



# Unmet Supportive Care Needs and Associated Factors: a Cross-sectional Survey of Chinese Cancer Survivors

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## Abstract

To assess cancer survivors' unmet supportive care needs and associated factors. Limited evidence is available about the supportive care needs of Chinese cancer survivors to inform future service planning. A cross-sectional survey was conducted (STROBE cross-sectional checklist used for report). Standardized questionnaires were administered to 364 cancer survivors. Using the Supportive Care Framework as conceptual framework, factors concerning individuals' cognitive appraisals of their situation and social resources were examined to explore their association with unmet supportive care needs. The most common unmet supportive care needs included concern about the cancer coming back (51.5%), the need for up-to-date information (49.3%), collaborative management with the medical team (48.8%), and financial support (48.8%). Factors associated with greater strength of unmet supportive care needs included being female, having higher personal support, and higher self-efficacy pertaining to social relationship. Having lower support from family and friends was a contributing factor associated with greater strength of unmet needs in comprehensive cancer care and relationship, as was lower self-efficacy pertaining to uncertainty management associated with greater strength of unmet needs in quality of life, and lower self-efficacy pertaining to health professional interaction associated with greater strength of unmet needs in information. Chinese cancer survivors experience a number of unmet supportive needs. Female and rural cancer survivors, and those with lower social support level and self-efficacy are susceptible to having higher levels of unmet supportive care needs. Consistent information provision and peer support system establishment are two potentially beneficial approaches to meet cancer patients' long-term supportive care needs. Females and rural cancer survivors, those with less support from family and friends, and those with lower self-efficacy in interactions with health professionals and in managing uncertainty are especially at risk for unmet supportive care needs.

What does this paper contribute to the wider global clinical community?

- This study found that “fear of cancer recurrence,” “up-to-date understandable information,” “financial concerns,” “peer support” and “to manage health together with the medical team” are significant unmet needs across different stages of cancer survivorship.
- Cancer patients living in rural areas may have higher unmet needs in the quality of life domain compared with metropolitan counterparts; female cancer survivors reported higher levels of unmet needs in the existential survivorship and comprehensive care than male survivors.
- Cancer survivors with higher social support from family and friends, and lower levels of personal support is associated with lower unmet supportive care needs in comprehensive care and relationships domains.
- Cancer survivors with lower self-efficacy in their interactions with health professionals reported higher unmet needs in the information domains. In addition, lower self-efficacy in uncertainty management was associated with higher unmet supportive care needs in quality of life.

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## Introduction

Cancer places a tremendous burden on the health care system in China [1]. As a country with a large land mass and population, implementation of an effective and sustainable cancer care system is challenging. The cancer care system in China is thus experiencing high demand within a context of restricted resources to meet this demand [2]. In recent times, more attention has been given in the Chinese health care system to ensure access to evidence-based anti-cancer treatment. However, less attention has been given to supportive cancer care, despite it being recognized as an essential component of cancer care for patients at all stages of disease [3].

The “Health China 2030” blueprint advocates for a shift in the concept of health care from treatment of disease to health promotion and management including self-management [4], and a sustainable health service system from treatment to rehabilitation and long-term care [5]. This shift in focus provides an opportunity to facilitate the development of a more comprehensive care system for people with cancer. Data will be essential to inform policy makers and health service managers to make targeted plans in this important area of health care.

## Background

Despite the urgent need for data to inform new models for delivery cancer services, there is limited evidence about the supportive care needs of Chinese cancer patients to inform future service planning. One recent study reported on the top unmet needs of cancer patients as part of a multi-country mapping survey [6]. The study identified that Chinese cancer survivors had a high level of unmet needs compared with Australian and Japanese counterparts, and that unmet needs varied among different cancer diagnostic groups [6]. This multi-national study highlighted an important gap in cancer supportive care services across many Asian countries. Similarly, another qualitative study of 31 Chinese cervical cancer survivors who had recently completed primary cancer treatment identified patients had unmet supportive care needs relating to symptom information, counseling and rehabilitation services, and peer support networks [7].

There is little available information about the factors associated with higher levels of unmet needs among Chinese cancer patients. One cross-cultural comparison study found that German women were more affected by psychological and physical needs, while Chinese women were more concerned with information about disease and treatment [8]. Furthermore,

a range of studies have identified that cancer patients’ unmet needs across a variety of countries vary according to time since diagnosis [9], time since treatment [10], symptom burden and age [11], education achievement [10], and marital and financial status [12]. Additionally, few studies have examined the influence of psychosocial factors on unmet needs among Chinese patients. For example, self-efficacy, or one’s beliefs about their capabilities to accomplish the desired level of performance, has been identified as an important factor influencing cancer patients’ health behavior [13], quality of life [14], perceived control over cancer [15], and information needs [16]. Such associations have not been explored in depth in Chinese cancer patients.

Given the gaps in the literature concerning the needs of Chinese cancer survivors, this study aimed to provide a comprehensive analysis of Chinese cancer survivors’ unmet supportive care needs and to identify factors associated with these needs. Specifically, this study investigated the influence of the person’s self-efficacy and their available social and environmental resources on supportive care needs [17].

## Conceptual Framework

This study is informed by the Supportive Care Framework for Cancer Care developed by Margaret Fitch [18]. This framework draws upon the constructs of human needs, cognitive appraisal, coping, and adaptation [18]. According to this framework, supportive care needs are conceptualized as comprising physical, psychological, emotional, practical, informational, spiritual, and social elements. Additionally, the framework proposes that such supportive care needs are influenced by the individuals’ cognitive appraisal of the situation and social and environmental resources. As such, these influencing factors are operationalized in the present study by inclusion of measures of an individuals’ appraisal of their self-efficacy, as well as their appraisal of the social and environmental resources available to them.

## Methods

### Design

It is a cross-sectional survey of patients who have completed primary cancer treatment in China. We used the Strengthening the Reporting of Observational studies in Epidemiology (STROBE) cross-sectional checklist when writing our report (see Supplementary File 1).

## Procedure and Participants

The study was carried out in accordance with the Declaration of Helsinki and approved by the ethics committee of the Hangzhou Normal University (2017-012). Cancer survivors were recruited from three cancer survivor rehabilitation associations in Zhejiang Province, China, from April 2017 to September 2017. Recruitment plans were discussed with the head of the cancer survivor rehabilitation associations and disseminated to their members. Cancer survivors were eligible if they were greater than or equal to 18 years old, with a definitive cancer diagnosis, and had completed first-line treatment, irrespective of time post-diagnosis. Those who agreed to take part in the survey were invited to a transient data collection site in cancer survivor rehabilitation center. Pencil-to-paper questionnaire was administered. For those with difficulty in reading the questionnaire, a researcher-administered approach was used. To elicit true answers from participants, researchers collecting data were trained to have uniform explanation of items of questionnaires, and participants were provided with water and food to enable adequate time for completion of the survey. Written informed consent was obtained from all participants.

To enable multivariable analysis, sample size calculations were based on the formula  $N \geq 50 + 8m$  ( $m$  indicates the number of independent variables), providing an  $\alpha \leq 0.05$ , power  $\geq 0.80$ , and a medium effect size [19]. Using this formula, a total of 346 participants were needed to allow 37 main independent variables to be included in the analysis.

## Survey Questionnaires

Sociodemographic items included age, gender, education level, marital status, religious belief, residential location, work category, and current work status. Medical information collected included the location of cancer, time since diagnosis, treatment type, and the length of treatment.

### Chinese Version of the Cancer Survivors Unmet Needs measure

The primary outcome of this study was supportive care needs. The Cancer Survivors Unmet Needs measure (CaSUN) measures unmet needs and the strength of unmet needs of cancer survivors in the domains of information, existential survivorship, comprehensive cancer care, quality of life, relationship and other practical issues, such as financial support, parking and legal support [20]. The Chinese version of CaSUN has been reported to have good reliability and validity (Cronbach's  $\alpha = 0.93$ ) [21]. It has 35 items, with five response options (no need or is not applicable, have need but need is being met, and unmet need with three levels of strength, i.e., weak, moderate, strong). The CaSUN responses are reported

as individual items of unmet need (score unmet need with weak, moderate, and strong response as 1 and other responses as 0) and strength of need (score unmet need with weak, moderate, and strong response as 1, 2, 3 respectively, other responses as 0). Domains of strength of needs are also reported by summing all items in the domain and calculating the average value of items in that domain.

### The Chronic Illness Resource Survey

The Chronic Illness Resource Survey (CIRS) was included in this survey to measure an individual's appraisal of social and environmental resources, as potential influences on unmet needs. The CIRS was developed from a multilevel "pyramid" model of social-environmental support (including support from health care, family and friends, personal, neighborhood, media and policy, organizational, and work or volunteer), which was reported with good predictive abilities for chronic illness self-management [22]. The Chinese version of the CIRS scale has good reliability (Cronbach's  $\alpha = 0.90$ ) and validity [23].

### Cancer Self-management Self-efficacy Scale

The "Assessment of Self-Efficacy in Managing Cancer Experiences" developed by Campbell and colleagues [24] was included in this study to assess the individual's appraisal of their ability to manage their cancer. The tool was translated into Chinese and modified in a previous study (Cronbach's  $\alpha = 0.97$ ) [25]. One limitation of the instrument was that it was rated as long and complex to be completed by participants. As such, a short form of the instrument was developed for the present study based on the initial Chinese study [25] using an item reduction approach conducted by a statistician. Firstly, items with correlation coefficients more than 0.5 with more than two dimensions were analyzed. If the deletion of the item resulted in minor change in the cumulative sums of squared loadings, the item was removed in the short form. Secondly, item correlation coefficients were calculated. For those coefficients larger than 0.60, items were removed one by one to compare change in the cumulative sums of squared loadings in factor analysis. The removal of item which resulted in a larger reduction of cumulative sums of squared loadings was retained. Thirdly, items with low factor loadings ( $<0.60$ ) were also analyzed for removal. As a result, a total of 19 items were retained in the short form. The short-form tool (Cronbach's  $\alpha = 0.79$ ) contained five dimensions, including maintaining social relationship (5 items), uncertainty management (2 items), health professional interaction management (4 items), maintaining independence and social functions (3 items), emotional management (5 items). Confirmatory factor analysis demonstrated good model fit with five domains (the Root Mean Square of Approximation

(RMSEA) 0.034, the Goodness of Fit Index (GFI) 0.965, the Normed Fit Index (NFI) 0.892, Tucker-Lewis Index (TLI) 0.940, Comparative Fit Index (CFI) 0.963, Ratio of chi-square to df 1.413).

## Data Analysis

All data analysis was conducted with Statistical Package for the Social Sciences (SPSS, IBM) version 23.0. Descriptive analyses were conducted for all demographic and clinical variables. The ranking of unmet needs was calculated by determining the percentage of unmet needs for each item. Mean strength of need was calculated for each domain. Using the strength of needs for different domains as dependent variables, simple regressions were conducted using bivariate analysis for the selection of demographic, clinical, subscales of the self-efficacy, and CIRS measures to be included for multiple regression. Those independent variables with  $p < 0.2$  [26] and those considered to be of clinical significance based on prior hypotheses derived from the literature were selected for the step-forward multivariable regression model.

## Results

### Sample Characteristics

A total of 380 potentially eligible participants were approached, and 2 patients refused to be part of study for the reason of old age (> 80 years old). For those completed surveys, 14 questionnaires were identified with substantial missing data. A number of 364 participants were included in the study. Their age ranged from 32 to 83 years. Nearly two-thirds (62.4%) were female, most of them (83.3%) were below high school education level, more than half (59.3%) lived in a rural area, and a large proportion (86.0%) were not currently working. The most commonly reported cancer type was breast cancer (26.1%), followed by lung cancer (17.9%), stomach cancer (9.6%), cervical cancer (7.4%), and rectal cancer (7.1%). Nearly two thirds (63.7%) of participants were diagnosed with cancer more than 5 years ago. The vast majority of participants (89.6%) had surgery, most (69.5%) had chemotherapy, and some (40.4%) reported using traditional Chinese medicine (TCM) (see Table 1).

### Cancer Self-management Self-efficacy and CIRS Scales

Cancer survivors in the current study demonstrated highest self-efficacy in maintaining social relationships, followed by uncertainty management and emotional management, with lowest levels of self-efficacy in maintaining independence

and social function (See Table 2). In regard to social and environmental resources, cancer survivors reported highest scores in the subscale physicians and health care, followed by subscales personal, media and policy, and family and friends, with the latter two having quite similar mean values (See Table 2).

### Strength of Unmet Supportive Needs by Domains

The mean strength of unmet needs was highest in the comprehensive cancer care domain, followed by the information, quality of life, and existential survivorship domains, with the relationship domain ranked as lowest level (see Table 2). The strength of unmet needs varied across time from the cancer diagnosis. Cancer survivors reported peak unmet needs during the period of 3–5 years after a cancer diagnosis in the domain of information, comprehensive cancer care and quality of life, and then a gradual decline afterwards. The strength of unmet needs in existential survivorship (impact of cancer on life perspective) and relationship decreased over time. After 15 years, an increase in the strength of unmet needs was seen in the domains of information and existential survivorship (see Fig. 1).

### Unmet Supportive Care Needs

The most common unmet supportive care needs included “concern about the cancer coming back,” reported by more than half of the participants (51.5%), followed by “the need for up-to-date information” (49.3%), the need “to manage health together with the medical team” (48.8%), “the need for financial support” (48.8%), and the need “to talk to other cancer patients” (48.5%). Analyses were conducted to identify how unmet needs varied over time. The top four unmet supportive care needs were consistently reported as among the top five unmet needs across all time periods. However, the ranking order for various unmet needs varied over time. For example, for those 3–5 year after diagnosis the highest unmet need was “Concerns about the cancer coming back,” while for those who were diagnosed less than 3 years ago, the need for “understandable information,” “managing health together with medical team” and “doctors talk to each other to coordinate care” were ranked as the top unmet needs. Moreover, the need to “talk to others” was ranked as the top unmet needs in the period 10 years after diagnosis (see Table 3).

### Predictors of the Strength of Unmet Supportive Care Needs

Five stepwise regressions were performed to identify factors significantly associated with the strength of unmet supportive care needs for five domains (see Table 4). For unmet

**Table 1** Sociodemographic and disease characteristics of the study sample ( $N = 364$ )

Variable	Types	Frequency (percentage)
Age	M $\pm$ SD (62.62 $\pm$ 8.81) (range 32–83)	
Gender	Female	227 (62.4)
	Male	136 (37.4)
	Missing	1 (0.2%)
Education Background	No official attendance at school	44 (12.1)
	Primary school	143 (39.3)
	Junior high school	116 (31.9)
	Senior high school	51 (14.0)
	College and higher	7 (1.9)
	Missing	3 (0.8)
	Single	2 (0.5)
Marriage status	Married	320 (87.9)
	Divorced	10 (2.7)
	Widowed	26 (7.1)
	Missing	6 (1.7)
	Buddhism	106 (29.1)
Religious belief	Christian	27 (7.4)
	No religion	224 (62.9)
	Other	2 (0.6)
	Rural area	216 (59.3)
Place of residence	Town	98 (26.9)
	City	45 (12.4)
	Missing	5 (1.4)
Work type	Farmers	212 (58.2)
	Public institute employee	40 (11.0)
	Company employee	28 (7.7)
	Freelancers	33 (9.1)
	Businessman	7 (1.9)
	Others	44 (12.1)
	Not working	313 (86.0)
Work status	Working full time	28 (7.7)
	Sick leave	12 (3.7)
	Reduced work time	11 (3.4)
	Breast	95 (26.1)
Cancer type	Lung	65 (17.9)
	Stomach	35 (9.6)
	Cervical	27 (7.4)
	Rectum	26 (7.1)
	Colon	17 (4.7)
	Multiple primary	15 (4.1)
	Liver	14 (3.8)
	Nasopharyngeal	14 (3.8)
	Esophagus	9 (2.5)
	Thyroid	7 (1.9)
	Lymphoma	7 (1.9)
	Ovarian	5 (1.4)
	Pancreatic	5 (1.4)
	Other	22 (6.0)
	Time since diagnosis	$\leq 1$ year
$> 1, \leq 3$ years		43 (11.8)
$> 3, \leq 5$ years		70 (19.2)
$> 5, \leq 10$ years		125 (34.3)
$> 10, \leq 15$ years		68 (18.7)
$> 15$ years		39 (10.7)
Missing		6 (1.6)
Treatment received	Surgery	326 (89.6)
	Chemotherapy	253 (69.5)
	Radiotherapy	106 (29.1)
	Targeted therapy	19 (5.2)
	TCM use	147 (40.4)
	Radiofrequency ablation	8 (2.2)
	Cryoablation	2 (0.5)

TCM traditional Chinese medicine

**Table 2** Unmet supportive care needs domain score, social support, and self-efficacy scores

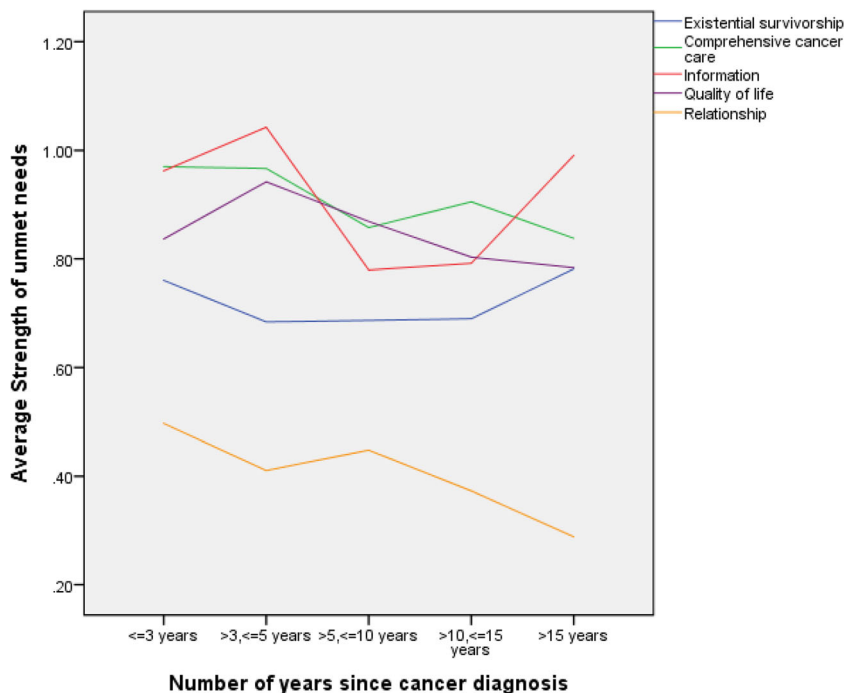
Subscales	Cronbach $\alpha$	Mean $\pm$ std. (range)
CaSUN <sup>†</sup>	0.934	
Existential survivorship	0.877	0.70 $\pm$ 0.68 (0–2.79)
Comprehensive cancer care	0.764	0.89 $\pm$ 0.84 (0–3.00)
Information	0.797	0.88 $\pm$ 0.88 (0–3.00)
Quality of life	0.722	0.85 $\pm$ 0.96 (0–3.00)
Relationship	0.669	0.41 $\pm$ 0.64 (0–3.00)
Chronic illness resource survey <sup>‡</sup>		
Physician and health care team	0.89	2.97 $\pm$ 1.71 (1–5)
Family and friends	0.64	2.62 $\pm$ 0.99 (1–5)
Personal actions	0.76	2.77 $\pm$ 1.03 (1–5)
Combined neighborhood/community	0.78	2.51 $\pm$ 0.97 (1–5)
Media and policy	0.64	2.64 $\pm$ 0.91 (1–5)
Community organizations	0.52	2.07 $\pm$ 0.97 (1–5)
Workplace		Median 0 (0–5)
Cancer self-management self-efficacy scale <sup>§</sup>		
Maintain social relationship	0.69	1.68 $\pm$ 1.18 (0–5)
Uncertainty management	0.51	1.38 $\pm$ 1.42 (0–5)
Emotional management	0.60	1.21 $\pm$ 0.98 (0–5)
Health professional interaction management	0.52	1.16 $\pm$ 1.09 (0–5)
Maintain independence and social function	0.56	Median 0.80 (0–5)
Physician and health care team	0.89	2.97 $\pm$ 1.71 (1–5)

<sup>†</sup> No need, 1 weak need, 2 moderate need, 3 strong need; <sup>‡</sup> 1 not at all, 5 very much; <sup>§</sup> 0 not applicable, 1 low self-efficacy, 5 high self-efficacy

supportive care needs in relation to existential survivorship, female cancer survivors ( $\beta = -0.17$ , 95% CI  $-5.78, -0.84$ ,  $p = 0.009$ ) and those with higher social relationship maintenance self-efficacy ( $\beta = 0.27$ , 95% CI  $1.20, 3.35$ ,  $p = 0.000$ )

reported higher strength of unmet supportive care needs compared with male cancer survivors and those with lower social relationship maintenance self-efficacy respectively. The model explained a total of 9.8% of the variance.

**Fig. 1** Average strength of unmet supportive care needs by time since cancer diagnosis



**Table 3** The rank and percentage of participants reporting unmet supportive care needs by time since diagnosis (in italics)

Overall rank ( <i>N</i> = 354) Rank (%)	Items	< 3 years ( <i>n</i> = 53) Rank (%)	3–5 years ( <i>n</i> = 70) Rank (%)	5–10 years ( <i>n</i> = 125) Rank (%)	> 10 years ( <i>n</i> = 107) Rank (%)
1 (51.5%)	19. I need help managing my concern about the cancer coming back	2 (55.4%)	1 (65.7%)	3 (46.4%)	3 (48.6%)
2 (49.3%)	1. I need up-to-date information	2 (55.4%)	2 (64.3%)	5 (44%)	4 (45.8%)
3 (48.8%)	6. I need to feel like I am managing my health together with the medical team	1 (57.1%)	3 (60%)	4 (44.8%)	4 (45.8%)
3 (48.8%)	15. I need help to find out about financial support and/or government benefits to which I am entitled	3 (53.6%)	5 (55.7%)	2 (47.2%)	5 (44.9%)
4 (48.5%)	24. I need to talk to others who have experienced cancer	4 (50%)	4 (58.6%)	6 (42.4%)	1 (53.3%)
5 (48.0%)	3. I need information provided in a way I can understand	1 (57.1%)	6 (52.9%)	5 (44%)	3 (48.6%)
6 (47.4%)	5. I need local health services that are available when I require them	4 (50%)	8 (51.4%)	5 (44%)	2 (51.4%)
7 (46.6%)	7. I need to know that all my doctors talk to each other to coordinate my care	1 (57.1%)	7 (52.9%)	5 (44%)	6 (43.0%)
8 (45.5%)	4. I need the very best medical care	5 (46.4%)	10 (48.6%)	1 (48.8%)	6 (43.0%)
8 (45.5%)	12. I need help to adjust to changes in my quality of life as a result of my cancer	5 (46.4%)	7 (52.9%)	3 (46.4%)	7(42.1%)
9 (39.6%)	10. I need help to reduce stress in my life	7 (42.9%)	9 (50.0%)	9 (36.0%)	9 (37.4%)
10 (36.0%)	28. I need an ongoing case manager to whom I can go to find out about services whenever they are needed	6 (44.6%)	15 (37.1%)	11 (33.6%)	11 (34.6%)

For the comprehensive cancer care needs domain, female cancer survivors ( $\beta = -0.21$ , 95% CI  $-3.30, -0.68$ ,  $p = 0.003$ ), and those with higher levels of personal support ( $\beta = 0.28$ , 95% CI  $0.54, 2.11$ ,  $p = 0.001$ ), social relationship

maintenance self-efficacy ( $\beta = 0.28$ , 95% CI  $0.62, 1.86$ ,  $p = 0.000$ ), and lower support from family and friends ( $\beta = -0.15$ , 95% CI  $-1.45, 0.077$ ,  $p = 0.003$ ) had higher strength of unmet needs compared with relevant comparison groups. These

**Table 4** Results of stepwise regression analyses predicting the variances in the strength of unmet supportive care needs by various domains

Model	Standardized beta	95%CI	<i>P</i> value	<i>R</i> <sup>2</sup>
Existential survivorship needs				0.098
Maintain social role self-efficacy	0.27	1.20, 3.35	0.000	
Gender (Male VS Female)	-0.17	-5.78, -0.84	0.009	
Comprehensive cancer care needs				0.256
Gender (male VS female)	-0.21	-3.30, -0.68	0.003	
Job type (public institution employee VS Farmer)	0.21	1.18, 5.27	0.002	
Cancer type (colon VS other cancer)	0.21	1.89, 8.90	0.003	
Personal support	0.28	0.54, 2.11	0.001	
Family and friends support	-0.15	-1.45, 0.07	0.077	
Maintain social relationship self-efficacy	0.28	0.62, 1.86	0.000	
Information needs				0.067
Health professional support	0.17	0.11, 0.67	0.007	
Maintain social relationship self-efficacy	0.22	0.19, 0.86	0.002	
Health professional interaction self-efficacy	-0.16	-0.75, -0.06	0.023	
Quality of life				0.066
Residential place (town VS rural area)	-0.12	-1.03, 0.04	0.07	
Working status (working VS not working)	-0.12	-1.14, 0.04	0.07	
Maintain social relationship self-efficacy	0.23	0.15, 0.63	0.001	
Uncertainty management self-efficacy	-0.17	-0.44, -0.05	0.013	
Relationship				0.101
Job type (company employee VS Farmer)	-0.17	-1.96, -0.28	0.009	
Cancer type (colon cancer VS other cancer)	0.12	-0.12, 2.52	0.075	
Family and friends support	-0.19	-0.65, -0.05	0.025	
Personal support	0.22	0.09, 0.69	0.012	
Maintain social relationship self-efficacy	0.18	0.07, 0.51	0.012	

The category after VS is the reference category

variables explained 25.6% of the variance in unmet comprehensive cancer care needs.

In the information needs domain, cancer survivors with higher levels of social relationship maintenance self-efficacy ( $\beta = 0.22$ , 95% CI 0.19, 0.86,  $p = 0.002$ ), and lower levels of health professional interaction self-efficacy ( $\beta = -0.16$ , 95% CI  $-0.75$ ,  $-0.06$ ,  $p = 0.023$ ) reported higher strength of unmet information needs, with 6.6% variance were explained by this model.

For the quality of life domain, cancer survivors with higher social relationship maintenance self-efficacy ( $\beta = 0.23$ , 95% CI 0.15, 0.63,  $p = 0.001$ ), and lower uncertainty management self-efficacy ( $\beta = -0.17$ , 95% CI  $-0.44$ ,  $-0.05$ ,  $p = 0.013$ ) had higher unmet needs compared with associated comparison groups. Compared with those living in rural area, cancer survivors living in cities also reported lower strength of unmet needs in quality of life ( $\beta = -0.12$ , 95% CI  $-1.03$ , 0.04,  $p = 0.07$ ).

For the relationship domain, cancer survivors with fewer supports from family and friends ( $\beta = -0.19$ , 95% CI  $-0.65$ ,  $-0.05$ ,  $p = 0.025$ ), more personal support ( $\beta = 0.22$ , 95% CI 0.09, 0.69,  $p = 0.012$ ) and higher social relationship maintenance self-efficacy ( $\beta = 0.18$ , 95% CI 0.07, 0.51,  $p = 0.012$ ) had higher strength of unmet needs compared with associated comparison groups.

## Discussion

### Unmet Supportive Care Needs

Our study demonstrated that “concerns about the cancer coming back” was the top unmet supportive care need overall, which is consistent with a previous study mapping unmet supportive care needs across the Asia-Pacific region [6]. Consistent with Miller’s finding [27], cancer survivors often regard 5 years as a critical mark, often feeling much more fearful about recurrence before this time point. Furthermore, our study confirms that the fear of recurrence remained the third highest unmet supportive care needs even 5 years after diagnosis, contributing to cancer survivors’ sense of uncertainty. Acquiring up-to-date information and understandable information were reported in top five unmet needs by cancer survivors across all stages of cancer. As reported by Lim et al. [28], our data confirm that providing cancer-specific information on treatment and prognosis, as well as on the appropriateness of food intake and complementary medicine are highly desired by Chinese cancer patients.

Our study highlights that cancer survivors have unmet needs for peer support throughout cancer survivorship, especially in the long term. The need to “talk to

other cancer survivors” was reported as the fourth highest unmet needs in the period of “< 5 years” and the highest unmet needs “from 10 years onward after a cancer diagnosis.” Consistent with the literature, peer survivors are an important source for emotional support by Chinese breast cancer survivors [29]. Moreover, studies indicate female cancer survivors in particular could benefit more from peer support in addition to support from family members [30]. This is because peer cancer survivors can serve as role models to promote hope [31], and also extend the supportive network [32]. Chinese culture often emphasizes the importance of family-oriented support. Our findings are important, as they indicate that peer support also plays a role in supportive care for some Chinese cancer patients. Cancer support systems and non-profit cancer support organizations are not yet well established across China [31]. It is important that peer support programs be integrated into future developments.

Cancer survivors less than 15 years since diagnosis consistently reported unmet needs for financial support. Cancer is one of the diseases that is covered by China’s major disease medical insurance scheme, which aims to cover 50%–90% of patients’ medical costs [33]. Despite this coverage, expensive imaging, examinations, and drugs are not always covered by this scheme. For example, for anti-cancer drugs, only those that are in the National Reimbursement Drug List (NRDL) are covered by insurance [34]. There is often a time gap between the introduction of new but more effective drugs and the inclusion of these drugs in the NRDL. For instance, Trastuzumab was only introduced into the drug list in 2017, nearly 20 years after its introduction in the United States. Many cancer patients have to pay the full price out-of-pocket for these expensive drugs. In addition, cancer survivors commonly reported the use of TCM and other nourishment supplements, which are not covered by health insurance. In contrast to cancer survivors in Western countries who often value returning to work, studies report that Chinese cancer survivors tend to consider the continuation of work and household load exhausting and as a potential impediment to recovery [29]. As a result, many cancer survivors choose to live for the moment and reduce or leave usual work, which further reduces income.

Similar patterns of unmet need were reported in the need “to manage health together with the medical team,” which was consistently identified to be an important issue. When cancer patients are discharged from the hospital, supportive care systems are not yet well established in the community for Chinese patients. For example, while it is common for cancer survivors to use TCM, such as herbs to promote health and relieve some symptoms [35], many Chinese oncologists are reluctant to discuss these due to insufficient knowledge [36].



## Factors Associated with the Strength of Unmet Supportive Care Needs

Female cancer survivors reported higher levels of unmet needs in the existential survivorship and comprehensive care than male survivors. This finding is consistent with Burg's investigation [37] and an Iranian sample [38], both of which reported that female cancer survivors have more unmet needs. This higher level of unmet need among female survivors highlights the importance of considering gender-specific styles of expression of need and the need for tailored supportive care strategies.

The current study also identified that cancer survivors who live in rural areas have higher unmet needs in the quality of life domain. Relative to cancer survivors living in town and big cities, those residing in rural areas had less exposure to modern technology and social activities. Furthermore, the fragmentation of health insurance schemes between rural and urban areas in China is an obstacle to equal access to health care resource [39], and there is higher mortality from cancer in rural populations compared with that of the urban population [40]. Such findings reflect challenges faced in China, whereby health system reform in recent years has not achieved its planned goal to strengthen primary care in rural areas [41].

Higher levels of personal support were related to higher strength of unmet supportive care in comprehensive care and relationships. Personal support in the context of CIRS is a measure of people's autonomy in managing their condition and higher personal support indicates a higher autonomy. In contrast to personal support, our findings illustrate that support from family and friends serves as a buffering factor for supportive care needs in comprehensive care and relationships. The more support from family and friends, the lower level of unmet supportive care in comprehensive care and relationships. Family-centered models of coping with cancer have been reported in Chinese culture, and it is not uncommon for family members to be surrogates for decision making during the cancer journey [42].

The current study found a positive relationship between social relationship maintenance self-efficacy and the strength of unmet needs across five domains. In other words, the higher self-efficacy cancer survivors have in maintaining their social relationship, the higher level of unmet supportive care needs. It has been reported that having close friends and contact with family was associated with the maintenance of independence [43]. Cancer survivors with higher self-efficacy in maintaining their social relationship engaged in more behavior to interact with friends and family members, and know more about their need to help keep independence. Therefore, this group of cancer survivors may have stronger sense of unmet supportive care needs as they have higher expectations of social support.

People with lower self-efficacy in their interactions with health professionals reported higher unmet needs in the information domains. According to Bandura's social cognitive theory, people with a lower sense of self-efficacy tend to have more concerns over failing and have less attention and effort to engage in and persist in behaviors to solve the problem [44]. This could contribute to unmet needs in relation to information. Similarly, lower self-efficacy in uncertainty management was associated with higher unmet supportive care needs in quality of life. People who are less confident in managing uncertainty are more likely to report lower quality of life. This is consistent with previous findings that uncertainty is negatively related to quality of life [45].

## Limitations

Several limitations of this study should be taken into consideration. Although the sample was recruited from three cities, convenience sampling limits its representativeness. Most participants were voluntary members of the cancer rehabilitation center, and this group of patients tends to be more willing to speak out about their needs than non-members. The sample included only a small number of cancer survivors in their first year after a cancer diagnosis and the results might not be generalizable to this group of patients.

## Conclusion

Chinese cancer survivors experience a number of unmet supportive needs. Female and rural cancer survivors and those with lower social support level and self-efficacy are susceptible to having higher levels of unmet supportive care needs. Resource prioritization and self-efficacy enhancement strategies may be effective for addressing unmet supportive care needs in Chinese cancer survivors.

## Implications

The current study has several implications for the improvement of cancer supportive care service in China. Firstly, fear of cancer recurrence and up-to-date understandable information were consistently reported as the top five unmet needs at different time points. Therefore, addressing fear of recurrence and provision of up-to-date understandable information to reduce the uncertainty is an ongoing priority. Second, female and rural cancer survivors, as well as those with less support from family and friends, lower self-efficacy in interactions with health professionals, and lower self-efficacy in managing uncertainty were more likely to experience higher levels of unmet needs and may require additional assessment and

interventions from their health professionals. Third, self-efficacy enhancement strategies hold promise to address Chinese survivors' unmet needs especially in relation to obtaining information and managing uncertainty. Further research should test the feasibility and effects of theoretically-driven interventions to address unmet needs and improve outcomes in Chinese survivors. Fourth, financial concerns are another prominent issue raised by the current sample. To address this issue effectively, multilevel responses are required including changes in the insurance system and clinical care (including interventions for enhancing return to work) to accommodate the immediate and long-term need of cancer patients.

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## Compliance with Ethical Standards

**Conflict of Interest** The authors declare that they have no conflicts of interest.

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