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Risk factors for low self-care self-efficacy in cancer survivors: Application of latent profile analysis

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Abstract

Aim: To identify subgroups of cancer patients with distinct self-care self-efficacy profiles and to explore factors that can be used to predict those at risk of low self-efficacy.

Design: A secondary analysis of data pooled from two cross-sectional surveys was performed.

Methods: In total, 1,367 Chinese cancer survivors were included in the analysis. Latent profile analysis (LPA) was performed to categorize participants into latent subgroups with distinct self-efficacy profiles. Multinomial logistic regression was conducted to identify predictors of self-care self-efficacy subgroup classification.

Results: We identified three distinct subgroups: low, medium and high self-care self-efficacy. Patients with the "low" profile, which was characterized by a low education level, single marital status, complications, late cancer stage and a lower level of social support, had the poorest self-care behaviour.

KEYWORDS

cancer survivors, latent profile analysis, risk factors, self-care self-efficacy

1 | INTRODUCTION

Owing to improvements in cancer detection and treatment techniques, the life expectancy of cancer patients has greatly increased such that cancer is now widely regarded as a chronic condition (Hulvat, 2020). However, the persistence of post-treatment symptoms can have a considerable and long-term impact on the everyday life of cancer patients (Foster et al., 2009; Shneerson et al., 2015). Self-care behaviours, defined as "activities performed by patients in partnership with their physician to minimize the consequences of treatment, and promote survival, health, and well-being" (Campling & Calman, 2018), are playing an increasingly important role in the management of persistent symptoms in patients with cancer.

Effective and consistent self-care behaviours are driven by self-care self-efficacy (Eller et al., 2018). A large volume of literature has highlighted the importance of self-care self-efficacy in the initiation and continuation of self-care behaviours (Boland et al., 2018; Foster et al., 2015; Karadag, 2019; Ludman et al., 2013; Peters et al., 2019; Wu et al., 2016). However, the majority of current studies have focused on self-efficacy at the group level and assumed that participants were from populations with a homogeneous level of self-efficacy. Many studies did not assess variation within populations, such that they could not be stratified into subgroups with distinct levels of self-efficacy. In contrast, a person-oriented approach can reveal subgroups of participants with different self-efficacy profiles, by assuming that heterogeneity exists within the population and that meaningful subpopulations of individuals can be identified based on shared attributes (Muthen, 2002). Latent profile analysis (LPA), which is a person-oriented approach using continuous data, can be applied to capture within-group variation

by clustering patients with different self-efficacy profiles into distinct classes (Collins & Lanza, 2010). Unlike traditional clustering procedures (e.g. K-means), LPA is a model-based approach to clustering, in which latent classes are identified based on posterior membership probabilities (Wang & Lanza, 2010). This represents a robust and comprehensive way to assign patients to classes that are exclusive and exhaustive. In other words, each class contains individuals who are similar to one other but different from individuals in other profile classes (Collins & Lanza, 2010). By assigning patients to different classes, healthcare providers can identify subpopulations with low levels of self-efficacy and tailor interventions to support them, while simultaneously minimizing unnecessary attention on patients who do not require such support (Yuan et al., 2014).

1.1 | Background

Derived from Bandura's social cognitive theory, self-efficacy refers to the belief (i.e. confidence) that a person has in their ability to engage in behaviours that lead to desired outcomes (Bandura, 1997). Self-care self-efficacy applied the self-efficacy concept to self-care (Eller et al., 2018). In cancer patients, a high degree of self-efficacy has been found to be significantly associated with health-promoting behaviours, as well as decreased physical and psychological symptoms (Boland et al., 2018; Foster et al., 2015). In diabetes mellitus patients, self-efficacy was found to be the most important predictor of self-care behaviours, and has been accepted as a clinical pathway though which diabetes care could be improved (Kav et al., 2017). Eller et al. (2018) reported that self-efficacy is a prerequisite for behavioural change in patients with chronic illness. Indeed, self-efficacy should be considered an important therapeutic target for clinical interventions focused on promoting self-care behaviours in patients with chronic disease.

In recent years, patient-centred care (PCC) has become an increasingly high priority for the delivery of healthcare services. The focus of PCC is on personalized, high-quality care, as well as increasing the efficacy and effectiveness of healthcare systems (Santana et al., 2018). However, there are challenges with respect to the effective implementation of PCC, including identifying patients who need targeted support based on their specific characteristics (Ognjanović et al., 2020). Person-oriented methods, such as LPA, have become increasingly popular in humanities and social science research in recent years. Such approaches could facilitate the development of targeted, cost-effective intervention strategies by distinguishing among patient groups (Mangoni & Woodman, 2019). Specifically for this study, LPA can be used to identify distinct self-care self-efficacy subgroups. Risk factors for low self-efficacy can then be identified, thus facilitating personalized interventions.

Factors associated with self-care self-efficacy, including sociodemographic, disease-related and psychological factors, as well as social support, have been examined in previous studies (Qian & Yuan, 2012; Yuan et al., 2014). For instance, Yuan et al. (2014) explored the relationship between socio-economic status (SES) and self-efficacy and found that a higher SES was associated with greater self-efficacy among patients with cancer. Further, Qian and Yuan (2012) identified a negative relationship between self-efficacy and age and a positive relationship between self-efficacy and education level, among gastric and colorectal patients. However, they found no gender difference in self-efficacy. In contrast, Foster et al. (2015) reported that female cancer survivors were more likely to report low self-efficacy compared with men. Given these inconsistent results, more studies with larger samples are needed. Studies have consistently shown that social support plays a substantial role in improving self-efficacy (Cene et al., 2013; Fivecoat et al., 2018; Foster et al., 2015; Qian & Yuan, 2012; Yuan et al., 2014). However, the traditional variable-centred analytical technique is not sufficient to examine the utility of social support for distinguishing among subgroups of patients with distinct self-efficacy profiles or to identify risk factors that may aid in the identification of subgroups with low self-efficacy.

Thus, the research questions of this study are "what latent profile groups exist in different cancer survivors and what factors can be used to predict those at risk of low self-efficacy?". To address the above questions, two main processes were conducted in our study. Firstly, we sought to use LPA to identify different subgroups with distinct self-care self-efficacy profiles in a large sample of Chinese cancer survivors and to compare differences in self-care behaviours among them. Secondly, we explored the utility of demographic factors, cancer-related factors and social support levels for distinguishing among the subgroups. In particular, we sought to identify factors that may be useful for predicting low self-efficacy, with the goal of facilitating early detection, precise localization and tailored interventions, to optimize the health of vulnerable cancer survivors.

2 | THE STUDY

2.1 | Study design and sample

The current study involved a secondary analysis of data pooled from two cross-sectional surveys that used convenience sampling to collect data from seven oncology and general hospitals in the Shanghai, Jiangsu, Zhejiang, Shandong and Sichuan provinces of China, during the periods February 2010 to October 2010 (Geng et al., 2018; Yuan et al., 2014) and December 2011 to June 2012 (Yao et al., 2013). The protocol was approved by the ethics committee of the Second Military Medical University (approval number: 2010LL008), as well as the ethics committees of each of the seven participating hospitals. The results are reported according to the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) checklist (see File S1).

Patients were eligible for the study if they met the following criteria: (a) confirmed histopathological diagnosis of cancer; (b) 18 years

of age or older; (c) at least 6 months since receiving their cancer diagnosis; (d) able to be interviewed; and (e) informed of their cancer diagnosis. Patients with a history of psychiatric disorders or cognitive impairment were excluded. Before the survey, the participants were informed regarding their rights as participants, as well as the study aims, and potential risks and benefits. Written informed consent was obtained from all participants. Finally, 1,367 cancer patients were enrolled in the study.

2.2 | Instruments

2.2.1 | Demographic and disease-related information

Demographic information including age, gender, religion, education level, marital status and monthly income was collected using a demographic questionnaire. Disease-related variables including disease stage, disease duration and complications were obtained from the medical records.

2.2.2 | Self-care self-efficacy

Self-care self-efficacy was measured using the Strategies Used by People to Promote Health (SUPPH) scale. The original SUPPH scale, which was developed by Lev and Owen (1996) based on self-efficacy theory, contains 29 items grouped into three subscales: positive attitude, making decisions and stress reduction. The Chinese version of the SUPPH (C-SUPPH) was developed by Yuan et al. (2015). As two items on the original scale have a very similar meaning in Chinese, they were combined into one item. Thus, the C-SUPPH contains 28 items and used the same three subscales. Each item was rated on a 5-point scale ranging from 1 (*very little*)–5 (*quite a lot*), with higher scores indicating more confidence regarding self-care self-efficacy. The raw scores were summed for each of the three subscales and converted to a standardized *T*-score (mean = 50, standard deviation = 10). The Cronbach's alpha coefficients for the C-SUPPH total and subscale scores in this study ranged from 0.849–0.970.

2.2.3 | Social support

The level of social support received by the participants was assessed using the Chinese Social Support Questionnaire (SSQ), which is a commonly used social support rating scale developed by Xiao in 1986 and revised in 1994 (Xiao, 1994). It contains 10 items measuring three dimensions of social support: objective support, subjective support and the use of support. The Cronbach's alpha of the scale was 0.81, while the test–retest reliability was 0.92. The total social support scores were obtained by summing those of the three dimensions. Scores of ≥45 indicated a high level of social support, scores of 33–45 represented a moderate level of social support, and scores <33 represented low social support.

2.2.4 | Communication with physicians

In the present study, communication with healthcare professionals was the self-care outcome measure, used to determine whether self-care behaviours varied among patients with different self-efficacy profiles. The Communication with Physicians Scale (CPS), developed by Lorig et al. (2001), was used to measure communication with healthcare providers. The scale includes three items pertaining to visits made by the participant to his/her physician: (a) How often do you prepare a list of questions for your doctor?; (b) How often do you ask questions about things you want to know and things that you do not understand about your treatment?; and (c) How often do you discuss any personal problems that may be related to your illness? The Chinese version of the scale was evaluated by Fu et al. (2003), with higher scores indicating better communication with physicians. The Cronbach's alpha coefficient of the scale was reported to be 0.73.

2.3 | Data analysis

To address the primary purpose of this study, we performed LPA to categorize the participants into latent subgroups based on their responses on the three subscales (i.e. positive attitude, making decisions and stress reduction) of the SUPPH scale. LPA was performed using Mplus version 7.4 (Muthen & Muthen); in this analysis, we used robust maximum likelihood (MLR) and expectation maximization estimation (Marsh et al., 2009). A series of LPA models with an increasing number of latent classes was generated until adding more classes did not increase the explanatory power. The model with the best fit was then determined based on statistical criteria, parsimony and interpretability. We used standard criterion indices for model comparison, including the Akaike information criterion (AIC), Bayesian information criterion (BIC), sample size-adjusted Bayesian information criterion (aBIC), Lo–Mendell–Rubin likelihood ratio test (LMR-LRT) and bootstrap likelihood ratio test (BLRT). In general, lower AIC and BIC values indicate a better model fit, and significant *p*-values for the LMR-LRT and BLRT suggest a better fit for model *k* compared to model *k*-1. The entropy value, ranging from 0–1, was used to evaluate the classification accuracy, with a higher value indicating greater precision (Tein et al., 2013).

Once the optimal number of latent profiles had been identified, the patients were classified into latent profile groups based on the most likely latent class membership. A univariate analysis of variance (ANOVA) and pairwise post hoc comparisons were conducted to examine omnibus and between-class differences in self-care behaviour, that is to compare CPS scores among the different self-care self-efficacy subgroups.

Then, we used multinomial logistic regression to identify predictors of class membership. We included demographic variables (e.g. age), disease-related variables (e.g. cancer stage) and social support level as covariates potentially affecting subgroup classification. Firstly, we used univariate analyses, including one-way ANOVA, the Kruskal–Wallis test and the chi-square test, to identify variables with statistically significant differences among the self-care self-efficacy subgroups. Variables that were significant in the univariate analysis ($p \leq .1$, two-sided probability) were entered into the multinomial logistic regression model. $p < .05$ was set as the threshold for inclusion of a variable in the final model. SPSS software (version 17.0; SPSS Inc.) was used to perform the above analysis.

3 | RESULTS

3.1 | Participant characteristics

More than half of the sample was male (53.1%). The median age of the participants was 55.0 years; 23.8% were below the age of 45 years, and 37.3% were above the age of 60 years. Most of the participants had no religion (85.5%), and 26.7% had a high level of educational attainment. More than half of the patients were single, divorced or widowed, and the majority had a monthly income <3,000¥. Regarding disease-related information, 59.4% of the patients were in the early stage of cancer and 53.9% had been diagnosed within the past year. The detailed participant characteristics are listed in Table 1.

3.2 | LPA results regarding self-care self-efficacy

We derived six models via the LPA, differing in terms of the number of self-care self-efficacy profiles. The fit indices for the models are displayed in Table 2. As shown in the table, the AIC, BIC and aBIC values kept decreasing from the first to the sixth model, with LMR and BLRT values sustaining a similar trend. As the LMR value was not significant in the sixth model, the first five models were compared. According to the BIC and aBIC criterion indices, there was a significant inflection point in the BIC value, and a reduction in the aBIC value, between the third and fourth profiles. In other words, the decrease in BIC and aBIC values became more gradual from the fourth model onwards. In addition, while the entropy value in the three-profile model was adequate, that in the four-profile model was 0.34 higher, suggesting a non-significant improvement in model fit. More importantly, the three-profile model was more parsimonious and easier to interpret than the four-profile model. Based on the above considerations, we identified the three-profile model as the optimal one. Figure 1 graphically depicts the three-profile model.

As illustrated in Figure 1, profiles 1 and 3 had the lowest and highest self-care self-efficacy scores across the three subscales of the SUPPH, and were thus defined as the "low self-care self-efficacy profile" and "high self-care self-efficacy profile," respectively. Profile 2, in which the self-efficacy scores were intermediate across the three subscales, was labelled as the "medium self-care self-efficacy profile." The total mean SUPPH scores were 37.72, 48.23 and 63.09 for the low, medium and high self-care self-efficacy profiles, respectively. Furthermore, the between-profile differences in SUPPH subscale scores (positive attitude, making decisions and stress reduction) were all statistically significant according to an omnibus ANOVA and post hoc analyses. The group size was 265 (19.4%), 734 (53.7%) and 368 (26.9%) for the low, medium and high self-care self-efficacy profiles, respectively (Table 2 and Figure 1).

3.3 | Differences in self-care behaviour among the three latent profiles

As mentioned, the outcome of self-care behaviour was interpreted according to communication with physicians. As shown in Table 3, patients with the "low" profile had significantly lower CPS scores, indicating poorer self-care behaviour compared with the "medium" and "high" subgroups. Furthermore, the "medium" subgroup had significantly poorer self-care outcomes than the "high" subgroup.

3.4 | Risk factors for low self-care self-efficacy

Once we had identified the latent class membership of the patients via LPA, we performed a univariate analysis to explore potential risk factors for low self-efficacy. We found that age, education level, marriage status, income (monthly), cancer stage, complications and disease duration were significantly associated with risk of the low self-efficacy profile. Furthermore, a significantly larger proportion of the "high" subgroup had a high level of social support compared with the "low" and "medium" subgroups. Differences in demographic and clinical characteristics among the three subgroups are summarized in Table 1.

We then performed multinomial logistic regression to validate the risk factors for low self-care self-efficacy, using the "high" profile as the reference group. As shown in Table 4, the "low" profile patients were more likely to have a low level of educational attainment (odds ratio [OR] = 2.757, 95% confidence interval [CI] = 1.590–4.780, $p < .001$), single marital status (OR = 3.273, 95% CI = 2.224–4.774, $p < .001$), complications (OR = 2.165, 95% CI = 1.385–3.385, $p = .001$), a late cancer stage (OR = 1.460, 95% CI = 1.024–2.081, $p = .037$) and a low level of social support. Similarly, the "medium" profile patients were more likely to be single, divorced or widowed (OR = 1.824, 95% CI = 1.373–2.422, $p < .001$) and to have complications (OR = 1.497, 95% CI = 1.024–2.189, $p = .037$) and a low level of social support.

4 | DISCUSSION

As the most important factor in health-promoting behaviours, self-efficacy is considered as a clinical pathway to improve self-care

TABLE 1 Demographic and clinical characteristics, and social support levels, of the three self-care self-efficacy profiles (*N*, %)

Variables	Total (*N* = 1,367)	Profile 1 (low profile) (*N* = 265)	Profile 2 (medium profile) (*N* = 734)	Profile 3 (high profile) (*N* = 368)	*p*
Age (year)					
<45	325 (23.8%)	52 (16.0%)	175 (23.8%)	98 (26.6%)	**.004**
45–59	532 (38.9%)	95 (35.8%)	287 (39.1%)	150 (40.8%)	
≥60	510 (37.3%)	118 (44.5%)	272 (37.1%)	120 (32.6%)	
Gender					
Male	726 (53.1%)	132 (49.8%)	391 (53.3%)	203 (55.2%)	.409
Female	641 (46.9%)	133 (50.2%)	343 (46.7%)	165 (44.8%)	
Religion					
No	1,169 (85.5%)	230 (86.8%)	626 (85.3%)	313 (85.1%)	.801
Yes	198 (14.5%)	35 (13.2%)	108 (14.7%)	55 (14.9%)	
Education level					
Low	328 (24.0%)	164 (61.9%)	377 (51.4%)	150 (40.8%)	**<.001**
Medium	363 (26.6%)	73 (27.5%)	191 (26.0%)	101 (27.4%)	
High	365 (26.7%)	28 (10.6%)	166 (22.6%)	117 (31.8%)	
Marriage status					
Married	634 (46.4%)	88 (33.2%)	335 (45.6%)	211 (57.3%)	**<.001**
Signal, divorced or widowed	733 (53.6%)	177 (66.8%)	399 (54.4%)	157 (42.7%)	
Income monthly (¥)					
<3,000¥	919 (67.2%)	200 (75.5%)	489 (66.6%)	230 (62.5%)	**.002**
≥3,000¥	448 (32.8%)	65 (24.5%)	245 (33.4%)	138 (37.5%)	
Cancer stage					
Early (I, II)	812 (59.4%)	140 (53.2%)	439 (60.6%)	233 (64.5%)	**.016**
Later (III, IV)	536 (39.2%)	123 (46.8%)	285 (39.4%)	128 (35.5%)	
Missing	19 (1.4%)				
Complication					
No	1,094 (80.0%)	184 (69.4%)	587 (80.0%)	323 (87.8%)	**<.001**
Yes	273 (20.0%)	81 (30.6%)	147 (20.0%)	45 (12.2%)	
Disease duration					
Within 1 year	737 (53.9%)	128 (48.3%)	395 (53.8%)	214 (58.2%)	**.049**
Above 1 year	630 (46.1%)	137 (51.7%)	339 (46.2%)	154 (41.8%)	
Social support					
Low	177 (12.9%)	60 (22.6%)	93 (12.7%)	24 (6.6%)	**<.001**
Medium	694 (50.8%)	146 (55.1%)	386 (52.7%)	162 (44.3%)	
High	493 (36.1%)	59 (22.3%)	254 (34.7%)	180 (49.2%)	
Missing	3 (0.2%)				

Note: Bold: significant at the .05 level.

outcomes in patients with chronic disease (Eller et al., 2018; Kav et al., 2017; Tan, 2016). However, most previous studies have a variable-centred approach to evaluating self-efficacy; by using a person-centred approach, we sought to identify discreet self-care self-efficacy profiles and factors for predicting low self-efficacy in the cancer survivor population. Ultimately, we identified three distinct self-efficacy subgroups, "low," "medium" and "high," according to their SUPPH scores. Compared with traditional classification

TABLE 2 Latent class model fit comparison

Model	AIC	BIC	aBIC	Entropy	LMR (*p* Value)	BLRT (*p* Value)
1 class	30,532.936	30,564.258	30,545.198	—	—	—
2 class	28,639.243	28,691.447	28,659.681	0.880	<.001	<.001
3 class	*27,835.689*	*27,908.774*	*27,864.302*	*0.856*	*<.001*	*<.001*
4 class	27,263.979	27,357.946	27,300.767	0.890	<.001	<.001
5 class	27,009.165	27,124.013	27,054.128	0.886	<.001	<.001
6 class	26,922.694	27,058.424	26,975.833	0.903	.0557	<.001

Abbreviations: aBIC, adjusted BIC; AIC, Akaike information criterion; BLRT, the bootstrap likelihood ratio test; BIC, Bayesian information criterion; LMR, Lo–Mendell–Rubin; —, not applicable.

Italic values indicate the optimal model.

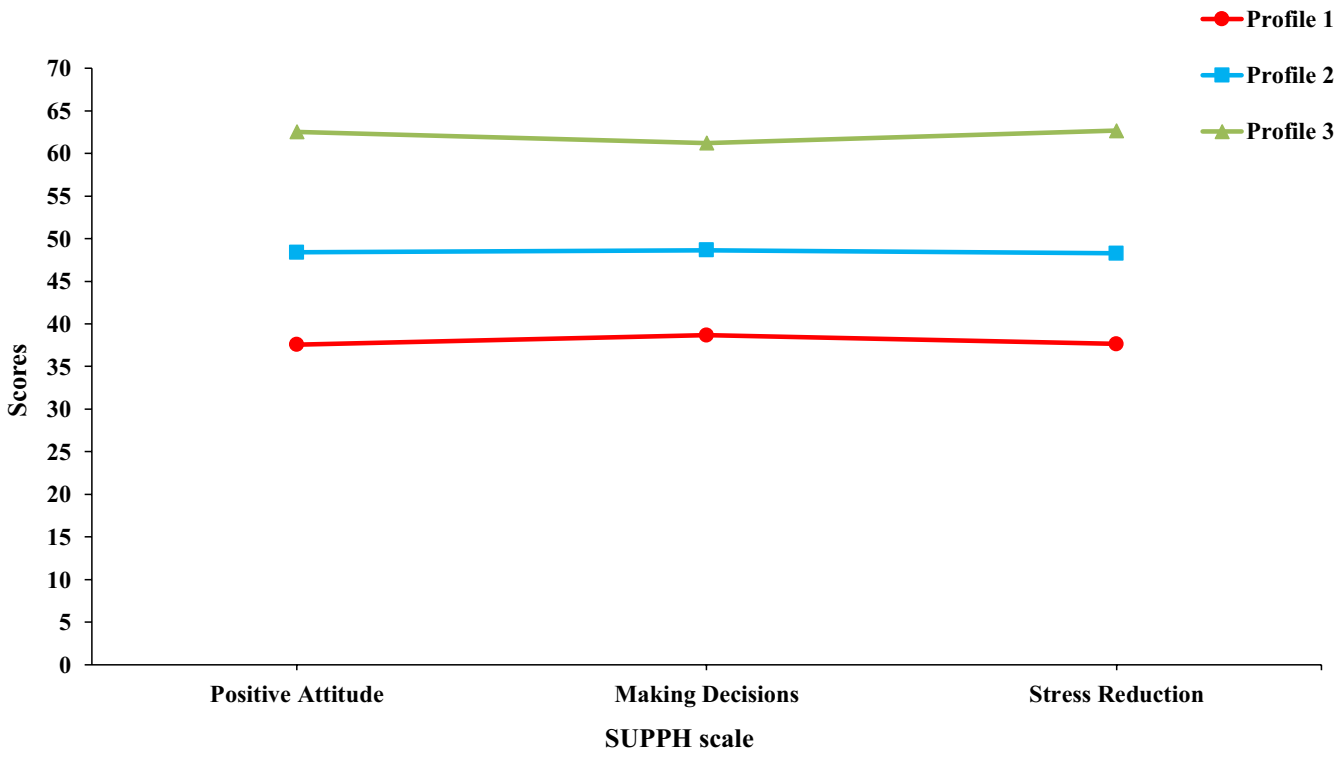

FIGURE 1 Self-care self-efficacy profiles based on scores on the three SUPPH subscales (profile 1 = low self-care self-efficacy, 19.4%; profile 2 = medium self-care self-efficacy, 53.7%; and profile 3 = high self-care self-efficacy, 26.9%)

approaches (e.g. K-means), LPA revealed new insights regarding the nature of inter-variation in patient self-efficacy.

We found that patients in the "low" and "medium" subgroups reported lower levels of communication with their physician, indicative of poorer self-care behaviour compared with patients in the "high" subgroup. These results are consistent with a large number of previous studies reporting that a high level of self-efficacy is associated with positive self-care behaviours, while low self-efficacy acts as a barrier to effective health management (Bandura, 1997; Foster et al., 2015; Karadag, 2019; Ludman et al., 2013; Peters et al., 2019; Wu et al., 2016). Thus, healthcare professionals should measure and carefully consider self-efficacy, as early detection and targeted management of such is likely to improve outcomes.

As mentioned above, we sought to identify predictors of low self-efficacy. In contrast to variable-centred approaches, such as regression analyses, which test the relationship between independent variables of interest and an outcome variable, our study examined combination of variables across individuals (Muthen, 2002; Nylund et al., 2007). As an example, our results showed that individuals in the low self-efficacy subgroup were more likely to have a low level of educational attainment, single marital status, complications, a late cancer stage and a low level of social support.

Consistent with previous findings, a lower level of educational attainment was significantly associated with low self-care self-efficacy (Eftekhar et al., 2012; Karimy et al., 2018; Qian & Yuan, 2012; Yuan et al., 2014). A study by Qian and Yuan (2012) found that education

TABLE 3 SUPPH scores and self-care behaviours of the three self-care self-efficacy profiles

Variables	Profile 1 (low profile, $n = 265$)	Profile 2 (medium profile, $n = 734$)	Profile 3 (high profile, $n = 368$)	Statistics[a]
Total-SUPPH	36.72 ± 4.06	48.23 ± 3.87	63.09 ± 4.99	p <.001; 1 < 2 < 3
Positive attitude	37.16 ± 4.46	48.30 ± 4.74	62.64 ± 5.30	p <.001; 1 < 2 < 3
Making decision	38.23 ± 6.13	48.63 ± 6.09	61.20 ± 6.44	p <.001; 1 < 2 < 3
Stress reduction	37.31 ± 4.77	48.23 ± 4.60	62.67 ± 5.49	p <.001; 1 < 2 < 3
Communication with physician	5.22 ± 2.47	5.97 ± 2.57	6.60 ± 3.38	p <.001; 1 < 2 < 3

[a]Statistics by omnibus ANOVA and post hoc analyses.

level was strongly associated with information seeking; patients with a higher level of education were more confident with respect to the performance of self-care activities. Similar results were also by Eftekhar et al. (2012), who found that a lack of knowledge was the most significant barrier to self-care. Thus, health professionals should pay more attention to patients with lower levels of education and offer them more medical information.

Although age was significantly different among the three profiles in our first univariate analysis, it was not an independent predictor of self-efficacy profile in the final model. Data regarding the relationship between age and self-efficacy have been contradictory. In a study by Qian and Yuan (2012), age was significantly and negatively associated with self-efficacy, while Akin et al. (2008) did not find this association. Furthermore, gender was not found associated with the assignment of patients to self-efficacy profiles. Although men have been reported to have higher levels of self-efficacy than women (Foster et al., 2015; Riegel et al., 2010), Qian and Yuan (2012) found no gender differences in self-efficacy. Given the limited evidence regarding gender differences in self-care self-efficacy, more studies are needed to verify the above results.

As for disease-related factors, we found cancer stage, complications and disease duration all significantly differed among the self-efficacy profiles. However, only cancer stage and complications were significant predictors of low self-efficacy. It is assumed that the level of self-efficacy in cancer patients decreases with disease progression, based on the results of previous studies using traditional variable-centred analyses (Porter et al., 2002; Qian & Yuan, 2012). However, due to the design (i.e. secondary analysis) of the current study, few disease-related variables were available. More variables, especially cancer-specific ones, should be examined to predict the risk of low self-efficacy.

We found that single marital status was a robust predictor of lower self-efficacy. Previous findings have indicated that married people had better self-care behaviours than single people (DiMatteo, 2004; Irani et al., 2019; Karimy et al., 2018). For example, DiMatteo (2004) reported that married patients were more likely to adhere to a healthy diet than single patients, while in another study, living alone was associated with higher levels of distress and thus less positive thoughts and actions (Irani et al., 2019). Such differences between married and single patients may reflect the importance of support systems, especially support given by the family and spouse (Karimy et al., 2018). Indeed, many previous studies have reported a positive relationship between social support and self-efficacy (Geng et al., 2018; Irani et al., 2019; Karimy et al., 2018). For instance, people with higher levels of social support had better self-efficacy in terms of health-promoting behaviours and more positive strategies for coping with stressful situations (Cene et al., 2013; Fivecoat et al., 2018; Geng et al., 2018; Irani et al., 2019; Karimy et al., 2018; Qian & Yuan, 2012; Yuan et al., 2014). Our study expands upon these findings by indicating that social support plays a role in the self-efficacy of cancer patients. More specifically, a lower level of social support appears to increase the likelihood of a patient having low or medium self-efficacy. As a possible explanation for this, social support could reinforce a patient's self-efficacy beliefs through a mechanism of collective efficacy. Collective efficacy is closely linked to self-efficacy (Vassilev et al., 2019; Band et al., 2019; Matthieu and Carbone, 2020). According to Vassilev et al. (2014), collective efficacy is applicable to the social networks, that is levels of social support, of people living with chronic illness. However, the specific mechanisms via which self-efficacy and collective efficacy interact to improve the health outcomes of cancer patients require further clarification. Overall, our findings could help researchers and healthcare providers to identify cancer survivors at high risk of poor outcomes due to low self-care self-efficacy.

Our study had several limitations that should be acknowledged. Firstly, because there were more than 15 different types of cancer diagnoses in the sample, subgroup analysis for each specific type of cancer was not feasible. Thus, the three profiles of self-care self-efficacy identified by LPA may not apply to all types of cancer survivors. Further studies are needed to confirm our self-care self-efficacy profiles in a more homogeneous sample. Secondly, due to the cross-sectional design, we were only able to assess self-care self-efficacy profiles at one point in time. Further studies using a longitudinal design are therefore warranted; in particular, extending the LPA to latent transition analysis would enable examination of latent transitions in profile membership between time points. Lastly,

TABLE 4 Risk factors for a low or medium self-care self-efficacy profile identified by multinomial logistic regression

	High profile (refer)[a] vs.					
	Low profile			Medium profile		
Risk factors	OR	95% CI for OR	*p*	OR	95% CI for OR	*p*
Age						
<45	1.039	0.653–1.651	.872	1.025	0.724–1.453	.888
45–59	0.901	0.608–1.335	.603	0.991	0.729–1.346	.952
≥60 (refer)						
Education level						
Low	2.757	1.590–4.780	**<.001**	1.432	0.994–2.063	.054
Medium	1.820	1.036–3.196	**.037**	1.082	0.743–1.576	.682
High (refer)						
Marriage status						
Single, divorced or widowed	3.273	2.224–4.774	**<.001**	1.824	1.373–2.422	**<.001**
Married (refer)						
Income						
<3,000¥	1.201	0.790–1.826	.392	0.985	0.723–1.342	.924
≥3,000¥ (refer)						
Complication						
Yes	2.165	1.385–3.385	**.001**	1.497	1.024–2.189	**.037**
No (refer)						
Cancer stage						
Late	1.460	1.024–2.081	**.037**	1.150	0.874–1.514	.318
Early (refer)						
Cancer duration						
Within 1 year	0.906	0.638–1.286	.580	0.973	0.743–1.274	.844
Above 1 year (refer)						
Social support						
Low	8.832	4.833–16.137	**<.001**	3.041	1.821–5.078	**<.001**
Medium	2.993	2.013–4.449	**<.001**	1.856	1.398–2.462	**<.001**
High (refer)						

Note: Bold: significant at the .05 level.

Abbreviations: CI, confidence interval; OR, odds radio.

[a]The reference category is subgroup patients in the high self-care self-efficacy profile.

due to the nature of secondary data analysis, few data were available on disease-related and psychological variables. Other factors potentially predicting self-care self-efficacy should be explored in future work.

5 | CONCLUSION

From a person-centred perspective, our study offers insight into distinct self-care self-efficacy profiles. Furthermore, we were able to identify risk factors for low self-care self-efficacy. Thus, our results could aid identification of patients at risk of low self-care self-efficacy and thus enable healthcare providers to provide more PCC. In turn, this may improve self-care behaviours and quality of life in vulnerable individuals.

6 | RELEVANCE TO CLINICAL PRACTICE

Cancer patients with low self-care self-efficacy have a higher risk of poorer outcomes. Self-efficacy has been regarded as an important target for clinical interventions to promote self-care behaviours in

cancer patients. Nurses play an important role in outcome monitoring, patient counselling, health education and self-care guidance during long-term care of cancer patients. When medical resources are limited, nursing resources should prioritize the most vulnerable patients. By distinguishing among different self-efficacy subgroups, nurses will be better able to recognize vulnerable patients, which could enable them to provide more personalized care. Maximizing the support of vulnerable patients, and minimizing unnecessary care of those with high self-efficacy, could lead to more cost-effective interventions and better self-care and quality of life in cancer survivors.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

AUTHORS' CONTRIBUTIONS

Changrong Yuan is the principal investigator of this research project who was responsible for the entire study design. Qingmei Huang did the data analysis and drafted the manuscript. Fulei Wu revised the manuscript. Jennifer Stinson reviewed and revised the manuscript. Wen Zhang and Yang Yang collected the data.

ETHICAL APPROVAL

The present study was approved by the ethics committee of the Second Military Medical University (No. 2010LL008) and each of the seven hospitals. All procedures performed were in accordance with the ethical standards of the research committee and with the 1964 Helsinki Declaration and its later amendments.

INFORMED CONSENT

Informed consent was obtained from all individual participants included in the study.

DATA AVAILABILITY STATEMENT

The data of this study are available from the corresponding author upon reasonable request.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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