

Cancer survivors in the first year after treatment: the prevalence and correlates of unmet needs in different domains

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Abstract

Objective: To explore cancer survivors' unmet needs in the first year after primary treatment, and to investigate the relationship between demographic, disease-related, and psychosocial characteristics and the number of unmet needs in different domains.

Methods: Cancer survivors were recruited through eight Dutch hospitals (November 2012–January 2013). In a cross-sectional survey, 255 survivors were asked about unmet needs across several domains (CaSUN) and demographic, disease-related, and psychosocial characteristics, comprising quality of life (EORTC QLQ-C30), psychological distress (HADS), mental adjustment (MAC), and problem solving (SPSI-R:S).

Results: Sixty-three percent of survivors reported one or more unmet needs ($M = 5.13$, $SD = 6.98$, range = 0–34). Common unmet needs concerned emotional support (31.3%), smoking cessation (26.7% of smokers), managing side effects/complications (25.9%), fear of recurrence (23.0%), cancer care (22.0%), social support (22.0%), up-to-date information (19.8%), and carrying out work (19.6%). Regression analysis showed that age, higher education, participation in support programs, anxiety, depression, and negative adjustment style correlated positively, while being female, time since last treatment, and quality of life correlated negatively with the number of unmet needs. Lower number of unmet needs also accounted for other types of cancer (except colon cancer) than breast cancer. These relationships differed per need domain.

Conclusions: The heterogeneity in unmet needs complicates the provision of adequate support for survivors.

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Background

Cancer survivors often experience psychosocial and physical problems after treatment, such as anxiety, depression, fear of recurrence, fatigue, difficulties with employment, and sexual dysfunction [1–6]. These problems vary across cancer and treatment types [5,7] and may continue long after treatment completion [8].

A majority of survivors report having unmet information and support needs, such as needs concerning health promotion, treatment and follow-up care, side-effects, finances, emotional and social support, and dealing with fear or stress [9–16]. Younger survivors, women, survivors with higher incomes, and survivors with more comorbid conditions generally have more needs [12–15]. Unmet needs are more prevalent among unemployed survivors [16] and survivors of a more advanced stage of cancer [10,13]. The relationship between cancer type and unmet needs is unclear [17]. Furthermore, having unmet needs is associated with higher psychological distress and lower quality of life [9–14].

However, further insight is needed. First, unmet needs can be categorized into several domains, such as unmet needs concerning existential issues, comprehensive cancer care, information, relationships, and quality of life [11]. However, previous researchers only studied the total number of unmet needs as dependent variable [9–13,16,18]. We expect the significance of these correlates to differ per domain.

Second, some factors important in cancer survivorship have not been clearly linked to having unmet needs. *Participation in support programs* after treatment (e.g. revalidation programs, psychological support) has beneficial effects on cancer recovery [19,20]. Next, *coping* with challenging situations, which comprise unmet needs, remains important during cancer survivorship [21]. Survivors continue to engage in cancer-specific coping strategies many years after diagnosis [22]. Furthermore, an intervention study demonstrated that training in *problem solving* led to fewer unmet needs in managing daily activities [23]. We propose these factors to relate to having unmet needs across different domains.

In this study, we aim to explore (a) the prevalence of unmet needs, and (b) the relationship between demographic, disease-related, and psychosocial characteristics and the number of unmet needs in different domains. The results can be expected to provide detailed information on the main correlates of unmet needs and might reveal implications for how survivors' unmet needs can best be addressed.

Methods

Participants and procedure

This study was approved by the Ethical Research Board of the Open University of the Netherlands. Patients could be included in the study if they were 18 years or older; they had been diagnosed with any cancer type; primary treatment (surgery, chemotherapy, and/or radiotherapy) had been completed successfully for at least six weeks but no more than one year; there was no sign of recurrence in the latest follow-up visit; they were able to read and speak Dutch; and there was no serious medical, psychiatric, or cognitive illness that would interfere participation.

Eighteen hospitals in the southern Netherlands were asked to assist in the recruitment process. Eight hospitals agreed to participate and recruited patients between November 2012 and January 2013 for 11 weeks on average. Patients were selected either during follow-up visits or review of their files. Oncologists, research nurses, and nurse practitioners from the outpatient clinics internal medicine, oncology, and urology invited patients who met the inclusion criteria to participate by giving them an information package during a follow-up visit or sending the package following file review. The information package consisted of an information letter, an informed consent form, and a survey booklet. A reminder survey was sent after two weeks. Patients who agreed to participate were required to sign the informed consent form and return it with the completed survey to the Open University. Patients who returned the questionnaire but not the consent form received a reminder letter.

Measurements

Demographic characteristics included age, sex, relationship status, education level, and employment status. Disease-related characteristics included cancer type, treatment type, participation in support programs after treatment, and time since last treatment. To create groups of meaningful size, cancer type was categorized into 'breast', 'colon', and 'other' (i.e. bladder, cervix, ovarian, stomach, and testicular cancer; Hodgkin and non-Hodgkin lymphoma).

Table 1 gives an overview of the psychosocial measurements. *Unmet needs* were measured using the Cancer

Survivors' Unmet Needs questionnaire (CaSUN)¹ [11], containing 35 items asking about needs over the past month. Twenty-eight items fall within one of five need domains: existential survivorship (14 items, $\alpha = .90$; e.g. emotional support), comprehensive cancer care (6 items, $\alpha = .81$; e.g. best medical care), information (3 items, $\alpha = .84$; e.g. up-to-date information), quality of life (2 items, $\alpha = .73$; e.g. manage side effects/complications), and relationships (3 items, $\alpha = .74$; e.g. partner/family support). Seven separate items concern complementary therapy, fertility issues, employment, financial support, insurance, legal services, and having a case manager. Respondents indicate whether they have *no need/not applicable*, a *met need*, or an *unmet need*. Strength of unmet needs is rated as *weak* (1), *moderate* (2), or *strong* (3). We extended the CaSUN with four items concerning lifestyle changes (e.g. help to quit smoking) and five items concerning return to work (e.g. making work adjustments; see Appendix A), resulting in a total of 44 items. Factor analysis demonstrated a separate factor for return to work and showed good reliability ($\alpha = .84$).

Statistical analysis

Missing values for the EORTC QLQ-C30, SPSI-R:S, HADS, and MAC were resolved by using the mean of the remaining items in the particular (sub)scale. The maximum permitted number of missing values was one for the scales of the EORTC QLQ-C30, HADS, and MAC and two for the SPSI-R:S. For the CaSUN, missing items were counted as 'no need/not applicable'. If all items of a domain were missing, the domain score was considered missing [12].

We treated the number of unmet needs as a count variable and therefore assessed the correlation between the number of unmet needs and the variables by means of Poisson and negative binomial regression analyses [24]. In cases of overdispersion we conducted negative binomial regressions, otherwise Poisson regressions. The variables were entered in three steps: demographic characteristics first, disease-related characteristics second, and psychosocial characteristics in the final step. The results are presented for the final step only. The contribution of the second and third step is reported by presenting the log likelihood values of each step. For the regression model concerning return to work only respondents who were employed before diagnoses were included. Descriptive statistics were examined using SPSS 22.0 and regression analyses were analyzed using STATA 12.1. Statistical tests were two-sided ($p < .05$).

¹Two researchers independently translated the CaSUN into Dutch and merged both versions into an initial version. Feedback from a native English speaker was incorporated. The text was piloted for comprehensibility and the results were incorporated into a final version.

Table 1. Psychosocial measurements and their properties

Concept	Instrument	N items	Item range	Timespan	Subscales used	N items subscale	Subscale range	α^a	Higher score indicates
Quality of life	EORTC QLQ-C30 [36]	30	1–7	Past week	Global health status	2	0–100	.88	Better overall health and quality of life
Psychological distress	HADS [37]	14	0–3	Past week	Anxiety Depression	7 7	0–21 0–21	.85 .81	Greater morbidity
Coping/Mental adjustment to cancer	MAC [38]	33	1–4	Time since last treatment	Positive adjustment ^b Negative adjustment	17 16	17–68 16–64	.78 .84	More positive or negative adjustment
Problem solving ability	SPSI-R:S [39]	25	0–4	No timespan	Total score	25	0–20	.79	Better problem solving ability

QLQ-C30: Quality of Life Questionnaire; HADS: Hospital Anxiety and Depression Scale; MAC: Mental Adjustment to Cancer; SPSI-R:S: Short Social Problem Solving Inventory-Revised.

^aAll Cronbach's alphas are based on the study sample.

^bThe scales constitute an updated scoring procedure measuring two higher-order factors representing global adjustment [38].

Results

The hospital staff invited 455 patients for study participation. Twenty-two patients were not suitable for study participation: 3 had metastases; 1 had not had cancer; 8 had finished primary treatment in fewer than six weeks; 10 had finished primary treatment longer than a year prior to the study. Further, 172 patients declined to participate and 6 did not return the informed consent form. Data from 255 patients were therefore used in the analysis, making the response rate 58.9% (255/433).

The mean age of the respondents was 60.57 years ($SD=10.74$, range=25–88) and 69.0% were female. The mean number of weeks since treatment completion was 26.51 ($SD=12.66$, range=6–52). Before diagnosis, 107 (42.6%) respondents were employed and 93 (37.1%) were retired; after treatment these figures were 89 (36.0%) and 104 (42.1%), respectively. A total of 134 (52.5%) respondents made use of at least one support program. See Table 2 for additional sample characteristics.

Prevalence of unmet needs

Table 3 shows the 10 most frequently cited unmet needs and their strength rating. Almost two-thirds (63.1%) reported at least one unmet need. The mean number of total unmet needs was 5.13 ($SD=6.98$, $\sigma^2=48.77$, range=0–34). The mean numbers of unmet needs in the different need domains were: existential survivorship 2.05 ($SD=3.12$, $\sigma^2=9.76$, range=0–13), comprehensive cancer care 0.85 ($SD=1.43$, $\sigma^2=2.06$, range=0–6), information 0.56 ($SD=0.98$, $\sigma^2=0.95$, range=0–3), quality of life 0.43 ($SD=0.72$, $\sigma^2=0.52$, range=0–2), relationships 0.35 ($SD=0.79$, $\sigma^2=0.62$, range=0–3), and return to work 0.70 ($SD=1.34$, $\sigma^2=1.80$, range=0–5). Concerning lifestyle, there was a high need for help to quit smoking (26.7%) and increasing exercise (18.0%; see Appendix A).

Correlates of unmet needs

Table 4 shows the results of the final regression models. With respect to demographic characteristics, women had

Table 2. Demographic and disease-related characteristics ($n=255$)

Characteristic	n (%)	Characteristic	n (%)
Age		Treatment type	
18–45	22 (8.6)	Surgery	32 (12.6)
45–65	130 (51.0)	Surgery and chemotherapy	55 (21.7)
65–older	103 (40.4)	Surgery and radiotherapy	46 (18.1)
		Surgery, chemotherapy, and radiotherapy	92 (36.2)
Relationship status		Other	29 (11.4)
Partner	217 (86.5)	Participation in support program	
No partner	34 (13.5)	No aftercare used	121 (47.5%)
Education level ^a		(Oncological) physiotherapy	72 (28.2%)
Low	137 (54.6)	Recovery and Balance ^b	50 (19.6%)
Middle	47 (18.7)	Aftercare provided by hospital	28 (11%)
High	67 (26.7)	Employment	
		General practitioner	25 (9.8%)
Employment		Social work	9 (3.5%)
Employed	89 (36.0)	Psychological support	7 (2.7%)
Unemployed	54 (21.9)	Walk-in consultation services	7 (2.7%)
Retired	104 (42.1)	Cancer type	
		Dietitian	6 (2.4%)
Breast	150 (58.8)	Mindfulness therapy	4 (1.6%)
Colon	51 (20.0)	Rehabilitation specialist	4 (1.6%)
Prostate	23 (9.0)	Other	6 (2.4%)
Non-Hodgkin lymphoma	15 (5.3)	Smoking	
Ovarian	8 (3.1)	Yes	45 (17.7%)
Bladder	3 (1.2)	No	209 (82.3%)
Stomach	2 (0.8)		
Cervix	1 (0.4)		
Hodgkin lymphoma	1 (0.4)		
Testicular	1 (0.4)		

^aLow: lower (vocational) education, medium general secondary education; Medium: secondary vocational education, higher general secondary education; High: higher vocational education, university education.

^bRecovery and Balance ('Herstel en Balans') is a national revalidation program aimed at physical and psychological recovery after cancer treatment.

fewer unmet needs in the information domain. Older survivors had more needs concerning comprehensive cancer care. Highly educated survivors had more unmet needs in total, and in the existential survivorship and comprehensive cancer care domains. Concerning disease-related characteristics, survivors of other types of cancer (except colon cancer) than breast cancer and survivors with a

Table 3. Ten most frequently reported unmet needs

CaSUN need description I need...	Domain	% (Reporting unmet need/ completing item)	Mean (SD) strength rating
emotional support to be provided for me	ES	31.3 (79/252)	1.59 (0.78)
help to quit smoking*	None	26.7 (12/45)	2.17 (0.83)
help to manage ongoing side effects and/or complications of treatment	QL	25.9 (66/255)	1.80 (0.85)
help to manage my concerns about the cancer coming back	ES	23.0 (58/252)	1.55 (0.73)
to feel like I am managing my health together with the medical team	CC	22.0 (56/254)	2.02 (0.84)
to talk to others who have experienced cancer	ES	22.0 (56/254)	1.66 (0.75)
to know that all my doctors talk to each other to coordinate my care	CC	20.1 (51/254)	2.16 (0.78)
up to date information	IN	19.8 (50/252)	1.82 (0.87)
help with carrying out my work*	RW	19.6 (21/107)	2.14 (0.91)
the very best medical care	CC	19.3 (49/254)	2.27 (0.86)

ES = Existential Survivorship, CC = Comprehensive Cancer Care, IN = Information, QL = Quality of Life, RW = Return to Work.

*Item developed for this study. In total, 63.1% reported at least one unmet need. Discounting the items developed for this study, this percentage was 59.6%.

relatively longer time since last treatment had fewer, while survivors who participated in a support program had more unmet needs in several domains. Concerning psychosocial characteristics, survivors with a negative adjustment style had more unmet needs in several domains. Survivors with higher quality of life had fewer unmet needs in total and in the comprehensive cancer care domain. Survivors with higher levels of anxiety had more unmet needs in total, and in the existential survivorship and comprehensive cancer care domains. Higher levels of depression were significantly associated with more unmet needs in the relationships domain.

The addition of disease-related characteristics to the models led to no or slight improvements in the models. In contrast, the addition of psychosocial characteristics led to major improvements in all models.

Discussion

This study explored the prevalence of cancer survivors' unmet needs and correlates of the number of unmet needs across different domains. Sixty-three percent reported one or more unmet needs. Frequently cited unmet needs concerned emotional and social support, help to deal with fear of recurrence, management of healthcare and complications, and up-to-date information. With respect to the additional work- and lifestyle-related items, survivors reported high unmet needs concerning help to quit smoking, increasing exercise, and return-to-work-related situations. Previous research highlighted the importance of these issues [25–27]. We suggest these items to be included in the CaSUN.

Discounting the additional items, 59.6% reported at least one unmet need. This is similar to other studies, reporting percentages of 47–54% among a mixed group [11,18], 66% among testicular [12], 52% among gynecological [10], and 61% among breast cancer survivors [9], except for a study on endometrial cancer (24%) [13]. These studies included participants many years after treatment or diagnosis. We found that, within the first year after primary treatment, greater time since treatment was associated with having less unmet needs, but only for the domains information, quality of life, and relationships. This suggests that while unmet needs remain long after treatment, they do decline to some extent [18,28].

We then explored the correlates of the number of unmet needs in different domains, leading to new insights. Of the demographic characteristics, men reported having more unmet needs in the information domain than women. Research shows that in general women seek information more actively than men [15,29], which may explain their lesser unmet need for information. Older survivors had more unmet needs in the domain comprehensive cancer care. Older survivors already showed to be more susceptible to complications after treatment [30], making comprehensive medical care more important.

Of the disease-related characteristics, survivors who participated in support programs reported more unmet needs in general and in the comprehensive cancer care, quality of life, and information domains than survivors who did not participate in such programs. Possibly, survivors with relatively many unmet needs are more likely to participate in support programs. Furthermore, survivors of types of cancer other than breast or colon cancer had fewer unmet needs than breast cancer survivors in general and in the existential survivorship and information domains. However, caution is needed, because the 'other' group was underrepresented in this study.

Of the psychosocial characteristics, better quality of life was associated with fewer, while higher anxiety levels were associated with more unmet needs. This supports the results of other studies [9–12,18]. A more negative adjustment to cancer was associated with more unmet needs, while a positive adjustment was not related to the number of unmet needs. This might indicate that survivors with a positive adjustment do not necessarily have fewer unmet needs, but are more accepting of it. Research shows that positive coping with cancer is related to satisfaction with one's current life, while negative coping is related to loss of meaning and confusion [31]. Furthermore, there was no association between problem-solving ability and the number of unmet needs. In the study that did find a relationship, participants were exposed to problem-solving training, and unmet needs were measured only with regard to managing daily activities [23].

Table 4. Results of Poisson and negative binomial regression analyses of demographic, disease-related, and psychosocial characteristics on the number of unmet needs [Correction added on 28 August 2015, after first online publication: Some of the values in this table were mistakenly deleted and they are now added in this version.]

Variable	Number of unmet needs																				
	Total needs (n = 235)			Existential survivorship (n = 235)			Comprehensive cancer care (n = 235)			Information (n = 234)			Quality of life (n = 235)			Relationships (n = 235)			Return to work (n = 99)		
	IRR ^a	[95% CI]	P	IRR	[95% CI]	P	IRR	[95% CI]	P	IRR	[95% CI]	P	IRR	[95% CI]	P	IRR	[95% CI]	P	IRR	[95% CI]	P
Demographic characteristics^b	-635.42			-445.00			-300.52			-243.92			-207.24			-178.96			-105.08		
Gender (ref. male)	0.72	[0.40-1.29]	.269	1.04	[0.53-2.05]	.906	0.62	[0.29-1.31]	.211	0.37	[0.15-0.93]	.034	0.68	[0.30-1.52]	.349	0.45	[0.17-1.21]	.112	2.00	[0.31-12.88]	.466
Age (years)	1.01	[0.99-1.03]	.558	1.00	[0.98-1.02]	.945	1.04	[1.01-1.07]	.003	1.03	[1.00-1.06]	.063	0.99	[0.97-1.02]	.611	1.00	[0.97-1.04]	.987	0.99	[0.94-1.04]	.655
Education (ref. low)																					
Middle	1.14	[0.70-1.86]	.587	1.16	[0.66-2.03]	.612	1.65	[0.92-2.99]	.096	0.76	[0.36-1.61]	.470	1.50	[0.85-2.66]	.165	1.33	[0.63-2.84]	.454	0.42	[0.11-1.61]	.207
High	2.06	[1.33-3.19]	.001	2.14	[1.32-3.47]	.002	1.92	[1.11-3.33]	.019	1.60	[0.86-2.99]	.136	1.54	[0.92-2.57]	.098	1.53	[0.76-3.06]	.233	1.39	[0.58-3.36]	.458
Relationship status (ref. partner)	1.03	[0.63-1.68]	.913	1.21	[0.71-2.06]	.480	0.77	[0.39-1.48]	.429	0.63	[0.28-1.40]	.253	1.17	[0.65-2.11]	.601	0.83	[0.36-1.92]	.670	1.81	[0.67-4.90]	.244
Disease-related characteristics	-626.80		.028	-439.84		.243	-292.43		.040	-237.85		.145	-197.29		.010	-172.99		.154	-101.68		.558
Cancer type (ref. breast)																					
Colon	0.76	[0.41-1.42]	.389	0.73	[0.35-1.50]	.392	0.54	[0.23-1.26]	.153	0.48	[0.18-1.29]	.146	0.64	[0.26-1.58]	.336	0.71	[0.23-2.15]	.540	0.70	[0.09-5.32]	.727
Other	0.41	[0.19-0.88]	.022	0.40	[0.17-0.99]	.047	0.62	[0.26-1.48]	.277	0.22	[0.06-0.79]	.020	0.55	[0.21-1.49]	.240	0.34	[0.09-1.28]	.110	0.62	[0.10-3.66]	.593
Treatment type (ref. surgery)																					
Surgery and chemotherapy	1.28	[0.64-2.54]	.482	1.44	[0.68-3.07]	.343	1.44	[0.60-3.49]	.418	1.15	[0.40-3.26]	.795	0.93	[0.37-2.32]	.876	0.92	[0.30-2.84]	.883	0.92	[0.10-8.10]	.940
Surgery and radiotherapy	0.60	[0.28-1.29]	.188	0.73	[0.30-1.75]	.480	0.44	[0.15-1.34]	.149	0.49	[0.14-1.67]	.253	0.88	[0.29-2.64]	.816	0.28	[0.06-1.36]	.115	2.44	[0.24-25.32]	.454
Surgery, chemotherapy and radiotherapy	0.90	[0.46-1.77]	.765	0.90	[0.42-1.92]	.779	0.98	[0.41-2.39]	.973	0.80	[0.28-2.28]	.675	0.89	[0.36-2.24]	.808	0.58	[0.18-1.85]	.360	1.56	[0.19-12.80]	.680
Other	2.23	[0.95-5.22]	.064	1.97	[0.73-5.33]	.180	1.47	[0.52-4.19]	.470	2.73	[0.74-10.11]	.134	1.38	[0.42-4.53]	.598	1.72	[0.44-6.74]	.440	-		-
Time since last treatment (weeks)	0.99	[0.98-1.01]	.309	0.99	[0.98-1.01]	.498	0.98	[0.97-1.00]	.068	0.98	[0.96-1.00]	.036	0.98	[0.96-0.99]	.014	0.97	[0.95-1.00]	.031	0.99	[0.94-1.04]	.597
Participation in support program (ref. none)	1.65	[1.06-2.55]	.026	1.27	[0.78-2.06]	.335	1.84	[1.04-3.26]	.036	1.80	[0.97-3.31]	.061	2.40	[1.34-4.27]	.003	2.67	[1.24-5.74]	.012	0.90	[0.23-3.50]	.881
Psychosocial characteristics	-547.63		.000	-375.03		.000	-249.11		.000	-206.64		.000	-163.11		.000	-145.89		.000	-86.12		.000
Quality of life (0-100)	0.98	[0.96-1.00]	.014	0.99	[0.97-1.01]	.295	0.98	[0.96-1.00]	.049	0.98	[0.96-1.00]	.063	0.99	[0.97-1.01]	.186	0.99	[0.97-1.01]	.268	0.98	[0.95-1.02]	.260
Anxiety (0-21)	1.11	[1.03-1.19]	.005	1.14	[1.06-1.24]	.001	1.14	[1.04-1.23]	.002	1.07	[0.97-1.18]	.172	1.02	[0.94-1.10]	.702	1.06	[0.96-1.18]	.263	1.07	[0.91-1.26]	.392
Depression (0-21)	1.06	[0.98-1.14]	.140	1.07	[0.99-1.15]	.105	0.98	[0.90-1.07]	.631	1.02	[0.92-1.12]	.717	1.05	[0.97-1.12]	.220	1.11	[1.01-1.22]	.034	1.00	[0.86-1.15]	.948
Mental adjustment																					
Positive (17-68)	0.99	[0.96-1.02]	.596	1.00	[0.97-1.03]	.926	1.00	[0.96-1.04]	.991	1.00	[0.96-1.04]	.827	1.00	[0.96-1.03]	.886	1.00	[0.95-1.05]	.969	0.99	[0.93-1.05]	.646
Negative (16-64)	1.04	[1.01-1.08]	.016	1.05	[1.01-1.09]	.019	1.05	[1.02-1.10]	.008	1.03	[0.98-1.08]	.270	1.06	[1.02-1.11]	.004	1.03	[0.98-1.09]	.276	1.07	[0.99-1.15]	.093
Problem solving (0-20)	0.97	[0.89-1.06]	.520	0.99	[0.90-1.09]	.898	1.06	[0.94-1.18]	.333	0.93	[0.82-1.06]	.278	1.02	[0.93-1.12]	.708	0.96	[0.85-1.09]	.537	0.88	[0.70-1.09]	.243
Likelihood ratio test of alpha = 0^c	$\chi^2(1) = 542.08, p < .001$			$\chi^2(1) = 138.11, p < .001$			$\chi^2(1) = 30.26, p < .001$			$\chi^2(1) = 21.89, p < .001$		$\chi^2(1) = 0.00, p = 0.500$			$\chi^2(1) = 2.85, p < .05$			$\chi^2(1) = 5.85, p < .01$			
Pseudo R² (final model)	0.10			0.13			0.14			0.11		0.21			0.18			0.19			

^aThe incidence rate ratio (IRR) explains that if the independent variable increases by one unit, the number of unmet needs changes with one time the IRR (given that the other variables are held constant) [40].

^bValues reported next to each dimension are the log likelihood values of each step. A significant value indicates that the dimension improved the model.

^cA significant value in this test of overdispersion indicates that a Poisson distribution is not appropriate.

Overall, the significance of the demographic, disease-related, and psychosocial characteristics differed per domain. Comprehensive cancer care had relatively many significant correlates, which indicates that these needs vary across survivors in particular. Although many survivors had unmet needs concerning return to work, these needs did not relate to the survivors' characteristics. This was against our expectations, because physical and psychosocial problems may cause serious difficulties at work [4]. A higher number of respondents (± 200) in the model would be preferable to draw better conclusions [32].

Implications

This study makes valuable contributions to the state of knowledge. For research implications, it is important to distinguish between different unmet needs domains. Our results revealed important relationships that would have not been found if only the total number of unmet needs were studied. For practical implications, providing support to cancer survivors seems to be a complex endeavor. Survivors experience unmet needs in different domains, which are influenced by demographic characteristics, disease history, and psychosocial functioning. Providing information that covers all these aspects would leave survivors with too general or too much information. To provide the right amount of support, tailored interventions may be an effective solution [33].

Limitations

This study is subject to some limitations. First, the cross-sectional design makes it difficult to interpret the nature of the relationships identified. Second, while quality of life encompasses multiple dimensions [34], we only focused on a global indication of quality of life. Therefore, quality of life results need to be interpreted with caution. Finally, because of an error in the compilation of the questionnaire, one item of the CaSUN ('Due to my cancer, I need help accessing legal services') was not measured. As this item did not belong to one of the domains, the results of the regression models were not affected. Also, this item was not of importance in previous studies, suggesting that the impact of the missing item on the results is small.

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Conclusions

With the number of cancer survivors set to increase in the coming years [35], meeting the needs of all survivors will become more challenging. Our study demonstrates that the heterogeneity in unmet needs complicates the provision of adequate support for survivors.

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Conflict of interest

The authors have declared no conflicts of interest.

Appendix A

Items added to the Cancer Survivors' Unmet Needs Measure

CaSUN need description I need...	% (Reporting unmet need/ completing item)	Mean (SD) strength rating
<i>Changing lifestyle</i>		
help to quit smoking	26.7 (12/45) ^a	2.17 (0.83)
help to exercise more	18.0 (46/255)	1.76 (0.85)
help to learn to eat healthier	6.3 (16/255)	1.31 (0.48)
help to reduce my alcohol consumption	3.0 (6/197) ^b	1.17 (0.41)
<i>Returning to work</i>		
help with carrying out my work	19.6 (21/107)	2.14 (0.91)
information about the rules and legislation on returning to work, such as regulations on working hours and recovering from disease	17.8 (19/107)	2.16 (0.96)
help to make adjustments to my job or to find a new job	15.0 (16/107)	2.38 (0.81)
help to discuss the topic of cancer in work situations	10.3 (11/107)	1.73 (0.90)
help to talk to and/or deal with colleagues	7.5 (8/106)	1.50 (0.76)

^aPercentage based on smokers only (n = 45)

^bPercentage based on people who drink alcoholic drinks (n = 197)

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