, Hong Kong
e-mail: houwaikai@gmail.com

demands, confidence in interpersonal cooperation is associated with less psychosomatic and depressive symptoms among Chinese [34]. Interpersonal dimensions of adjustment to cancer, in addition to the intrapersonal dimensions, should be considered when investigating Asian populations.

Perceptions of the interpersonal relations among close social partners have been shown to be important in adapting to the diagnosis and treatment of cancer in Asian patients. Hong Kong Chinese colorectal cancer (CRC) patients reporting emotional coexperience and a secure alliance with family and friends also foresee continuous support from these people and demonstrate coping confidence and better psychological functioning [15, 16]. While Caucasian breast cancer patients emphasize participation in peer support groups during treatment, Asian patients highlight the importance of a cooperative feeling and love in their interactions with family and friends [2]. Chinese and Japanese women with breast cancer tend to perceive similar levels of support and express lower demand for additional support than do their Caucasian counterparts despite having smaller social networks [20]. If interpersonal and intrapersonal dimensions of interaction have an equivalent impact on adjustment in Asian patients, a valid and reliable patient-reported instrument for capturing both is needed. The utility of such instrument also extends beyond geographical Asia as substantial Asian communities exist in most countries and often retain their social values over generations.

The relationship between perceptions of a stressful event and physical and psychosocial adjustment has been highlighted in Lazarus' transactional model of coping [24]. The model asserts that a situation is appraised as "stressful" and undermines physical and mental health only if an individual perceives the situation as incurring a significant negative impact and not to be effectively managed by coping efforts. A generic perception of negative impact predicts psychological morbidity in the year after diagnosis [26], while interference in daily and social life is associated with impairments to the quality of life (QoL) among medium- and long-term survivors [1, 45]. Personal control over cancer course [6, 31], physical symptoms, and emotion regulation [28, 42] has also been found to be related concurrently and prospectively with psychological distress and well-being. However, only one study has assessed interpersonal dimensions, namely familial distress and strained relationship, among older long-term survivors by using a validated instrument (i.e., impact of cancer scale) [45].

This study aims to develop a psychometric instrument for assessing perceptions of both intrapersonal and interpersonal dimensions of cancer experience and tests this in Asian cancer patients. I decided to validate the instrument among samples of Chinese CRC patients because increasing incidence in the past decades suggests a need to understand correlates of adjustment so as to optimize clinical and psychosocial

services among this population. As the People's Republic of China (PRC) modernizes, CRC demonstrates the sharpest increases in incidence, becoming the third commonest cancer in urban Shanghai [19] and the fastest increasing cancer in Qidong city [4]. In Hong Kong, the most developed city in the PRC, CRC ranks the second in incidence and mortality [14]. CRC is also the most frequent cancer among Chinese Singaporeans [35]. However, only few studies have examined psychosocial adjustment in Chinese CRC populations [15–17].

Patients and methods

As part of a larger longitudinal study on Hong Kong Chinese people with CRC, I used a three-stage process to identify salient interpersonal experience in these people. Stage 1 involved a qualitative interview of CRC patients to help identify appropriate item domains. Two studies detailed in this paper followed: study 1 established the psychometric structure and reliability of the instrument; study 2 administered the instrument to a separate cohort of CRC patients to assess scale psychometrics. Upon obtaining the Ethics Committees' approvals, suitable people were identified and recruited at Queen Elizabeth Hospital (QEH), the largest Hong Kong government-funded clinical oncology unit and community settings.

Item development

A qualitative study [15] captured the mechanisms through which psychosocial resources and coping procedures impact upon adjustment. Chinese CRC patients were recruited and interviewed in QEH between March and July 2005; data saturation (i.e., no new data over three consecutive interviews) was achieved with 16 participants. Participants ranged in age from 34 to 73 years (six females, ten males); most ($n=14$) were married; one was widowed and one single. These people had stages II to IV colon ($n=11$) or rectal cancer ($n=5$); all had received curative/palliative surgery and radiotherapy and/or chemotherapy, with seven having temporary/permanent stoma.

Based on the qualitative findings, 15 items were written in Chinese to address significant interpersonal experience: difficulties experienced by family and friends ($n=5$), family financial strain ($n=2$), efficacy in managing cancer with family and friends ($n=5$) and with medical professionals ($n=3$) [15]. I also adapted subscales in the Chinese Illness Perception Questionnaire-Revised (<http://www.uib.no/ipq>) [29] to address comparable self-referent dimensions (*consequences*, $n=6$; *emotional representations*, $n=6$; *personal control*, $n=6$). The instruction read "We are interested to know your personal views regarding colon/rectal cancer. Please indicate how much you agree or disagree with the following statements." Participants rated each item on a

five-point scale (1 = *strongly disagree*, 2 = *disagree*, 3 = *uncertain*, 4 = *agree*, 5 = *strongly agree*).

Study 1: Instrument development and piloting

The materials were translated into English by a trained bilingual translator, then back-translated into Chinese by a naïve second translator. The two translators were Cantonese-speaking Chinese with university degrees in Chinese–English translation. The author examined semantic and conceptual equivalence of the original and the back-translated versions. Discrepancies in the two versions were resolved by joint meetings between translators and when necessary by reiteration of the translation process.

The draft instrument (hereafter referred to as Cancer Experience and Efficacy Scale [CEES]) was administered to a convenience cohort of 166 Chinese CRC patients who had completed treatment, recruited opportunistically from two community support centers and QEH over a 3-month period. Participants either completed the draft instrument independently or by means of telephone or face-to-face interview by the author. Demographic and medical data were obtained from medical records. After completing the instrument, all participants were debriefed individually or in groups to identify any problems or ambiguities in the items.

Study 2: Validation

The CEES was then administered via structured telephone interview to a second cohort of 215 Chinese CRC patients recruited from QEH. Inclusion criteria were 21 years of age or older, histological diagnosis of CRC within 12 weeks, and no prior malignancies. Exclusion criteria were active axis 1 psychiatric disorders, linguistic/intellectual difficulties, brain metastasis, or serious medical condition(s). A standardized pro forma was used to obtain demographic information; a Chart Review Data Sheet recorded medical information from hospital charts. Participants also completed the following measures (Table 4).

Physical functioning A self-developed checklist assesses nine general and CRC-specific symptoms: stomachache, gas/bloating, belch, proctalgia, sleep problems, fatigue, pain, nausea, and loss of appetite [15, 23], with a four-point scale to indicate presence and severity: 0 = *not at all*, 1 = *a little bit*, 2 = *quite a bit*, and 3 = *very much*. Cronbach's alpha (α) for the current administration was 0.78. Subjective health status was assessed as 1 = *very poor*, 2 = *poor*, 3 = *so far so good*, and 4 = *very good*.

Psychological morbidity Anxiety and depression were measured using Chinese Hospital Anxiety and Depression Scale (HADS), which uses a four-point scale (e.g., 0 = *not at all*, 1 = *not very much*, 2 = *quite a lot*, 3 = *very much indeed*) [25]. Seven items measure anxiety (HADS-A) and

depressive symptoms (HADS-D), respectively. The Chinese HADS was shown to be reliable ($\alpha > 0.70$) and valid among Chinese [17]. Alphas for the HADS-A and HADS-D were 0.89 and 0.87, respectively.

Psychological well-being The ten-item subscale of Chinese Affect Scale (CAS-PA) [11] assesses frequency of positive affect in the past two weeks on a five-point scale: 0 = *not at all*, 1 = *rarely*, 2 = *sometimes*, 3 = *often*, and 4 = *all the time*. The CAS-PA demonstrates $\alpha > 0.85$ in Chinese young and middle-aged adults [11] and $\alpha = 0.92$ in the current administration. The Satisfaction with Life Scale (SWLS) [5] measured participants' current sense of fulfillment by using a four-point scale from *strongly disagree* (1) through *strongly agree* (4). The SWLS generates $\alpha > 0.80$ across various studies [32], including this study (0.88).

Optimistic personalities The Chinese Revised Life Orientation Test (C-LOT-R) [22] assesses positive outcome expectancies. The C-LOT-R has demonstrated satisfactory reliability ($\alpha = 0.61$ – 0.71) and validity in Chinese populations [22]. The eight-item Chinese Hope Scale (HS) [18] assesses the bifacet dispositional hope of Snyder et al. [38] and has been demonstrated to be reliable ($\alpha = 0.70$ – 0.90). Participants rate each item on a four-point scale (1 = *strongly disagree*, 4 = *strongly agree*). Alphas for C-LOT-R and HS were 0.76 and 0.84 respectively.

Social relationships Validated for use in Chinese CRC patients [16], the Social Relational Quality Scale (SRQS) measures three qualitative aspects of social relationships, *family intimacy* ($\alpha = 0.78$), *family commitment* ($\alpha = 0.78$), and *friendships* ($\alpha = 0.84$), on a four-point scale (1 = *strongly disagree*, 4 = *strongly agree*).

Data analysis

Following data cleaning and checking, missing values were excluded pairwise. Item-to-total correlations ($r > 0.30$) and unrotated factor extraction demonstrated item-construct loadings [37]. Unless otherwise specified, all analyses were performed using SPSS software (v.14, SPSS Inc., Chicago, IL, USA).

Exploratory factor analysis (EFA) with promax rotation was conducted on the CEES draft in study 1. Factorability of the item correlation matrix was tested by using the Kaiser–Meyer–Olkin (KMO) index and Bartlett's test of sphericity [40]. The optimal number of factors was determined by sequentially using latent root criteria (eigenvalues > 1.0) and scree plot. Item loadings should exceed 0.40. Factor reliability was determined using three

methods: $\alpha \geq 0.70$, interitem correlations ≥ 0.30 , and item-to-total correlations ≥ 0.50 [40].

Based on the EFA results, confirmatory factor analysis (CFA) was performed with LISREL 8.54 (Scientific Software International Inc., Lincolnwood, IL, USA) on the CEES in study 2. The Comparative Fit Index (CFI), Nonnormed Fit Index (NNFI), Incremental Fit Index (IFI), and standardized root mean square residual (SRMR) were used to evaluate data model fit [8]. The model was accepted if all fit indices > 0.95 and the SRMR < 0.08 ; correlations between error covariances of items were added to the model based on modification indices (MI) and expected parameter change statistics (EPC) [8].

Correlational analysis evaluated the psychometrics of the CEES relative to the other measures. Lower perceived negative impact [1, 26] and higher personal control [6, 28, 31, 42] are associated with less distress and higher subjective well-being among cancer patients. If the CEES assesses dimensions significant to adjustment, subscales measuring negative experience should be positively correlated with distress and inversely correlated with well-being, whereas subscales measuring coping efficacy should be inversely correlated with distress and positively correlated with well-being. To determine appropriate convergence and divergence, correlations between CEES subscales and psychosocial measures were examined. Optimistic personalities and good social relationships enhance coping efficacy in stressful situations [3] and are therefore predicted to be positively correlated with CEES efficacy subscales. I also analyzed correlations between subscales assessing negative experience and optimistic personalities and social relational quality, assuming that perception of negative cancer experience is time specific and thus weakly correlated with these psychosocial resources, which are developed over an extended period of time.

Known group comparisons were performed by using Mann–Whitney *U* tests ($p < 0.05$). Younger age (< 65 years) [30], active adjuvant therapies [36, 43], and colostomy [33] significantly predict psychological morbidity among CRC patients. I anticipated that participants who were younger ($<$ median 67 years) [27], receiving adjuvant therapies, or wearing a stoma at survey reported higher scores on negative experience and lower scores on efficacy.

Results

Study 1

Participants

Of 206 potential participants identified and approached via the Hong Kong Stoma Association (site 1; $n = 107$), a NGO Support and Resource Center (Site 2; $n = 86$), and QEH ($n = 13$), 166 (81%) participated in study 1: 83 from site 1, 70

from site 2, and 13 from QEH (Table 1). Age, sex ratio, and time since diagnosis did not differentiate participants ($n = 166$) from nonparticipants ($n = 40$). Bonferroni-adjusted comparisons showed a significant difference in the distribution of tumor site between sites 1 and 2 ($p < 0.0001$). Demographic and medical characteristics of the participants are summarized in Table 1.

Sixty-four percent of participants completed the questionnaires, while 23% completed telephone and 13% face-to-face interviews. There were more rectal cancer patients [$t(164) = -1.14$; $p < 0.05$] and longer time since diagnosis [$t(164) = 0.82$; $p < 0.05$] among self-completing participants.

Debriefing and item analysis

Participants considered the item “My colon/rectal cancer has serious financial consequences” ambiguous and a duplicate of items 9 and 10 (Table 2). The item “My colon/rectal cancer strongly affects the way others see me” was irrelevant because participants believed that people cannot tell the illness from their appearance. Participants also expressed difficulty in answering to the item “My colon/rectal cancer is a serious condition” because they believed that only doctors know their conditions. Lastly, most participants agreed strongly with the reverse-worded item “My actions will have no affect on the outcome of my colon/rectal cancer” irrespective of their scores on the other *personal control* items [29], reflecting a generalized fatalism over life events [10]. These four items also displayed extremely low item-to-total correlations and did not load onto the first unrotated factor, suggesting that they were not tapping the same construct and thus were dropped.

Factor structure

Rotated factor analysis was performed on the 29 remaining items (Table 2). The KMO index (0.83) and Bartlett’s test ($\chi^2 = 2,337.66$, $df = 406$, $p < 0.0001$) indicated that the sample size was adequate and the extracted factors accounted for substantial observed variance. Community values (range = 0.33–0.76) suggested that a satisfactory-to-large proportion of item variance was predicted by the underlying factors. The latent root criterion suggested a six-factor model (63.35% of the total observed variance); inspection of the scree plot showed a noticeable difference in slope after the first six eigenvalues. Orthogonal (varimax) rotation generated comparable results.

Factor 1 (*socioeconomic strain*; 26.57% of observed variance) included items addressing difficulties and distress experienced by family and friends and the expected financial difficulties on family. Factor 2 (*emotional strain*, 12.39% of observed variance) included items addressing participants’ cancer-specific emotional distress. Factor 3

Table 1 Participant characteristics

	Study 1 (n=166)								Study 2 (n=215)	
	Site 1 (n=83)		Site 2 (n=70)		QEH (n=13)		Total		n	%
	n	%	n	%	n	%	n	%		
Demographic characteristic										
Mean age in years (SD)	61.55 (9.38)		60.93 (9.04)		55.85 (8.14)		60.84 (9.22)		64.28 (10.58)	
Sex										
Female	34	41.0	37	52.9	6	46.2	77	46.4	82	38.0
Male	49	59.0	33	47.1	7	53.8	89	53.6	133	62.0
Marital status										
Single	3	3.6	3	4.3	1	7.7	7	4.2	14	6.5
Married	67	80.7	55	78.6	9	69.2	131	78.9	168	78.1
Divorced/widowed	13	15.7	12	17.1	3	23.1	28	16.9	33	15.4
Education level										
No formal	8	9.6	3	4.3	–	–	11	6.6	53	24.5
Elementary	32	38.6	29	41.4	8	61.5	69	41.6	70	32.6
Secondary	36	43.4	31	44.3	4	30.8	71	42.8	76	35.3
Tertiary	7	8.4	7	10.0	1	7.7	15	9.0	16	7.4
Household income (HK\$)										
<\$5,000	14	17.3	12	18.8	1	7.7	27	17.1	52	24.2
\$5,001-\$10,000	24	29.6	25	39.1	6	46.2	55	34.8	62	28.8
\$10,001-\$20,000	27	33.3	13	20.3	2	15.4	42	26.6	64	29.8
\$20,001-\$30,000	12	14.8	9	14.1	2	15.4	23	14.6	24	11.2
>\$30,000	4	4.9	5	7.9	2	15.4	11	7	13	6.0
Employment										
Employed	18	21.7	11	15.7	3	23.1	32	19.3	37	17.2
Retired	37	44.6	35	50.0	7	53.8	79	47.6	100	46.5
Housewife	16	19.3	21	30.0	2	15.4	39	23.5	43	20.0
Unemployed	12	14.5	3	4.3	1	7.7	16	9.6	35	16.3
Medical characteristic										
Tumor site										
Colon	16	19.3	41	58.6	5	38.5	62	37.3	113	52.6
Rectum	67	80.7	29	41.4	8	61.5	104	62.7	102	47.4
Stage										
Unknown	16	19.3	6	8.6	–	–	23	13.9	–	–
I	13	15.7	4	5.7	–	–	17	10.2	5	2.3
II	23	27.7	13	18.6	1	7.7	36	21.7	46	21.4
III	27	32.5	39	55.7	8	61.5	74	44.6	124	57.7
IV	4	4.8	8	11.4	4	30.8	16	9.6	40	18.6
Mean time since Dx in days (SD)									126.11 (18.70)	
Year(s) since Dx										
0–2	47	56.6	54	62.8	12	92.3	103	62.1		
3–5	9	10.8	11	15.7	1	7.7	21	12.7		
≥5	27	32.5	15	21.4	–	–	42	25.3		
Surgical extent										
No surgery	–	–	–	–	–	–	–	–	27	12.6
Open	67	80.7	62	88.6	11	84.6	140	84.3	144	67.0
Laparoscopic	16	19.3	8	11.4	2	15.4	16	15.7	44	20.5
Adjuvant therapies	54	65.1	57	81.4	12	92.3	123	74.1	131	60.9
Radiation therapy (RT)	41	49.4	19	27.1	7	53.8	67	40.4	20	9.3

Table 1 (continued)

	Study 1 (n=166)						Study 2 (n=215)			
	Site 1 (n=83)		Site 2 (n=70)		QEH (n=13)		Total		n	%
	n	%	n	%	n	%	n	%		
Chemotherapy (Chemo)	49	59.0	56	80.0	11	84.6	116	69.9	110	51.2
RT + Chemo	–	–	–	–	–	–	–	–	1	0.5
Colostomy at survey	72	86.7	1	1.4	77	77	77	46.4	61	28.4

US\$1 = HK\$7.8

SD standard deviation, Dx diagnosis, Site 1 Hong Kong Stoma Association, Site 2 NGO Support and Resource Center, QEH Queen Elizabeth Hospital

(*personal efficacy*, 7.51% of observed variance) included items addressing personal efficacy in coping with the illness. Factor 4 (*personal strain*, 6.61% of observed variance) included items addressing negative impact of the illness on participants' daily living. Factor 5 (*collective efficacy*, 5.32% of observed variance) included items addressing coping efficacy through collaborating with family or friends. Factor 6 (*proxy efficacy*, 4.95% of observed variance) included items addressing coping efficacy through working with medical professionals.

Internal consistency

Alpha for Factor 1, 2, 3, 4, 5, and 6 were 0.89, 0.89, 0.76, 0.85, 0.75, and 0.83 respectively, while the mean interitem correlations were 0.57, 0.58, 0.39, 0.58, 0.33, and 0.42, respectively (Table 3). All item-to-total correlations exceeded or approached 0.50 (range=0.44–0.79).

Study 2

Participants

Of 305 eligible Hong Kong Chinese CRC patients attending the new-case clinics in QEH between July 2006 and March 2007, 263 (86%) were approached for participation, among which 234 (89%) were recruited within 12 weeks of histological diagnosis (mean=36 days, SD=18.70). Three months after giving fully informed consent, 215 participants were administered the CEES together with other measures via structured telephone interview. None of the demographic and medical characteristics differentiated the participants (n=215) from the dropouts (n=19). Characteristics of the participants are summarized in Table 1.

Factor structure

The six factors identified in study 1 were entered into two latent factors in a CFA model: experience and efficacy

(Fig. 1). Correlations of error covariances between items 9 and 10 (expected financial strains) and between items 18 and 19 (*personal efficacy*) were added to the model due to large MI and EPC. All fit indices and SRMR approached or exceeded cutoff criteria, indicating good data model fit [$\chi^2(df)=702.91(368)$; CFI=0.95; NNFI=0.94; IFI=0.95; SRMR=0.08]. All subscales were internally consistent ($\alpha=0.79$ –0.92; Table 4).

Concurrent validity

Correlations between CEES subscales and outcome variables indicated conceptual consistency between CEES and adjustment (Table 4). Physical symptom severity and psychological distress (HADS-A and HAD-D) were positively correlated with all *experience* subscales ($r=0.28$ –0.65) and inversely correlated with *personal* and *collective efficacy* subscales ($r=-0.52$ to -0.24). Subjective health was inversely correlated with *experience* subscales ($r=-0.42$ to -0.31) and positively correlated with *personal* and *collective efficacy* ($r=0.40$; 0.24). Psychological well-being (CAS-PA and SWLS) was correlated with all subscales in predicted directions ($r=-0.56$ to 0.50).

Convergent and divergent validity

Correlations of CEES scores with optimistic personalities (C-LOT-R and HS) and SRQS scores confirmed appropriate convergence and divergence (Table 4). Scores on optimistic personalities were uncorrelated or weakly correlated with *experience* subscales ($r\leq-0.22$) but were positively correlated with *personal efficacy* ($r=0.26$ –0.30) and *collective efficacy* ($r=0.28$ –0.43), except for the correlation with *emotional strain* ($r=-0.33$). SRQS subscale scores were uncorrelated with *experience* subscales but were moderately correlated with *collective efficacy* ($r=0.33$ –0.50); a modest correlation was observed between SRQS *friendships* and CEES *personal efficacy* ($r=0.22$).

Table 2 Exploratory factor analysis of the CEES (promax rotation)

Item	1	2	3	4	5	6	Item-to-total <i>r</i>
Socioeconomic strain							
5 My colon/rectal cancer causes much trouble in my close social partners' (e.g., family, friends) life	0.88	-0.07	0.03	-0.04	0.14	-0.09	0.74
6 My colon/rectal cancer makes me a burden for the life of my close social partners (e.g., family, friends)	0.78	-0.02	0.01	0.08	0.09	0.05	0.74
7 My colon/rectal cancer makes me unable to take care of my family and provide them with what they need	0.77	-0.09	0.00	0.15	0.02	0.04	0.76
9 My colon/rectal cancer makes my family and I experience actual hardships such as inadequate housing, food, or medical attention in the next few months	0.76	0.10	0.10	-0.10	-0.18	0.02	0.70
10 My colon/rectal cancer makes my family and I reduce our standard of living to the bare necessities of life in the next few months	0.68	0.05	0.05	-0.05	-0.13	0.05	0.65
8 My colon/rectal cancer hurts the feeling of those who are close to me (e.g., family, friends)	0.55	0.10	-0.20	0.10	0.10	-0.09	0.64
Emotional strain							
13 My colon/rectal cancer makes me feel angry	-0.07	0.79	-0.02	0.09	0.00	0.07	0.73
11 I get depressed when I think about my colon/rectal cancer	0.13	0.77	0.10	0.00	-0.05	-0.07	0.79
16 My colon/rectal cancer makes me feel afraid	-0.06	0.76	-0.02	0.01	0.05	-0.02	0.70
12 When I think about my colon/rectal cancer I get upset	0.15	0.74	0.08	-0.04	-0.10	-0.01	0.75
15 Having colon/rectal cancer makes me feel anxious	0.10	0.68	0.03	0.06	0.13	-0.02	0.70
14 My colon/rectal cancer does not worry me ^a	0.15	-0.68	0.02	-0.15	-0.01	0.01	0.59
Personal efficacy							
18 What I do can determine whether my colon/rectal cancer gets better or worse	0.03	0.01	0.78	0.03	-0.03	0.03	0.65
19 The course of my colon/rectal cancer depends on me	-0.11	0.04	0.72	0.01	-0.04	0.07	0.61
17 There is a lot which I can do to control the symptoms of my colon/rectal cancer	-0.06	0.05	0.58	0.12	0.05	0.14	0.51
20 I have the power to influence my colon/rectal cancer	0.04	0.13	0.55	-0.07	0.01	-0.16	0.46
21 What I do can determine whether the symptoms of my colon/rectal cancer get better or worse	0.21	-0.12	0.54	-0.17	0.05	-0.07	0.46
Personal strain							
4 My colon/rectal cancer causes much inconvenience to daily life	0.22	0.01	-0.07	0.71	-0.00	0.05	0.78
2 My colon/rectal cancer does not affect my life much ^a	0.09	-0.13	-0.07	-0.67	0.14	0.04	0.62
1 My colon/rectal cancer has major consequences on my life	-0.01	0.13	-0.06	0.66	0.12	-0.09	0.61
3 My colon/rectal cancer strongly affects my daily routine	0.29	-0.01	-0.01	0.62	-0.08	0.07	0.74
Collective efficacy							
24 Working together with my family and friends, I can solve many of the problems arising from my colon/rectal cancer	0.03	-0.13	-0.03	0.11	0.68	0.06	0.59
22 By joining with family and friends, I have a great deal of control over the problems arising from my colon/rectal cancer	-0.12	-0.11	0.19	0.18	0.66	-0.17	0.52
23 The course of my colon/rectal cancer in the future mostly depends on my being helped and supported by family and friends/colleagues	0.06	-0.09	0.13	-0.14	0.62	-0.01	0.58
25 My family are able to manage well with any problems I might have from my colon/rectal cancer for me	0.05	0.22	-0.17	-0.13	0.61	0.13	0.47
26 My friends/coworkers are able to overcome any problems I might have from my colon/rectal cancer for me	0.02	0.29	-0.03	-0.26	0.46	0.08	0.44
Proxy efficacy							
29 Doctors are able to solve any problems resulting from my colon/rectal cancer for me	0.06	-0.10	-0.04	-0.08	-0.03	0.71	0.53
28 By collaborating with my doctors/medical professionals, we can have more control over my colon/rectal cancer	-0.03	0.08	-0.05	-0.03	0.04	0.70	0.54
27 With the help of my doctors/medical professionals, I have more control over my colon/rectal cancer	-0.04	-0.04	0.19	0.10	0.15	0.51	0.47

r correlation^a Reverse coded

Table 3 Test of internal consistency and interfactor correlations of the CEES

Factor (α)	Mean interitem r	1	2	3	4	5	6
1 Socioeconomic strain (0.89)	0.57	–	0.54*	-0.15	0.60*	-0.10	-0.02
2 Emotional strain (0.89)	0.58		–	-0.07	0.48*	-0.10	-0.02
3 Personal efficacy (0.76)	0.39			–	-0.24**	0.29*	0.22**
4 Personal strain (0.85)	0.58				–	-0.24**	-0.08
5 Collective efficacy (0.75)	0.33					–	0.32*
6 Proxy efficacy (0.83)	0.43						–

r correlation

* $p < 0.001$; ** $p < 0.01$

Known group comparisons

Higher *personal*, *socioeconomic*, and *emotional strain* scores were reported by participants who were younger ($n=96$; $Z=-5.33$ to -2.06) or receiving adjuvant therapies ($n=131$; $Z=-3.81$ to -2.49); stoma patients reported higher *personal strain* ($n=61$; $Z=-3.12$). Lower scores on *collective efficacy* were noted among participants receiving adjuvant therapies ($Z=-2.16$) or wearing a stoma ($Z=-2.25$).

Discussion

Based upon the above analyses, I conclude that the CEES addresses intrapersonal and interpersonal dimensions of adjustment in Chinese CRC patients. The three experience subscales

measure perceived strain on patients (*personal strain*; *emotional strain*) and their significant others (*socioeconomic strain*); the three efficacy subscales measure perceived coping efficacy on individual basis (*personal efficacy*) and through collaborating with family and friends (*collective efficacy*) and with medical professionals (*proxy efficacy*). Good internal consistency was demonstrated in all CEES subscales ($\alpha \geq 0.75$). Significant correlations with symptom distress, psychological morbidity (HADS), and subjective well-being were consistent with the CEES having good concurrent validity. Appropriate correlations of the CEES subscales with optimistic personalities and relational quality suggested good convergent and divergent validity. Clinical utility was indicated in higher experience and lower efficacy subscale scores reported by participants who were younger (<67 years), receiving adjuvant therapies, or wearing a stoma. This study

Fig. 1 Standardized coefficients for the confirmatory factor analysis of CEES

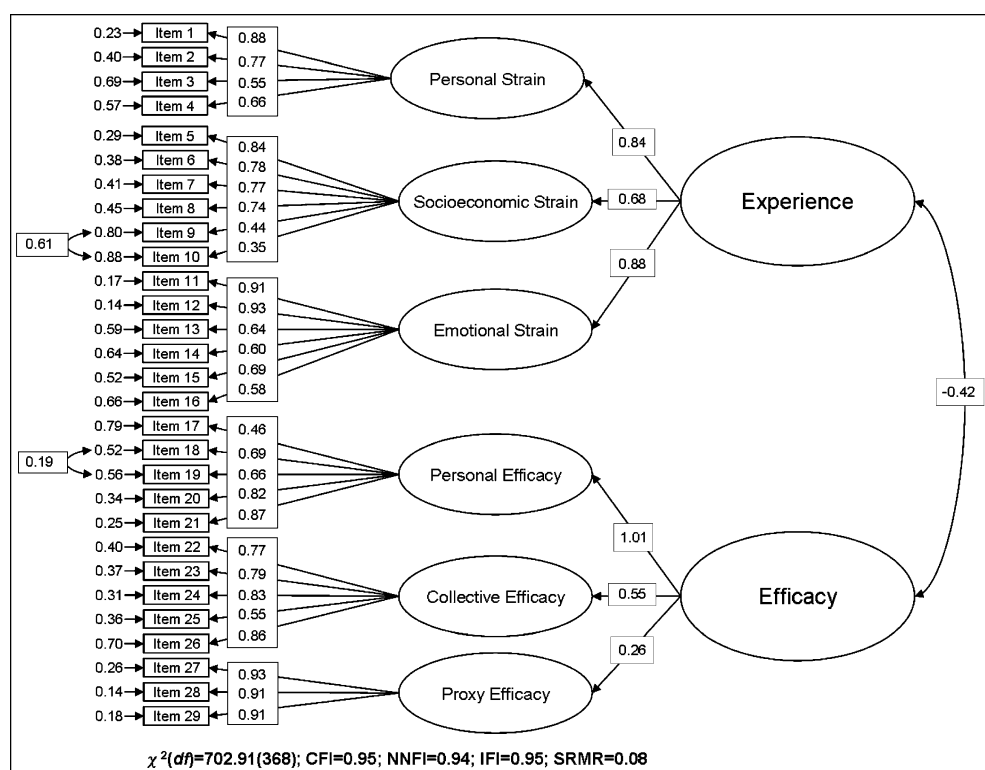


Table 4 Correlation matrix of psychosocial variables with the CEES subscales ($n=215$)

Variable (range)	α	Mean (SD)	CEES—experience			CEES—efficacy		
			Personal strain	Socioeconomic strain	Emotional strain	Personal efficacy	Collective efficacy	Proxy efficacy
Physical symptoms (0–27)	0.87	3.84 (3.63)	0.28*	0.35*	0.38*	−0.32*	−0.24*	−0.07
Anxiety (0–21)	0.89	4.35 (4.91)	0.52*	0.45*	0.62*	−0.35*	−0.30*	−0.05
Depression (0–21)	0.87	5.73 (5.19)	0.54*	0.50*	0.65*	−0.52*	−0.44*	−0.20**
Subjective health (1–4)	–	1.99 (0.58)	−0.33*	−0.31*	−0.42*	0.40*	0.24*	0.05
Positive affect (0–40)	0.92	21.86 (9.54)	−0.45*	−0.44*	−0.56*	0.49*	0.50*	0.19**
Life satisfaction (5–20)	0.88	13.06 (3.72)	−0.50*	−0.44*	−0.47*	0.39*	0.44*	0.08
Optimism (0–24)	0.76	16.68 (3.27)	−0.22**	−0.10	−0.33*	0.26*	0.28*	0.02
Hope (0–32)	0.84	23.31 (4.52)	−0.13	−0.13	−0.20**	0.30*	0.43*	0.12
Family Intimacy (7–28)	0.78	22.99 (3.63)	−0.09	0.07	0.01	0.10	0.41***	−0.01
Family Commitment (5–20)	0.78	17.29 (2.46)	−0.07	0.07	−0.11	0.13	0.50*	0.10
Friendships (5–20)	0.84	13.58 (3.68)	−0.03	0.05	−0.04	0.22**	0.33*	0.04
CEES								
Personal strain (4–20)	0.79	13.26 (4.53)	–	0.52*	0.58*	−0.22**	−0.15*	0.11
Socioeconomic strain (6–30)	0.81	15.25 (5.95)		–	0.53*	−0.28*	0.04	−0.10
Emotional strain (6–30)	0.87	17.36 (6.99)			–	−0.35*	−0.16***	−0.06
Personal efficacy (5–25)	0.83	17.18 (4.04)				–	0.47*	0.19**
Collective efficacy (5–25)	0.85	16.27 (5.25)					–	0.17***
Proxy efficacy (3–15)	0.92	12.49 (2.65)						–

SD standard deviation

* $p < 0.001$; ** $p < 0.01$; *** $p < 0.05$

adds to the current literature by providing a psychometric instrument for assessing both self-referent and interpersonal dimensions of cancer perception among patients with an Asian sociocultural background.

Our findings also suggest differential roles for perceived cancer-related strain and efficacy in psychological adjustment to cancer. Previous studies have shown that cognitive coping strategies like positive reinterpretations and fatalistic thoughts mediate the benefit of dispositional positive thinking [7, 39] and perceived social support [12] on cancer patients; collective as well as personal mastery has been found to predict lower perceived stress and psychological morbidity among East Asians [34] and Native Americans [13], whose populations emphasize interdependence among close social partners. However, none addressed the role of cancer-specific perceptions in the association between psychosocial resources and adaptation. In this study, Chinese CRC patients reporting higher personal and collective efficacy in coping with cancer were more optimistic [18, 22] and had better social relational quality [16] and adjustment outcomes, suggesting a mediational role for efficacy beliefs between psychosocial resources and adjustment. Collective efficacy might mediate specifically the positive impact of social relational quality on psychological well-being. In contrast, a signif-

icant association of personal and socioeconomic strain with decreased psychological well-being but not with the personality and social relational traits demonstrates that perceived strain impacts upon psychological well-being irrespective of preexisting psychosocial resources.

The weak relationship between proxy efficacy and other psychosocial variables might reveal cultural variations in medical experience. Asian patients regard their relationships with doctors to be social and cast unquestioning trust in them; the assumed social contract is that doctors should provide services in a caring manner [9]. A recent study found that medical professionals' emotional support but not treatment-related support predict QoL in Chinese lung and liver cancer patients [44]. CEES *proxy efficacy* subscale possibly assessed a problem-focused dimension with little relevance to Chinese CRC patients' psychological adjustment.

Limitations and conclusions

A number of methodological points warrant discussion. The focus of CEES was derived from people formerly treated for CRC, many of whom faced rectal cancer. The instrument thus should be most sensitive in this population. Also, the CEES was developed and validated in samples of Chinese CRC patients; in particular, the participants in study 2 were a

convenience sample of CRC patients from one tertiary clinic (QEH) in Hong Kong, restricting generalizability of the findings to other Chinese or Asian populations. Furthermore, cross-sectional design precludes examination of test–retest reliability of the CEES, while the measures of physical functioning were not formal instruments, so some caution is needed in interpreting the findings.

Notwithstanding these limitations, this study contributes to advancing psycho-oncological research in Chinese populations. Instruments have been validated for assessing physical and psychological symptomatology and QoL in Chinese CRC patients (e.g., [23]). However, very little is known on the psychosocial correlates of adjustment among these people. The CEES could be used to reveal specific adaptation needs of these patients in addition to existing QoL instruments. For example, socioeconomic strain impacts patients' psychological well-being independent of coping resources and thus should be assessed and managed by appropriate counseling services. The findings on collective sense of mastery also inform psychosocial interventions for Chinese cancer populations. Future intervention programs could aim at empowering both patients and their family and friends to actively participate in symptom or treatment self-care management. Such programs could enhance collective mastery of Chinese CRC patients, predictive in turn of more sustained and successful coping and positive adjustment outcomes.

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