

# The predictors need for complementary interventions using mobile application technology in women with breast cancer

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## ABSTRACT

**Introduction:** Some women with breast cancer tend to have psycho-social stress, embarrassment from the disease's treatment, and difficulty asking for help. Furthermore, several studies indicate limited use of complementary online intervention in mental and spiritual health care, particularly when using mobile-based technologies. This study identifies the key factors that affect the need for mobile-app complementary interventions and the variables affecting them among Indonesian breast cancer patients

**Methods:** A cross-sectional survey study with a simple random sampling technique included 112 patients between May and July 2022. The research instrument used is The Quality of Life-Breast Cancer questionnaire, Functional Assessment of Chronic Illness Therapy–Spiritual Well-Being (FACIT-Sp), Palliative Performa Scale Version 2, and The Need for Complementary Interventions using mobile-app technology (NCIM) to measure Predictors of The Need for Complementary Interventions. Meanwhile, multiple linear stepwise regression was used, and the potential multicollinearity effects among NCIM predictive variables were assessed through the collinearity analysis of variable inflation factors

**Results:** The psychological-social dimension of quality of life and the faith–peace dimension of FACIT-Sp ( $F = 11.255$ ;  $p = 0.001$ ). The most strongly correlated variable is the psychological dimension ( $t = -3.35$ ,  $p < 0.001$ ).

**Conclusions:** The key factors that affect the need for mobile-app complementary interventions and the variables affecting them among Indonesian breast cancer patients are psychological and social dimensions of quality of life and faith and peace in the spiritual dimension. This study can provide the development of complementary intervention using mobile application technology.

**Keywords:** breast cancer, complementary intervention, mobile-app technology

## Introduction

Women are having high risk to develop breast, colorectal, lung, cervical, and thyroid cancer (WHO, 2022). The prevalence has risen from 1.40/00 to 1.490/00 between 2013 and 2018. Globocan data for 2020, the number of new cases of breast cancer reached 68,858 cases (16.6%) of a total of 396,914 new cases of cancer in Indonesia. Meanwhile, the number of deaths reached more than 22 thousand cases. West Java is the

25th-ranking province, with 202 and 594 cervical and breast cancer cases reported in 2019 (Center for Data and Information Ministry of Health Republic Indonesia, 2019).

The breasts are a woman's second sexual organ that enhances physical beauty. Furthermore, breast cancer impacts self-image and produces psycho-social stress, including melancholy, inadequacy, sorrow, and embarrassment from the disease's treatment (Zhang et

al., 2019). Many women with breast cancer isolate themselves because they feel ashamed and cannot form meaningful relationships with others (Najmabadi et al., 2014). Therefore, sufferers tend to have difficulty asking for help, disrupting their quality of life.

One of the objectives of healthcare providers is to actively manage patients' disease and treatment-related health issues (Santos et al., 2021). Nurses need to think of holistic intervention strategies, including complementary interventions ones that safeguard their privacy (Galutira, 2018). Nurses and other healthcare professionals have thought about incorporating complementary interventions, such as acupuncture, music therapy, hypnosis, and massage therapy, into clinical practice to give their patients a more holistic treatment and care (Anisa, Erika and Rachmawaty, 2018). The theory of unity by Martha E. Rogers stated that humans are open systems. They can be influenced by external factors (Berman, Snyder and Frandsen, 2016), hence the role of nurses in influencing illness individuals with appropriate interventions is very important, because they value a holistic approach to health, nurses often have a positive attitude toward complementary and alternative medicine (Elfaki, 2022).

The discipline of eHealth (Health Informatics/Medical Informatics) is expanding globally as a result of recognition from renowned organizations like the World Health Organization, Institute of Medicine in the USA, and many others (Qureshi, Farooq and Qureshi, 2021). Mobile technology in nursing and e-health has revolutionized how nurses execute interventions and interact with patients and other medical professionals (Silva et al., 2018). It allows nurses to improve relationships with patients and families, systematize their job, and give advice on treatment. Participation in health care positions nurses as consultants and advisors, improving results, particularly in managing chronic diseases (Nezamdoust, Abdekhoda and Rahmani, 2022).

There are reports of considerable outcomes from several online therapies. Meanwhile, people with PTSD and co-occurring depressive symptoms can benefit from internet CBT (Sijbrandij, Kunovski and Cuijpers, 2016). Numerous apps have beneficial, evidence-based components such as high-quality data, reliable measurements, and practical meditation techniques. Mobile-app significantly improve mental health treatment in China (Yin et al., 2020).

Indonesia has a very high need for mental health treatments due to a 500% growth in the internet between 2001 and 2015, 95% of whom are active

smartphone users. Mental health services might be employed for this issue (Sukmawati et al., 2019). The Indonesian government issued a decree of the Minister of Health regarding the policy of using e-health, where e-health is very supportive from planning, implementing, and evaluating health programs in Indonesia (Ministry of Health of the Republic of Indonesia, 2022). Several studies indicate that there is still limited use of complementary intervention in health care, particularly when using mobile-app technologies (Gijsberts et al., 2019). This concerns the requirements for getting this intervention, which is unclear. Predictors and status of the need for mobile-app complementary interventions should be determined first, referring to the quality of life and the functional assessment of chronic illness therapy.

This cross-sectional descriptive study was created with the goals of (a) assessing the status of the need for mobile-app complementary interventions in Indonesian women with breast cancer and (b) identifying the key factors affecting the status of needs in this population. This study aimed to examine the need for mobile-app complementary interventions and the variables affecting the concept among Indonesian breast cancer patients. To aid in the development of complementary types of mobile-app interventions, it is critical to identify the key factors relating to the state of this demand. For nurses, this study provides information about the needs of women with breast cancer for complementary interventions utilizing technology, which focus on the Quality of Life domain.

## Materials and Methods

### *Research design*

The study design used a cross-sectional study to identify the predictors of the need for complementary interventions for mobile-app technology.

### *Setting and samples*

The outpatient and inpatient oncology department of a teaching hospital in Bandung served as the recruitment site for this cross-sectional survey. The populations consist of 1,433 women who had breast cancer at Al-Ihsan Hospital Bandung in the last 6 months. Sample calculation was obtained using the Slovin formula  $n = N / (1 + (N \times e^2))$ , with a tolerance degree of 10% (Sugiyono, 2017). About 112 participants were selected by simple random sampling, N (Number of population): n (sample). The interval is 1433 people: 112 people = 13, then the member of the population affected by the sample is every person's name that has a multiple of 13 serial number who met the inclusion

Table 1. Distribution frequencies characteristics of participants (N=112)

Characteristics	N
<b>Age</b>	
early adult (26 – 35 years)	3
late adult (>35-45 years)	30
early elderly (>45-55 years)	51
late elderly (>55 years)	28
<b>Work</b>	
employee	19
unemployed	93
<b>Education</b>	
Elementary	41
Junior High School	27
Senior High School	33
University	11
<b>Cancer Stadium</b>	
I	4
II	54
III	44
IV	10
<b>Comorbid</b>	
present	13
absent	99
<b>Illness period</b>	
< 1 year	35
≥ 1 s.d 2 year	13
> 2 year	64
<b>Therapy</b>	
Surgery	17
Chemotherapy	30
Surgery and Chemotherapy	53
Surgery, radiation, and chemotherapy	9
Surgery and radiation	3

\*Spearman Correlation

criteria, were at least 18 years old, with a minimum Palliative Performa Scale version 2 (PPSv2) score of 60%, and could give a signed agreement. Breast cancer recurrence history, severe organ dysfunction, and inability to read or write Indonesian were all grounds for exclusion criteria.

#### Measurement and data collection

The demographic questionnaire includes age (early adult (26 – 35 years), late adult (>35-45 years), early elderly (>45-55 years) and late elderly (>55 years)), occupation (employee and unemployed), education (Elementary, Junior High School, Senior High School and University), co-morbidities (present and absent), illness period (<1 year, >1 – 2 year, >2 year), type of therapy (Surgery; Chemotherapy; Surgery and Chemotherapy; Surgery, radiation, and chemotherapy; Surgery and radiation), the habit of taking herbal supplements (yes or no), and cancer stage (I, II, III and IV).

The Quality of life (QoL) has been recognized as a subjective measurement reported by patients of the health status of breast cancer women. This instrument is adapted from The Quality of Life-Breast Cancer questionnaire (Ferrell, Dow and Grant, 2012) with Indonesian language adjustment and has 38 statement items covering the physical, psychological, social, and spiritual domains. The spiritual domain leads to the participants's spiritual position based on beliefs. The

questionnaire's validity test produced the results of  $r = 0.361$  and  $0.938$  for Cronbach's alpha, and the instrument uses a scale of 1 to 10. Score calculation was obtained by adding all items in the subscale and making an average score. Each Quality of Life domain will also be calculated separately. Subsequently, the total score is categorized based on the calculation of the predetermined category. Quality of life score categories is 0 – 19% (very poor), 20 – 39% (poor), 40 – 59% (enough), 60 – 79% (good) and 80 – 100% (very good).

The 12-item Spiritual Wellbeing Scale (FACIT-Sp-12) is the most widely used tool for measuring spiritual well-being among those with cancer. The FACIT-Sp distinguishes between meaning, peace, and faith (Arnold, Bredle and Lent, 2021). The version's construct validity and reliability ( $\alpha$  Cronbach = 0.931) consist of 10 statements with a Likert scale. The lowest and highest scores are 0 and 48. Meanwhile, FACIT-Sp categories are low < mean score and high  $\geq$  mean score.

Palliative Performance Scale version 2 an instrument for swiftly communicating individuals' present functional level is the Palliative Performance Scale (PPSv2) Version 2, which provides more common terminology to describe the status. The PPSv2 measures ambulation, activity and signs of disease, self-care, intake, and conscious level using five observer-rated dimensions. Dependability for the PPS between the two groups with an absolute intraclass correlation coefficient of 0.959 (Society, 2009; Cleary, 2015).

Questionnaire was made referring to the Supportive Care Needs Survey (SCNS) (Macleduff *et al.*, 2004) and the Acceptability of Mental Health Mobile App Survey (AMMS) (Sukmawati *et al.*, 2019), which has 10 statement items covering the physical, social, psychological and spiritual dimension. The validity instrument is 0.377, with a Cronbach Alpha score of 0.836. The instrument uses a Likert scale, and the status of the need categories are low < mean score and high  $\geq$  mean score.

The efforts to minimize bias are to make the questionnaire short and easy to understand and set the time for the survey. Therefore, filling out the questionnaire is only about 10-15 minutes, informing participants that the survey is short. The participants should be informed that the poll is anonymous and responses will not have any consequences for the continuity of treatment

#### Data collection

Data collection was done through 1) Sample selection, using samples from teaching hospitals in Bandung, the PPSv2 observation sheet identified eligible

Table 2. Variables scores and categories

Variables	mean	SD	min	max
<b>NCIM</b>	25,17	8,57	10	40
<b>SubScales NCIM</b>				
Physical dimension	5.10	1.97	2	8
Social dimension	4.47	1.64	2	8
Spiritual dimension	10.34	3.76	4	16
Psychological dimension	5.26	2.08	2	8
<b>NCIM Categories</b>				
	<b>n</b>	<b>%</b>		
Low	49	44		
High	63	56		
<b>QoL Categories</b>				
	<b>n</b>	<b>%</b>		
Very poor	28	25		
Poor	36	32		
Enough	25	22		
Good	22	20		
Very good	1	1		
<b>Facit-Sp Categories</b>				
	<b>n</b>	<b>%</b>		
Low	55	49		
High	57	51		

participants. 2) Provide informed consent for all participants after the study's objectives and the confidentiality principle are stated. 3) Meanwhile, enumerators followed the standard instructions, assisting with item-by-item questioning and objectively documenting answers. There were 112 individuals recruited, and the participants' completed questionnaire has no missing data.

**Data analysis**

Data analysis was conducted using IBM SPSS Statistics, version 22.0 (IBM, Armonk, NY, USA). Descriptive analysis was performed using mean, standard deviation, and distribution statistics for the survey's participant characteristics and each subscale. Furthermore, Pearson correlation analysis was used to determine the impact of patient factors on NCIM scores. Multiple linear stepwise regression was used to identify the variables affecting NCIM in breast cancer patients. The potential multicollinearity effects among predictive variables were assessed using the collinearity analysis of variable inflation factors.

**Ethical consideration**

The ethical test is performed with the letter number 123/KEP. 01/UNISA-BANDUNG/III/2022. Patients who agreed to take part signed written consent papers and received guarantees of their confidentiality and anonymity

Table 3. Correlation between continuous variables and Need Complementary Interventions using Mobil Application (NCIM) (N = 112)

Variables	mean	SD	r	p
<b>Age</b>	50	10.04	0,129	0,175
<b>Quality of Life</b>				
Physical dimension	29.57	14.75	-0.168	0.077
Social dimension	47.63	18.43	-2.42	0.010
Spiritual dimension	38.91	8.64	-0.246	0.009
Psychological dimension	97.89	32.66	-3.05	0.001
<b>Facit-Sp</b>				
Meaning	8.92	2.28	0.021	0.830
Faith	10.29	3.75	0.066	0.489
Peace	8.50	2.48	0.065	0.049
<b>PPSv<sub>2</sub></b>	74.82	13.01	0.108	0.256

Pearson Correlation, Correlation is significant at the 0.05 level (2-tailed)

**Results**

**Participant characteristics**

Table 1 shows that the average age of the participants was 50 years (SD = 10.4), more at stage II (n = 54.48%), received types of surgery and radiation therapy (n = 53.47%) and a period of cancer more than 2 years (n=64.57%). About 83% or 93 individuals unemployed, with the highest education level being elementary at 37%.

The correlation between continuous variables and the need for complementary interventions using mobil application (NCIM)

Table 2 shows the mean score NCIM 25.17 at an SD of 8.57. About 56% or 63 participants have high needs for Complementary Interventions using mobil application. Meanwhile, 57% or 64 had a poorer quality of life than other categories, but 51% or 57 had high spiritual well-being.

Based on Table 3 below, social (r = -2.42, p = 0.010) and psychological dimensions (r = -3.05, p = 0.001) of the quality of life of cancer patients have a significant relationship with NCIM. The Facit-Sp dimension faith (r = 0.066, p = 0.489) and peace (r = 0.065, p = 0.049) have a relationship with NCIM, while age and PPSv2 were not associated with NCIM.

According to Table 4, the F value 11.255 with a probability of 0.001 (<0.05) shows that the regression coefficient of the quality of life and the Facit-Sp dimension simultaneously affect the NCIM. Psychological dimensions (t = -3.35 p = < 0.001) of life have a very significant influence on participants in their needs for Complementary Interventions using mobile app technology (NCIM). Furthermore, there is no linear relationship between the independent variables influenced by the dependent variable (VIF<10).

Table 4. Multivariate regression analysis predicting NCIM scores (N = 112)

Model		B	$\beta$	t	p	VIF
Step 1	(Constant)	31.69		8.10	0.00	
	QoL_psychologis	-0.07	-0.265	-2.21	0.03	1.714
	QoL_social	-0.03	-0.064	-0.52	0.60	1.778
	FacitSp_Faith	0.10	0.043	0.33	0.74	2.007
	FacitSp_Peace	0.08	0.024	0.19	0.85	1.930
Step 2	(Constant)	32.01		9.16	0.00	
	QoL_psychologis	-0.07	-0.266	-2.23	0.03	1.713
	QoL_social	-0.03	-0.063	-0.52	0.60	1.778
	FacitSp_Faith	0.14	0.059	0.63	0.53	1.075
Step 3	(Constant)	31.33		9.69	0.00	
	QoL_psychologis	-0.08	-0.306	-3.36	0.00	1.000
	FacitSp_Faith	0.17	0.072	0.79	0.43	1.000
Step 4	(Constant)	33.00		13.42	0.00	
	QoL_psychologis	-0.08	-0.305	-3.35	<0.001	1.000

Dependent Variable: NCIM (Need Complementary Interventions using Mobile Application), VIF = variable inflation factor. R2 = .093, Adjusted R2 = .085 F = 11,255 (p = 0,001)

## Discussions

The key factors that affect the need for mobile-app complementary interventions and the variables affecting them among Indonesian breast cancer patients are psychological and social dimensions of quality of life and faith and peace in the spiritual dimension. This study can provide the development of complementary intervention using mobile application technology. Breast cancer causes psycho-social stress, which includes depression, a sense of inadequacy, sorrow, and shame due to the disease's treatment. Previous studies show that cancer mortality was predicted by psychological discomfort. Community-based cohorts, including participants with a history of cancer, may exaggerate the relationship between psychological distress and subsequent mortality (Hamer, Chida and Molloy, 2009). Socioeconomic challenges, limited access to supportive treatment, late breast cancer diagnosis, self-perception of the disease, social restraints, and other religious/cultural restrictions are potential factors contributing to the projected discrepancy (Haidari et al., 2020). Health professionals can use technology to provide complementary interventions for patients because of face-to-face limitations with health workers.

Most women with breast cancer need complementary interventions based on mobile technology, which has no relationship with the characteristics, as shown in Table 1. The NMCI questionnaire is an instrument created to identify the need for complementary therapies based on mobile technology to support cancer patient's physical, psychological, spiritual, and social health.

Similar studies include internet technology in providing interventions to improve the life of cancer patients, such as research about telehealth medicine. A telemedicine intervention was linked to improved self-efficacy and decreased depression (Chen et al., 2018).

Other studies stated that web-based psycho-social oncology programs successfully lowered stress and depression (Leslie et al., 2022).

Psycho-social problems of breast cancer patients tend to be depressive symptoms such as being down, empty, dismal, and gloomy (Velosa, Caldeira and Capelas, 2017). In addition to being irritated or moody, they may find it difficult to cry or weep without severe precipitation and emotional distress (Veeraiah, Kayser and Sudhakar, 2022). According to previous research, fear of the sickness progressing, inability to engage in one's interests, and having to revisit the hospital are the three most common causes of psycho-social problems in breast cancer patients (Herschbach et al., 2004). Poor mental health can affect the immune system and cause the manifestation of distressing somatic symptoms (Zapała et al., 2022).

A major component of spiritual suffering is a lack of meaning in life, which appears to be connected to depression. Spirituality significantly impacts the quality of life and psychological well-being after accounting for a health state. Most spirituality assessments include the religious and existential components (Levine and Targ, 2003). However, faith and peace affect the need for mobile-app complementary interventions, but most participants always worship as their religious activity.

The possible reason for the correlation between faith and peace with NCIM is that it encourages patients to seek support through complementary interventions. This is based on mobile app in accepting the possibility of physical disability and other negative effects of breast cancer.

A similar study stated that the positive influence on breast cancer patient's quality of life (QoL) is spiritual well-being (SpWB). SpWB is not always limited to a particular type of behavior or idea. The meaning, purpose, fulfillment, and peace experienced in life stem largely from their faith in themselves, others, and God (Yilmaz and Cengiz, 2020). Furthermore, spiritual well-

being is linked to lower anxiety and sadness and a higher quality of life (Chen et al., 2021).

Nurses need to consider complementary interventions based on the mobile app to support the psychosocial dimension and also spiritual well-being, especially faith and peace, in women with breast cancer. Therefore, breast cancer patients have a good quality of life characterized by good mental and social health.

## Conclusion

Women with breast cancer who participated in this study had a need for NCIM. Furthermore, predictors that were found to affect the level of need are the psychological-social dimension of quality of life and faith-peace FACIT-Sp. The results suggest that an effective mobile-app-based complementary intervention model should be developed based on these dimensions.

In clinical practice, the nurse team should pay special attention to patients with low quality-of-life scores and poor spiritual well-being. They should organize support activities, including family members, patient colleagues, friends, and clinical staff. Furthermore, nurses should provide various complementary therapies to help patients develop healthy coping mechanisms. The findings also point out a positive direction, recommending that research nurses collaborate closely with information technology specialists to create complementary therapies appropriate for mobile-app. Complementary interventions that might be developed are guided spiritual mindfulness through mobile applications. The technology used needs to be considered in patients who are often senile.

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## Conflict of interest

The absence of any conflicts of interest between the subjects and the researcher is ensured by this study. No ties to family, relatives, or other relationships will have an impact on the study's outcomes.

## References

- Anisa, N. R., Erika, K. A. and Rachmawaty, R. (2018) 'Nurse's spiritual care competencies to patient with end stage breast cancer', *Journal of Public Health*, 7(4), pp. 268–273. doi: 10.11591/ijphs.v7i4.14742.
- Arnold, B., Bredle, J. and Lent, L. (2021) *FACIT-Sp: Functional Assessment of Chronic Illness Therapy - Spiritual Well-Being*, *Facit.Org*. Available at: <https://www.facit.org/measures/FACIT-Sp> (Accessed: 30 July 2022).
- Berman, A., Snyder, S. and Frandsen, G. (2016) *Kozier and Erb's Fundamentals of Nursing: Concepts, Process and Practice*. 10th edn, *Nurse Education in Practice*. 10th edn. Boston: Pearson. doi: 10.1016/j.nepr.2011.09.002.
- Center for Data and Information Ministry of Health Republic Indonesia (2019) *The burden of cancer in Indonesia, Center for Data and Information Ministry of Health Republic Indonesia*. Jakarta. Available at: <https://pusdatin.kemkes.go.id>.
- Chen, J. et al. (2021) 'Association between spiritual well-being, quality of life, anxiety and depression in patients with gynaecological cancer in China', *Medicine*, 100(1), p. e24264. doi: 10.1097/MD.00000000000024264.
- Chen, Y.-Y. Y. et al. (2018) 'Effect of telehealth intervention on breast cancer patients' quality of life and psychological outcomes: A meta-analysis', *Journal of Telemedicine and Telecare*, 24(3), pp. 157–167. doi: <https://doi.org/10.1177/1357633X16686777>.
- Clearly, T. A. (2015) 'The Palliative Performance Scale (PPSv2) Version 2.', *Try This: Best Practices in Nursing Care to Older Adults*, (32), pp. 1–2. doi: 10.1186/1472-684X-7-10.Institute.
- Elfaki, B. A. (2022) 'Perspectives on complementary and alternative medicine: The role of nurses and health care providers: A review', *Journal of Positive School Psychology*, 6(4), pp. 5978–5984.
- Ferrell, B., Dow, K. H. and Grant, M. (2012) 'Quality of Life Instrument - Breast Cancer Patient Version (QOL-BC)', *Measurement Instrument Database for the Social Science*. Available at: [www.midss.ie](http://www.midss.ie).
- Galutira, G. D. (2018) 'Theory of reflective practice in nursing', *International Journal of Nursing Science*, 8(3), pp. 51–56. doi: 10.5923/j.nursing.20180803.02.
- Gijsberts, M.-J. H. E. et al. (2019) 'Spiritual Care in palliative care: A Systematic review of the recent European literature', *Medical Sciences*, 7(2), p. 25. doi: 10.3390/medsci7020025.
- Haidari, R. El et al. (2020) 'Factors associated with health-related quality of life in women with breast cancer in the middle east: A systematic review', *Cancers*, 12(3), pp. 1–19. doi: 10.3390/cancers12030696.
- Hamer, M., Chida, Y. and Molloy, G. J. (2009) 'Psychological distress and cancer mortality', *Journal of Psychosomatic Research*, 66(3), pp. 255–258. doi: 10.1016/J.JPSYCHORES.2008.11.002.
- Herschbach, P. et al. (2004) 'Psychological problems of cancer patients: A cancer distress screening with a cancer-specific questionnaire', *British Journal of Cancer*, 91(3), pp. 504–511. doi: 10.1038/sj.bjc.6601986.
- Leslie, M. et al. (2022) 'Web-based psychological interventions for people living with and beyond cancer: A meta-review of what works and what doesn't for maximising recruitment, engagement, and efficacy (Preprint)', *JMIR Cancer*, 8. doi: 10.2196/36255.

- Levine, E. G. and Targ, E. (2003) 'Spiritual correlates of functional well-being in women with breast cancer', *Integrative Cancer Therapies*, 1(2), pp. 166–174. doi: 10.1177/1534735402001002008.
- Macleoduff, P. et al. (2004) 'Supportive Care Needs Survey : A guide to administration , scoring and analysis', *Australia: University of New Castle*, (January).
- Ministry of Health of the Republic of Indonesia (2022) *Decree of the Minister of Health of the Republic of Indonesia concerning the Implementation of an Electronic-Based Government System in the Health Sector and Transformation Strategy Digital Kesehatan*. Indonesia. Available at: [https://yankes.kemkes.go.id/unduhuan/fileunduhuan\\_1669623021\\_65288.pdf](https://yankes.kemkes.go.id/unduhuan/fileunduhuan_1669623021_65288.pdf).
- Najmabadi, K. M. et al. (2014) 'Self-disclosure of breast cancer diagnosis by Iranian women to friends and colleagues', *Asian Pacific Journal of Cancer Prevention*, 15(6), pp. 2879–2882. doi: 10.7314/APJCP.2014.15.6.2879.
- Nezamdoust, S., Abdekhoda, M. and Rahmani, A. (2022) 'Determinant factors in adopting mobile health application in healthcare by nurses', *BMC Medical Informatics and Decision Making*, 22(1), pp. 1–10. doi: 10.1186/s12911-022-01784-y.
- Qureshi, Muhammad Mudassar, Farooq, A. and Qureshi, Muhammad Mazhar (2021) 'Current eHealth challenges and recent trends in eHealth'. Lahore, pp. 1–11. Available at: <http://arxiv.org/abs/2103.01756>.
- Santos, A. D. et al. (2021) 'Oncology patients' experiences with novel electronic patient portals to support care and treatment: Qualitative study with early users and nonusers of portals in alberta, canada', *JMIR Cancer*, 7(4). doi: 10.2196/32609.
- Sijbrandij, M., Kunovski, I. and Cuijpers, P. (2016) 'Effectiveness of Internet-Delivered Cognitive Behavioral Therapy for Posttraumatic Stress Disorder: a Systematic Review and Meta-Analysis', *Depression and Anxiety*, 33(9), pp. 783–791. doi: 10.1002/da.22533.
- Silva, A. M. de A. et al. (2018) 'Mobile technologies in the nursing area', *Revista brasileira de enfermagem*, 71(5), pp. 2570–2578. doi: 10.1590/0034-7167-2017-0513.
- Society, V. H. (2009) *Palliative Performance Scale*.
- Sugiyono (2017) *Metodologi Penelitian Kuantitatif, Kualitatif dan R&D Quantitative, Qualitative and R&D Research Methodology*. Bandung: Alfabeta.
- Sukmawati, I. et al. (2019) 'Development and validation of acceptability of mental-health mobile app survey (AMMS) for android-based online counseling service assessment', *Journal of Physics: Conference Series*, 1339(1), pp. 1–8. doi: 10.1088/1742-6596/1339/1/012124.
- Veeraiah, S., Kayser, K. and Sudhakar, R. (2022) 'Psychosocial factors influencing distress among cancer patients in South India', *Journal of Psychosocial Oncology Research & Practice*, 4(1), p. e067. doi: 10.1097/or9.000000000000067.
- Velosa, T., Caldeira, S. and Capelas, M. L. (2017) 'Depression and spiritual distress in adult palliative patients: A cross-sectional study', *Religions*, 8(8), pp. 1–19. doi: 10.3390/rel8080156.
- WHO (2022) *Cancer*. Available at: [https://www.who.int/health-topics/cancer#tab=tab\\_1](https://www.who.int/health-topics/cancer#tab=tab_1).
- Yilmaz, M. and Cengiz, H. Ö. (2020) 'The relationship between spiritual well-being and quality of life in cancer survivors', *Palliat Support Care*, 18(1), pp. 55–62. doi: 10.1017/S1478951519000464.
- Yin, H. et al. (2020) 'Mobile mental health apps in China: Systematic app store search', *Journal of Medical Internet Research*, 22(7), pp. 1–14. doi: 10.2196/14915.
- Zapata, J. et al. (2022) 'The needs of cancer patients during the COVID-19 pandemic — psychosocial, ethical and spiritual aspects — systematic review', *Peer Journal*, 10(e), p. 13480. doi: 10.7717/peerj.13480.
- Zhang, Q. et al. (2019) 'Psychosocial predictors of adjustment to disability among patients with Breast Cancer: A Cross-Sectional descriptive study', *Journal of Nursing Research*, 27(2), pp. 1–7. doi: 10.1097/jnr.0000000000000283.

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