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Received empowering knowledge and associated factors among patients with cancer: A cross-sectional multicentre study

Heli Arffman [a,*], Mervi Siekkinen [b], Helena Leino-Kilpi [a,b], Miko Pasanen [a], Heli Virtanen [a,b]

[a] Department of Nursing Science, University of Turku, Turku, Finland
[b] The Wellbeing Services County of Southwest Finland/Turku University Hospital, Finland

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ABSTRACT

Purpose: This study aimed to analyse the knowledge received by patients with cancer and to examine its association with sociodemographic, illness-related, and psychological factors, as well as health-related quality of life (QOL).

Methods: This cross-sectional multicentre survey included patients (n = 350) undergoing chemotherapy, radiotherapy, or post-treatment follow-up at two Finnish university hospital outpatient clinics. Data were collected between February and September 2019. The survey employed the Received Knowledge of Hospital Patient scale (RKhp), General Self-Efficacy Scale (GSE), Short Warwick-Edinburgh Mental Well-Being Scale (SWEMWBS), and the 15D Quality of Life Questionnaire. Data were analyzed using multivariate statistical methods.

Results: Patients reported receiving the most knowledge in the biophysiological domain of empowerment, followed by functional and experiential domains, whereas knowledge regarding financial, social, and ethical aspects was received the least. Several sociodemographic factors were significantly associated with received knowledge. Patients with higher education, and those who were single or employed, reported receiving less knowledge. In contrast, illness-related factors showed little or no association with received knowledge. Of the psychological factors, only positive mental well-being was associated with higher levels of received knowledge. No associations were found between received knowledge and self-efficacy or QOL.

Conclusions: The findings highlight the need to improve patient education, particularly in psychosocial, ethical, and financial aspects, to better address patients' individual knowledge needs. This study offers insights for clinical practice and future research aiming to enhance patient-centered education.

1. Introduction

Cancer is the second leading cause of death worldwide, with nearly 20 million new cases diagnosed in 2022. By 2050, 35 million new cases are expected annually, which represents a 77 % increase from 2022 (Bray et al., 2024). Similarly, In Finland the number of cancer cases is expected to increase significantly due to an ageing population, with about 11,000 more cases in 2030 compared to 2013. As a result, cancer increasingly requires comprehensive healthcare resources (Cancer Society of Finland, 2025).

Patients with cancer face many psychosocial and health concerns during the whole trajectory of illness, treatment and care. These concerns arise not only from the adverse effects of the treatments, but many psychological, practical, financial and social problems caused by cancer and its treatment (Riba et al., 2019). While some of these concerns emerge during or after cancer treatment, other persist in a long-term manner, and appear months or even years later (Palmer et al., 2020; Stein et al., 2008).

Based on research into cancer patients' expectations they are high regarding the content of patient education. Specifically, patients expect detailed knowledge concerning the prognosis, possible side effects, indicators of cancer recurrence, potential benefits of the treatment proposed for them, as well as the psychosocial effects of cancer (Palmer et al., 2020; Vaartio-Rajalin et al., 2015; Husson et al., 2011; Siekkinen et al., 2008). Patients place great value on the patient education provided by healthcare professionals, which is crucial for their empowerment. However, expectations regarding education and received knowledge among patients with cancer are widely reported to be unfulfilled (Ross et al., 2022; Arora et al., 2007; Doherty et al., 2019; Faller et al., 2016; Bergenmar et al., 2014; Watson et al., 2019.)

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* Corresponding author. Department of Nursing Science, Faculty of Medicine, University of Turku, Turku, 20014, Finland.
E-mail address: hejopal@utu.fi (H. Arffman).

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To effectively manage health concerns caused by cancer, patient education needs to support the empowerment of patients. Patient education refers to the support patients receive when searching for information, and understanding and using knowledge related to their health problem. It is the key to a high-quality of care and is achieved through interaction between the patient and healthcare professionals based on the patient's already existing knowledge and their individual knowledge expectations. (Arora et al., 2007; Leino-Kilpi et al., 1999). Empowering patient education involves supporting patients' critical thinking and enabling them to make autonomous, informed decision related to their own care (Anderson and Funnell, 2010). Empowerment can be achieved through education addressing at least the six dimensions supporting empowerment: the biophysiological, functional, experiential, ethical, social and financial dimension (Leino-Kilpi et al., 1998, 2020). Empowerment is both a process and an outcome. The process reflects personal growth and opportunity facilitated by patient interaction between health care professionals and patients. As an outcome, empowered patients have sufficient knowledge and skills to improve their quality of life by changing their own actions in a health-promoting direction and managing the psychosocial effects caused by the illness. (Aujoulat et al., 2007; Bravo et al., 2015).

Patient education has been shown to be associated with psychological factors such as self-efficacy and positive mental well-being, which are both analyzed in this study. Self-efficacy, originally derived from Bandura (1997) social cognitive theory, refers to an individual's belief in their ability to achieve a goal and significantly influences their motivation to act (Bandura, 1997). It has been shown to be a significant factor in patients' survival of this illness as well as improving the psychological well-being and closeness to other people, promoting management of negative things and increasing personal growth (Rottmann et al., 2010; Luszczynska et al., 2005). Positive mental well-being refers to an individual's ability to think positively and experience life satisfaction, cope with stressful life situations, and recognize their own abilities to make decisions affecting their well-being (Tennant et al., 2007; WHO, 2022). Patient education is associated with mental well-being and can significantly improve positive development in cancer patients by strengthening patients' perception of their own, stronger personality and better empowerment to face challenging situations (Raphael et al., 2019; Litzelman et al., 2017).

As an outcome, patient education (i.e. knowledge supporting empowerment) has been shown to be associated with patients' health-related quality of life, indicating that patients who receive more knowledge, tend to have higher scores as regard quality of life among surgical patients (Koekenbier et al., 2016). Patient education interventions widely focusing on the physical, psychological and social consequences of cancer has been shown to improve health related quality of life by improving emotional functioning (Husson et al., 2011; Siekkinen et al., 2015; Caminiti et al., 2021) as well as enhancing self-management and problem-solving skills (McCorkle et al., 2011). Health related quality of life is a multidimensional concept that is assessed by individuals themselves and encompasses physical, emotional and social elements associated with illness and treatment (Sintonen, 2001). However, the association between patient education and quality of life is still open to controversy, as many educative interventions do not show significant improvement on a patient's quality of life (Tuominen et al., 2019; Ryhänen et al., 2013; Hersch et al., 2009).

Ensuring wide-ranging patient education encompassing all the dimensions supporting empowerment (Leino-Kilpi et al., 2020) is an essential element in cancer care. Despite the recognized importance of patient education in cancer care, evidence regarding the association between received knowledge, sociodemographic and psychological factors (such as self-efficacy and positive mental well-being), and health-related quality of life remains scarce and inconsistent. Thus, there is a clear knowledge gap concerning how patient education supports patients' empowerment and quality of life in this specific patient group. To address this gap, this study aims to identify specific areas requiring improvement in patient education, with a focus on understanding individual knowledge gaps among patients with cancer. This knowledge is crucial for developing more effective educational approaches that support patient empowerment in oncology care.

2. Aim of the study

The aim of this cross-sectional study was to analyse the different dimensions of knowledge received by patients with cancer that may support their empowerment. Furthermore, the study investigated possible associations between received knowledge and patients' sociodemographic, illness-related, and psychological background factors, as well as health-related quality of life. The primary objective was to increase understanding of patients' received knowledge in relation to empowerment, and to provide insights for developing patient education among patients with cancer.

The research questions were as follows.

1. What was the level of received knowledge in different dimensions supporting empowerment among patients with cancer?
2. What was the association, if any, between received knowledge (RKhp) and sociodemographic, illness-related and psychological factors?
3. What was the association, if any, between received knowledge (RKhp) and health related quality of life?

3. Methods

3.1. Study design and setting

This is a descriptive, cross-sectional and multicentered study carried out in the outpatient clinics of two (out of five) University hospitals in Finland. The clinics were specifically selected due to their strategic locations, ensuring comprehensive coverage of a diverse patient population across the country. The sample size in the present study was based on previous power analyses conducted using the Received Knowledge of Hospital Patients (RKhp) instrument, which have indicated that approximately 110–220 participants are sufficient to detect meaningful differences or relationships in received knowledge, with power levels ranging from 0.80 to 0.95 and significance levels between 0.01 and 0.05 (Klemetti et al., 2015; Montin et al., 2010; Heikkinen et al., 2007).

3.2. Participants and sampling

Consecutive sampling was used to recruit patients ($n = 350$) undergoing active outpatient cancer treatments or post-treatment follow-up, based on the expected number of eligible patients attending the outpatient clinics during the data collection periods. To reflect differences in patient volumes, the target was to recruit approximately 60 % of participants from the hospital with a higher outpatient volume and 40 % from the hospital with a lower volume. All eligible patients attending outpatient visits during a randomly selected one-to two-week data collection period were invited to participate.

3.3. Inclusion and exclusion criteria

Patients were eligible for participation with the following criteria: aged 18 years or above; undergoing active outpatient cancer treatments, including chemotherapy, radiotherapy or a combination of the two, or post-treatment follow-up; demonstrating sufficient comprehension of the Finnish language; and providing written informed consent. Both patients currently undergoing treatment and those in follow-up were included to capture diverse patient experiences. Importantly, no exclusion criteria were set based on the duration since cancer diagnosis, which allowed for the inclusion of patients at various stages of their cancer journey. Patients with cognitive impairments, severe physical conditions, or language barriers preventing questionnaire completion were excluded.

3.4. Data collection

Data were collected from two university hospitals between February and September 2019, with response rates of 59.8 % (Hospital A) and 48.7 % (Hospital B), respectively. The paper questionnaires were distributed to the patients by the researcher or outpatient and research nurses, with a verbal and written explanation of the study being provided to the patients. The response time requested for patients to complete the questionnaires was a period of three weeks.

Data were collected using two complementary approaches: self-administered questionnaires and extraction of information from patient records. Sociodemographic background data (e.g., age, gender, education, marital status, living situation, employment status, and living environment) as well as psychological background factors (health-related self-efficacy and positive mental well-being) and quality of life were collected through patient-completed questionnaires using validated instruments. For the retrieval of illness-related factors (e.g., cancer diagnosis, stage, type and duration of treatment), patients provided their personal identification numbers as part of the informed consent process, enabling the researcher to extract relevant medical information from patient records. After data collection, all personal information was coded and stored electronically to ensure confidentiality.

3.5. Instruments

Four parallel, valid and suitable instruments were used to collect the data (Table 1). The received knowledge was assessed using the Received Knowledge of Hospital Patient scale (RKhp) developed at the University of Turku in Finland. This scale is based on the theory of received knowledge supporting empowerment (Leino-Kilpi et al., 2020) and it contains 40 items of received knowledge in six dimensions: biophysiological (8 items); functional (8 items); experiential (3 items); ethical (9 items); social (6 items) and financial (6 items). For example, the patients were asked about received knowledge in the following dimensions: in the biophysiological dimension (e.g. symptoms and different treatment options related to illness), in the functional dimension (e.g. diet, exercise and rest), in the experiential dimension (emotions and possibilities to discuss them with health care professionals), in the ethical dimension (e.g. participating to treatment and care decision-making, ways to make own wishes heard), in the social dimension (provision of the support for family members or caregivers regarding matters related to illness, as well as their participating in treatment and care), and financial dimension (costs and social benefits). The items were rated on a four-point Likert scale ranging from “completely agree” (4) to “completely disagree” (1). In addition, patients could rate the item “does not apply to me” (0). A high total score means a greater amount of knowledge was received. This instrument has been used extensively in national and international studies and found to be a valid instrument (Leino-Kilpi et al., 2020).

Psychological factors were assessed using two instruments: Self-efficacy was assessed using the General Self-Efficacy Scale (GSE), which was designed to assess perceived self-efficacy reflecting optimistic self-believes with the aim to predict coping and adaptation after stressful life events (Schwarzer and Jerusalem, 1995). The scale contains 10 items on a four-point Likert scale ranging from not at all true (1) to exactly true (4) with a higher score meaning a higher perceived self-efficacy. Positive mental well-being was assessed using The Short Warwick-Edinburgh Mental Well-Being Scale (SWEMWBS) (Stewart-Brown et al., 2009). This valid instrument consists of seven items derived from the14-items full WEMWBS (Tennant et al., 2007), encompassing aspects of mental well-being, including hedonic and eudaimonic dimensions: positive affect (such as optimism and relaxation), satisfying interpersonal relationships, and positive functioning (which includes clear thinking, self-acceptance, competence, and autonomy). All items are positively phrased and rated on a five-point Likert scale ranging from ’none of the time’ (1) to ’all of the time’ (5).

Health-related quality of life was assessed using a general 15D questionnaire, conceptually consisting of physical, mental and social well-being (Sintonen, 2001). The 15D questionnaire includes 15 dimensions: mobility, vision, hearing, breathing, sleeping, eating, speech (communication), elimination, usual activities, mental function, discomfort and symptoms, depression, distress, vitality and sexual activity. Each dimension is divided into 5 different levels (1 = best possible situation, 5 = worst situation) and generates the 15D score (a single index number over all the dimensions).

3.6. Ethical considerations

The research proposal was approved by the ethics committee of the Hospital District of Southwest Finland (96/1801/2018). Permissions from the research committees of both hospitals were obtained. The respondents received a written information about the study, which explained the purpose and implementation of the study, as well as the principles of voluntary and anonymity. Prior to participating in the study respondents signed an informed consent including personal identification number. They were informed that the number was used solely to extract the relevant illness-related information from patient records and that this information remained confidential and accessible only to the researcher. Permits to use all the instruments were obtained prior to the study from the copyright holders.

3.7. Data analyses

Statistical analyses were obtained using R version 4.0.2. Descriptive statistics were calculated to describe the sample. Univariate statistics (means, standard deviations and percentages) were used to describe the sample on sociodemographic, illness-related and psychological factors and to assess the received knowledge.

The mean score of the received knowledge was divided to three categories using quartiles. The background of the highest and lowest group were compared using Fisher’s exact test and the Mann Whitney *U* test. Linear regression analysis was used to examine the association between sociodemographic, illness-related and psychological factors and the received knowledge and health related quality of life. Because of the large set of possible explanatory variables, a model selection was performed using Akaike Information Criterion (AIC) and exhaustive searching.

4. Results

4.1. Respondents

The sample consisted of patients with cancer (n = 350), aged 24 to 89, with the majority being female. The sociodemographic and illness-related characteristics of the participants are described in detail in Table 2.

4.2. Received knowledge in different dimensions supporting empowerment

Received knowledge (RKhp Total) in all dimensions had been achieved relatively well (mean = 3.03, SD = 0.65) as experienced by patients with cancer (Table 1). Knowledge was best received in the biophysiological dimension, where the dispersion of responses was also the lowest (mean = 3.55, SD = 0.48) and the minimum score was the highest (1.38) indicating the highest knowledge received in this dimension. The second most knowledge was received in the functional (mean = 3.30, SD = 0.69) and third in the experiential dimension (mean = 3.06, SD = 0.79). The least knowledge was received in the financial (mean = 2.40, SD = 0.99), social (mean = 2.73, SD = 0.89) and ethical

Table 1
Instruments, their Properties and Scores.

Concept	Instrument	Subscales	Number of items/max score	Item range	n	Min	Max	Mean	SD	Cronbach alfa	Higher score indicates
Received knowledge supporting empowerment	Received Knowledge of Hospital patients (RKhp)[a]	Total	40	1–4	317	1.2	4.00	3.03	0.65	0.977	Higher received knowledge
Received knowledge supporting empowerment: Subscales		Biophysiological	8	1–4	344	1.38	4.00	3.55	0.48	0.868	Higher received knowledge
		Functional	8	1–4	339	1.00	4.00	3.30	0.69	0.911	
		Experiential	3	1–4	338	1.00	4.00	3.06	0.79	0.768	
		Ethical	9	1–4	333	1.00	4.00	2.90	0.82	0.923	
		Social	6	1–4	332	1.00	4.00	2.73	0.89	0.900	
		Financial	6	1–4	326	1.00	4.00	2.40	0.99	0.933	
Positive mental well-being	The Short Warwick-Edinburgh Mental Well-being Scale (SWEMWBS)[b]		7	1–5	349	11.0	35.0	28.7	4.4	0.873	Higher positive mental well-being, when max score = 35
Self-efficacy	General Self-efficacy scale (GSE)[c]		10	1–4	345	14.0	40.0	32.3	4.0	0.879	Higher perceived self-efficacy, when max score = 40
Health-related quality of life	15D[d]		15	0–1	322	0.5	1.0	0.9	0.1	na	Higher overall quality of life on index number

[a] Received Knowledge of Hospital Patients (RKhp; © Leino-Kilpi, Salanterä, Hölttä, 2003).
[b] The Short Warwick-Edinburgh Mental Well-being Scale (SWEMWBS; © NHS Health Scotland, University of Warwick and University of Edinburgh, 2006).
[c] General Self-efficacy scale (GSE; © Schwarzer and Jerusalem, 1995).
[d] 15D (15D ©/Harri Sintonen, www.15D-instrument.net).

dimensions (mean = 2.90, SD = 0.82) respectively.

4.3. Association between received knowledge (RKhp Total and subscales) and sociodemographic factors

Several sociodemographic factors, including the level of education, marital and employment status were significantly associated with the received knowledge (Table 1). Specifically, highly educated patients reported receiving less knowledge in all dimensions supporting empowerment compared to those attending secondary school specifically in the experiential, ethical, social, and financial dimensions (β = −0.59, p < .001; β = −0.48, p < .001; β = −0.49, p < .001; β = −0.67, p < .001, respectively) (Table 3). Marital status was also found to be associated with received knowledge, with married or partnered patients reporting higher knowledge received compared to single patients in social (β = 0.40, p = .040) and financial dimensions (β = 0.59, p = .006). Additionally, patients who were not working reported higher received knowledge in the social dimension compared to those who were still working (β = 0.25, p = .016) (Table 3). These significant differences were also observed in terms of employment status when investigating the lower and upper quartiles (Table 2).

Sociodemographic factors such as age and gender showed no statistically significant association with received knowledge. Nevertheless, when examining quartiles (Table 2), significant differences emerged regarding age (p = .013) and gender (p = .002). In the lower quartile, where patients reported receiving the least knowledge, they tended to be younger compared to those in the upper quartile. A higher proportion of men was observed in the upper quartile, whereas the lower quartile had a higher proportion of women, although the difference was not as clear as in men. This analysis reveals that factors such as education level, marital and employment status are significantly associated with knowledge received. However, age and gender show no direct association with received knowledge, although significant variations across quartiles were observed.

4.4. Association between received knowledge (RKhp Total and subscales) and illness-related factors

The study highlighted some statistically significant associations between received knowledge and illness-related factors. Specifically, patients in the metastatic stage of cancer reported receiving less knowledge than patients in the curative stage in the functional dimension (β = −0.20, p = .028) (Table 3). Some differences were also found in the knowledge levels by patients with different cancer diagnoses, with patients with lymphoma reporting higher levels of knowledge in the experiential and financial dimensions (β = 0.55, p = .004; β = 0.65, p = .007) respectively, whereas patients with other cancer types also reported lower levels of knowledge in experiential (β = −0.39, p = .016) and financial dimensions (β = −0.57, p = .014). However, based on the relatively even distribution of patients in the upper and lower quartiles of the RKhp Total (Table 2), it appears that background variables associated with cancer (cancer type, ongoing treatment and duration of the treatment or care) had no association with the received knowledge.

4.5. Association between received knowledge (RKhp Total and subscales) and psychological factors

As regards the psychological factors, the self-efficacy mean score was 32.3 (SD 4.0) with a maximum score of 40, and for the positive mental well-being the mean score was 28.7, (SD 4.4) with a maximum score of 35 (Table 1). Among these psychological factors, positive mental well-being had a positive association with received knowledge in all dimensions supporting empowerment; this indicate that patients who have higher levels of positive mental well-being are more likely to achieve higher level of knowledge across all dimensions. The strength of the positive mental well-being was moderate, the coefficient ranging from 0.04 to 0.05 (Table 3). The association is statistically significant at a very high level (p < .001) for all dimensions except the social and financial dimensions, where it was significantly at a lower level (p = .002 and p = .003, respectively). Nevertheless, self-efficacy was not significantly associated with the received knowledge in any of the dimensions. However, significant differences were observed in the lower and upper quartiles (Table 2). Patients in the upper quartile reported significantly higher levels of self-efficacy compared to those in the lower quartile, indicating that higher received knowledge is statistically significantly (p = .029) associated with higher levels of self-efficacy when investigating these quartiles. These results indicate that among psychological factors only positive mental well-being is associated with

Table 2
Socio-demographic, Illness-related and Psychological Background Factors and their Association with Received Knowledge (RKhp[a]).

Sosiodemographic, illness-related and psychological factors	Total f (%)	Mean, (SD)/ Median	Lower quartile in RKhp[a] f (%) n = 80	Upper quartile in RKhp[a] f (%) n = 80	Lower quartile in RKhp[a] Mean (SD) Median	Upper quartile in RKhp[a] Mean (SD) Median	P-value for comparison of lower and upper quartiles in RKhp[a]
Gender							**.013**
Female	243 (69)		65 (56.5)	50 (43.5)			
Male	107 (31)		15 (33.3)	30 (66.7)			
Age in years		61.2 (12.3)			59.3 (12.8) 59	65.09 (9.95) 67	**.002**
Marital status							0.111
Married or having a partner	243 (69)		53 (45.7)	63 (54.3)			
Single (including unmarried, single parents, divorced, widowed)	107 (31)		27 (61.4)	17 (38.6)			
Living alone							0.563
Yes	86 (24)		19 (55.9)	15 (44.1)			
No	264 (75)		61 (48.4)	65 (51.6)			
Highest education							**< .001**
High (degree in the university or university of applied science)	121 (35)		44 (77.2)	13 (22.8)			
Moderate (general upper secondary education or vocational upper secondary education)	134 (38)		24 (42.1)	33 (57.9)			
Low (secondary school)	92 (26)		12 (26.1)	34 (73.9)			
Employment status							**.002**
Working (including full-time job, part-time job, housework)	126 (37)		41 (66.1)	21 (33.9)			
Not working (including retired, unemployed, disabled/sick leave)	222 (63)		39 (39.8)	59 (60.2)			
Living environment							0.342
Large or mid-sized city or suburb	173 (49)		42 (55.3)	34 (44.7)			
Small town or rural area	167 (48)		38 (47.5)	42 (52.5)			
Cancer type							0.125
Breast cancer	144 (41)		38 (55.9)	30 (44.1)			
Colon cancer	44 (13)		7 (50.0)	7 (50.0)			
Prostate cancer	31 (9)		3 (25.0)	9 (75.0)			
Gynecological cancer	32 (9)		7 (43.8)	9 (56.2)			
Upper GI-cancer	33 (9)		8 (50.0)	8 (50.0)			
Head and neck cancer	21 (6)		5 (55.6)	4 (44.4)			
Lymphoma	18 (5)		2 (18.2)	9 (81.8)			
Other	27 (8)		10 (71.4)	4 (28.6)			
State of illness							1.000
Curative	224 (64)		50 (50.0)	50 (50.0)			
Palliative/metastatic	126 (36)		30 (50.0)	30 (50.0)			
Duration of the treatment or care		9.97/4.0					0.668
6 months or less	230 (66)		46 (48.0)	48 (51.0)			
more than 6 months	119 (34)		32 (52.5)	29 (47.5)			
Treatment							0.870
Chemotherapy	174 (50)		38 (51.4)	36 (48.6)			
Radiation therapy	140 (40)		33 (47.1)	37 (52.9)			
Post-treatment follow-up	18 (5)		6 (60.0)	4 (40.0)			
Chemoradiotherapy	17 (5)		3 (50.0)	3 (50.0)			
Other (not started yet)	1 (0,3)		0 (0.0)	0 (0.0)			
Self-efficacy[b]		32.3 (4.0)			31.87 (4,17) 32	33.33 (3.76) 33	**.029**
Positive Mental Well-being[c]		28.7 (4.4)			27.23 (4.35) 27	30.88 (3.56) 31	**< .001**
Health-related Quality of Life[d]		0.9 (0.1)			0.85 (0.09) 0.85	0.90 (0.07) 0.91	**< .001**

Bolded results indicate statistically significant differences at the $p < .05$ level.

[a] Received Knowledge of Hospital Patients (RKhp; © Leino-Kilpi, Salanterä, Hölttä, 2003).

[b] General Self-efficacy scale (GSE; © Schwarzer and Jerusalem, 1995).

[c] The Short Warwick-Edinburgh Mental Well-being Scale (SWEMWBS; © NHS Health Scotland, University of Warwick and University of Edinburgh, 2006).

[d] 15D (15D ©/Harri Sintonen, www.15D-instrument.net).

received knowledge in all dimensions supporting empowerment, whereas the association between received knowledge and self-efficacy was not observed.

4.6. Association between received knowledge (RKhp Total and subscales) and health-related quality of life

The health-related quality of life of cancer patients was relatively high (mean 0.9; SD 0.1) (Table 1). The present study investigated the association between received knowledge and health-related quality of life using the Pearson correlation coefficient (r) (Table 4). Our findings reveal that the biophysiological dimension showed the strongest correlation with health-related quality of life, whereas the social dimension displayed the weakest correlation ($r = 0.29$, $p \leq .001$; $r = 0.16$, $p = .01$, respectively). Therefore, based on the result where the highest correlation coefficient of 0.29 in biophysiological dimension was still low, it can be stated that there is no association between health-related quality of life and received knowledge in any dimension supporting empowerment. An analysis of the quartiles (Table 2) revealed that patients in the upper quartiles - who reported receiving more knowledge - had significantly higher health-related quality scores compared to those in the lowest quartile, who reported receiving less knowledge (mean 0.90, $p < .001$; mean 0.85, $p < .001$, respectively). This suggests a potential association between received knowledge and health-related quality of life.

5. Discussion

The aim of this study was to analyse received knowledge supporting empowerment in different dimensions as seen by cancer patients themselves. Furthermore, this study aimed to investigate the potential association between received knowledge and patient's sociodemographic, illness-related and psychological factors, in addition to their health-related quality of life. To achieve this aim, we investigated a total of 350 patients with cancer ($n = 350$). The finding (together with the previous research) can serve as a basis for improving the empowerment of patients through education in the future.

The results of this study show that the most knowledge was received in the biophysiological dimension of empowerment, which is consistent with previous studies (Rankinen et al., 2007; Ryhänen et al., 2012). However, the knowledge patients received was lacking regarding treatment options and test results, which can hinder patients participating in treatment decision making (Doherty et al., 2019) and lead to incorrect understanding of the illness and treatment goals (Derry et al., 2019). This phenomenon has been reported in earlier studies, where some patients were not aware that their illness had progressed to the metastatic stage (Costantini et al., 2015; Weeks et al., 2012). In conclusion, the results of this study highlight the fact that knowledge was received relatively well about other functional issues regarding daily activities, diet, exercise, rest and hygiene. Adequate patient education is essential for patient with cancer, as the nature of the illness and its treatment often cause physical symptoms and limits the patient's ability to perform everyday activities. Therefore, a high level of knowledge as regards the functional aspect can support patients' self-care, functional well-being and rehabilitation (Doherty et al., 2019; Davies et al., 2008).

However, the received knowledge seems to be lower regarding psychosocial issues, including talking about the emotions caused by the illness. These findings are in line with previous studies, which have found that patients with cancer have been insufficiently provided with education and discussion on how to deal with emotions such as fear of cancer recurrence, stress, anxiety and other psychosocial concerns (Ross et al., 2022; Watson et al., 2019); as well as lack of information on who to turn to for psychosocial support (Raphael et al., 2019). Additionally, knowledge on ethical dimension was received rather poorly. It can indicate that patients do not have sufficient understanding of what is their role in decision-making concerning their treatment and care, how they can make their own wishes heard and what rights they have. In terms of decision-making, the results of this study confirm previous research findings that cancer patients do not receive the necessary knowledge to support their decision-making (Tariman et al., 2010). It is known that decision-making concerning one's own treatment and care plays a significant role in supporting the empowerment of patients (Aujoulat et al., 2007; Bravo et al., 2015). In addition, it is well documented that an active role investigating treatment options gives the patients the sense of control (Jørgensen et al., 2018). It can therefore be concluded that in terms of patient adherence to treatment and empowerment, education needs to be developed especially on ethical aspects. Hence, attention should be paid to the interaction between the patient and the health care professionals by focusing on listening to the patient's own wishes and expectations regarding their treatment and care.

Moreover, our study findings show that the knowledge patients received was particularly lacking in the social and financial dimensions. These results are consistent with earlier studies conducted among surgical patients (Rankinen et al., 2007; Johansson Stark et al., 2014; Klemetti et al., 2015). While these results do not explicitly indicate a negative perception of patient education provided by nurses, it may be attributed to the limited availability of other multidisciplinary resources, such as social workers or rehabilitation nurses, who can assist with social and financial issues. Hence, it is crucial for nurses to have the expertise and ability to guarantee that patients receive comprehensive knowledge encompassing all aspects of patient care supporting their empowerment.

The present study revealed that only a limited number of sociodemographic and illness-related background factors were seen to be associated with received knowledge. Notably, a higher education at a university level was found to be significantly associated with received knowledge, indicating that patients with a university degree may have higher expectations of the knowledge provided by health care professionals. This finding is consistent with previous studies (Rankinen et al., 2007; Johansson Stark et al., 2014).

Nevertheless, the results suggest that sociodemographic and illness-related factors do not appear to be strong predictors for the successful acquisition of knowledge among patients with cancer. Therefore, more attention should be paid to patients' cognitive structures and orientation, i.e. how they structure their treatment. Developing individualized educational programmes that address the patient's unique cognitive capacities together with their knowledge expectations instead of focusing illness-related factors, such as cancer diagnosis, stage of cancer or current treatment, tend to be more effective in supporting empowerment and should be included in future research.

Notably, in this study in the psychological factors the levels of self-efficacy and positive mental well-being of the participating patients were relatively high. This indicates that patients may have high levels of self-efficacy, mental well-being and positive attitudes towards the future despite the challenges posed by the cancer. Positive mental well-being also had a strong positive association with received knowledge in every dimension of empowerment. It can be concluded that this psychological factor is a facilitator for better received knowledge and better overall empowerment. Conversely, it has been documented that those

Table 3
A Regression Model of Received Knowledge in different Dimensions Supporting Empowerment.

Dimension of received knowledge	Variable[a]	β = Regression coefficient	Standard error (SE)	Confidence Interval (95 % CI) lower, upper	p-value[b]
RKhp Total (RKhp; © Leino-Kilpi, Salanterä, Hölttä, 2003)	Intercept				
	Duration of treatment or care: >6 months	−0.04	0.07	−0.18, 0.11	0.620
	Gender; male	0.14	0.08	−0.01, 0.29	0.700
	Employment status; not working	0.11	0.07	−0.03, 0.26	0.123
	Highest education: moderate	−0.09	0.10	−0.26, 0.09	0.338
	Highest education: high	−0.44	0.09	−0.62, −0.26	**< .001**
	Living environment: small town/ rural area	−0.01	0.07	−0.15, 0.13	0.885
	Self-efficacy	−0.01	0.01	−0.03, 0.02	0.640
	Positive mental well-being	0.05	0.01	0.03, 0.07	**< .001**
RKhp/Biophysiological	Intercept				
	Treatment: radiation therapy	−0.06	0.05	−0.16, 0.05	0.272
	Treatment: follow-up	−0.23	0.12	−0.46, −0.00	**.047**
	Treatment: chemotherapy	−0.15	0.12	−0.39, 0.09	0.221
	Highest education: moderate	−0.02	0.06	−0.15, 0.11	0.755
	Highest education: high	−0.17	0.07	−0.31, −0.04	**.010**
	Living environment: small town/ rural area	−0.01	0.05	−0.12, 0.09	0.822
	Self-efficacy	−0.01	0.01	−0.03, 0.00	0.109
	Positive mental well-being	0.05	0.01	0.03, 0.06	**< .001**
RKhp/Functional	Intercept				
	State of illness: metastatic	−0.20	0.09	−0.37, −0.02	**.028**
	Duration of treatment or care: >6 months	0.00	0.09	−0.17, 0.17	0.977
	Employment status; not working	0.09	0.08	−0.06, 0.24	0.245
	Highest education: moderate	−0.09	0.09	−0.27, 0.10	0.353
	Highest education: high	−0.47	0.10	−0.66, −0.28	**< .001**
	Living environment: small town/ rural area	−0.10	0.07	−0.24, 0.05	0.193
	Self-efficacy	−0.01	0.01	−0.03, 0.01	0.361
	Positive mental well-being	0.05	0.01	0.03, 0.07	**< .001**
RKhp/Experiential	Intercept				
	Cancer type: colon	−0.05	0.14	−0.32, 0.22	0.724
	Cancer type: prostate	0.14	0.17	−0.18, 0.47	0.389
	Cancer type: gynecological	0.21	0.15	−0.09, 0.51	0.175
	Cancer type: upper GI	0.07	0.15	−0.23, 0.36	0.642
	Cancer type: head and neck	−0.17	0.18	−0.52, 0.17	0.325
	Cancer type: lymphoma	0.55	0.19	0.18, 0.93	**.004**
	Cancer type: others	−0.39	0.16	−0.71, −0.07	**.016**
	Duration of treatment or care: >6 months	−0.05	0.09	−0.22, 0.13	0.611
	Employment status; not working	−0.08	0.09	−0.26, 0.11	0.418
	Highest education: moderate	−0.26	0.11	−0.47, −0.05	**.015**
	Highest education: high	−0.59	0.11	−0.81, −0.37	**< .001**
	Living environment: small town/ rural area	0.12	0.09	−0.05, 0.29	0.176
	Self-efficacy	0.00	0.01	−0.02, 0.03	0.769
	Positive mental well-being	0.05	0.01	0.03, 0.07	**< .001**
RKhp/Ethical	Intercept				
	Duration of treatment or care: >6 months	−0.03	0.09	−0.20, 0.15	0.780
	Gender: male	0.16	0.10	−0.03, 0.35	0.102
	Employment status; not working	0.19	0.09	0.00, 0.37	**.048**
	Highest education: moderate	−0.09	0.11	−0.32, 0.13	0.410
	Highest education: high	−0.48	0.12	−0.71, −0.25	**< .001**
	Living environment: small town/ rural area	0.04	0.09	−0.14, 0.21	0.682
	Self-efficacy	0.00	0.01	−0.02, 0.03	0.919
	Positive mental well-being	0.05	0.01	0.02, 0.07	**< .001**
RKhp/Social	Intercept				
	Duration of treatment or care: >6 months	−0.08	0.11	−0.29, 0.13	0.446
	Treatment: radiation therapy	0.06	0.11	−0.15, 0.27	0.577
	Treatment: follow-up	−0.04	0.26	−0.49, 0.40	0.843
	Treatment: chemoradiotherapy	−0.34	0.23	−0.80, 0.11	0.140
	Employment status; not working	0.25	0.10	0.05, 0.46	**.016**
	Marital status: married/living with a spouse	0.40	0.20	0.02, 0.79	**.040**
	Highest education: moderate	−0.12	0.13	−0.37, 0.12	0.329
	Highest education: high	−0.49	0.13	−0.75, −0.23	**< .001**

(*continued on next page*)

Table 3 (*continued*)

Dimension of received knowledge	Variable[a]	β = Regression coefficient	Standard error (SE)	Confidence Interval (95 % CI) lower, upper	p-value[b]
	Living environment: small town/ rural area	0.02	0.10	−0.18, 0.22	0.870
	Living alone: no	−0.35	0.21	−0.76, 0.07	0.104
	Self-efficacy	0.00	0.01	−0.03, 0.03	0.908
	Positive mental well-being	0.04	0.01	0.02, 0.07	**.002**
RKhp/Financial	Intercept				
	Cancer type: colon	−0.06	0.19	−0.43, 0.32	0.770
	Cancer type: prostate	0.08	0.26	−0.44, 0.59	0.771
	Cancer type: gynecological	0.08	0.18	−0.28, 0.44	0.677
	Cancer type: upper GI	0.10	0.20	−0.28, 0.49	0.605
	Cancer type: head and neck	−0.24	0.22	−0.68, 0.20	0.275
	Cancer type: lymphoma	0.65	0.24	0.18, 1.13	**.007**
	Cancer type: others	−0.57	0.23	−1.03, −0.12	**.014**
	Duration of treatment or care: >6 months	0.03	0.11	−0.18, 0.24	0.784
	Gender: male	0.29	0.16	−0.02, 0.60	0.065
	Employment status; not working	0.13	0.12	−0.11, 0.36	0.289
	Marital status: married/living with a spouse	0.59	0.21	0.17, 1.00	**.006**
	Highest education: moderate	−0.21	0.13	−0.47, 0.05	0.119
	Highest education: high	−0.67	0.14	−0.94, −0.39	**< .001**
	Living environment: small town/ rural area	0.03	0.11	−0.18, 0.24	0.774
	Living alone: no	−0.47	0.23	−0.92, −0.02	**.040**
	Self-efficacy	0.02	0.02	−0.01, 0.05	0.294
	Positive mental well-being	0.04	0.01	0.01, 0.07	**.003**

[a] Reference classes: Cancer type: breast cancer (ref), State of illness: curative (ref), Duration of treatment or care: ≤6 months (ref), Cancer type: breast cancer (ref), State of illness: curative (ref), Duration of treatment or care: ≤6 months (ref), Cancer treatment: chemotherapy (ref), Gender: female (ref), Employment status: working (ref), Education: low (secondary school) (ref), Living environment: Large or mid-sized city or suburb (ref).

[b] Bolded results indicate statistically significant differences at the $p < .05$ level.

Table 4

Pearson correlations between health-related quality of life and received knowledge in RKhp total and Subscales.

	15D	Bio-physiological	Functional	Experiential	Ethical	Social	Financial
15D (15D ©/Harri Sintonen, www.15D-instrument.net)	1						
RKhp/Biophysiological	0.29[c]	1					
RKhp/Functional	0.27[c]	0.69	1				
RKhp/Experiential	0.22[c]	0.55	0.68	1			
RKhp/Ethical	0.18[a]	0.60	0.69	0.73	1		
RKhp/Social	0.16[a]	0.62	0.62	0.65	0.80	1	
RKhp/Financial	0.20[b]	0.44	0.52	0.56	0.68	0.74	1
RKhp Total (RKhp; © Leino-Kilpi, Salanterä, Hölttä, 2003)	0.25[c]	0.72	0.82	0.81	0.92	0.87	0.81

[a] $p \leq .05$.

[b] $p \leq .01$.

[c] $p \leq .001$.

patients who have poorer mental well-being, altered cognitive capacities or less confidence in their ability to deal with their health-related issues, may have difficulties in obtaining the information even when the information provided is of a high-quality (Vaartio-Rajalin et al., 2015). It should be noted that the inclusion of positive mental well-being as a covariate in regression analyses requires caution. Given the cross-sectional nature of the data, it is possible that positive mental well-being reflects both the disease and treatment experiences as well as the knowledge received, rather than preceding it. Hence, the observed associations should not be interpreted as causal, and intervention studies are needed to clarify these relationships. In this study the association between self-efficacy and received knowledge was not very distinct. Self-efficacy was not significantly associated with the received knowledge in any of the dimensions. However, significant differences were observed between self-efficacy and received knowledge (RKhp Total) in the lower and upper quartiles. Patients in the upper quartile reported significantly higher levels of self-efficacy compared to those in the lower quartile indicating that better received knowledge is associated with higher levels of self-efficacy to some extend. It should be emphasized that in previous research high self-efficacy has been shown to be associated with better symptom management of therapy-related toxicities and thus, predicts higher general physical and emotional health and quality of life (White et al., 2019; Thornton et al., 2021). Therefore, it is fundamental to identify effective approaches for healthcare professionals in order to assess and support each individual's characteristics and cognitive structuring and tailor patient education for supporting their empowerment.

This study revealed that there is no clear association between received knowledge and health related quality of life. However, our findings suggest that patients who reported receiving knowledge relatively well had a better health related quality of life when comparing the averages in lower and upper quartiles. Nonetheless, the correlations between received knowledge and health related quality of life were weak. This finding suggests, along with other studies, that patient education alone may not be sufficient to significantly improve physical or emotional outcomes among patients with cancer (Ryhänen et al., 2013; Hersch et al., 2009) and therefore, effective educational interventions adapted into practice are useful to improve psychological outcomes and quality of life (Siekkinen et al., 2015; Tuominen et al., 2019).

5.1. Strengths and limitations

There are some limitations in this study regarding the sample. Firstly, while the sample size was substantial (n = 350), a more comprehensive inclusion of patients in the survival and follow-up phases would have provided a better understanding of potential variations in education attainment across different treatment phases, yielding more generalizable results. The study only reached 5 % of those participating in follow-up after cancer treatments. Thus, the results can only be generalized with caution.

Secondly, the predominant inclusion of breast cancer patients (40 %) and the secondary representation of colorectal cancer patients (13 %) may introduce a bias in the sample composition. However, a 2020 report by the Finnish Cancer Registry (Pitkäniemi et al., 2020) states that breast and colorectal cancers were the most common cancers in Finland, and therefore also the most represented in this study. Other cancer types, collectively accounting for less than 10 %, were insufficiently represented. Consequently, the "other" group, encompassing diverse cancer diagnoses was inadequately represented, precluding an analysis of potential differences in received knowledge across these groups. Therefore, it should be ensured that these groups are better represented in future studies. It is noteworthy that the inclusion of a diverse group of cancer diagnoses and treatment phases in this study could be considered a strength. This warrants the conclusion that neither the cancer diagnosis nor the treatment phase is significantly associated with the received knowledge.

Thirdly, the cross-sectional design limits causal interpretations, especially regarding psychological variables such as positive mental well-being, which may act both as predictors and outcomes of received knowledge. Future studies using intervention-based designs are recommended to better clarify these causal relationships. The strength of this study is reinforced not only by the large number of respondents, but its implementation across two university hospitals (2 out of 5) specifically selected due to their strategic locations; this factor ensured comprehensive coverage of the population across the country giving more generalizable results.

6. Conclusion

In conclusion, cancer patients appeared to gain the most knowledge in the biophysiological dimension of empowerment, followed by the functional dimensions. This suggests that patients generally receive adequate information about treatment-related aspects, daily activities, diet, exercise, and rest. The lowest levels of knowledge were observed in the financial, social, and ethical dimensions, indicating a lack of understanding of psychosocial issues, such as discussing emotions and social and financial challenges caused by the illness. In the ethical dimension, patients' knowledge about their rights, their role in decision-making, and their ability to express their wishes should be strengthened. Importantly, positive mental well-being was associated with higher levels of knowledge across all dimensions of empowerment, suggesting that this psychological factor may support both knowledge acquisition and overall empowerment. Further research should explore cancer patients' expectations and interpersonal characteristics to better understand how to enhance their empowerment.

CRediT authorship contribution statement

Heli Arffman: Writing – review & editing, Writing – original draft, Methodology, Investigation, Data curation, Conceptualization. **Mervi Siekkinen:** Writing – review & editing, Supervision, Methodology, Investigation, Conceptualization. **Helena Leino-Kilpi:** Writing – review & editing, Supervision, Methodology, Investigation, Conceptualization. **Miko Pasanen:** Writing – review & editing, Supervision, Formal analysis, Data curation. **Heli Virtanen:** Writing – review & editing, Supervision, Methodology, Investigation, Funding acquisition, Conceptualization.

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Declaration of competing interest

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