

# Sustainability of Healthcare Services, Psychological Problems, and Patient Satisfaction in Cancer Care: Examining the Interplay

Vimala Venugopal Muthuswamy<sup>1\*</sup>, P. Chitramani<sup>2</sup>

<sup>1</sup>Department of Management, College of Business, King Faisal University, Al-Ahsa 31982, Saudi Arabia.

Email: fmuthuswamy@kfu.edu.sa

<sup>2</sup>Professor in Business Administration, Dean – School of Commerce and Management, Avinashilingam Institute for Home Science and Higher Education for Women.

Email: chitramani\_mba@avinuty.ac.in

## Abstract

**Purpose:** This study examines the interrelations among psychological problems, sustainable health care services, and cancer patient satisfaction in the context of Kingdom of Saudi Arabia. Primarily, this research aims to check the direct relationship between sustainable health care services and cancer patient satisfaction. Whereas this research used cancer patients' psychological problems as a moderating variable on this relationship. **Method:** This article pursues the research by using the methodology of structural equation modeling (SEM) with STATA software. To achieve the aim of this research the data was collected from 96 cancer patients getting treatment in Kingdom of Saudi Arabia. **Findings:** The findings demonstrate a positive relationship between sustainable healthcare services and patient satisfaction. Furthermore, the psychological problems of cancer patients served as a significant moderator on this relationship. This revealed a complex relation between all these variables. **Implications/Originality:** The following study fills the gap in the existing literature by studying the interconnected dynamics of psychological factors, sustainable health care, and patient satisfaction in cancer care in the Kingdom of Saudi Arabia. The results not only have theoretical implications for future research but also have a practical call for policymakers and healthcare stakeholders to form patient-centric and sustainable care centers for cancer patients.

**Keywords:** Sustainable Healthcare, Cancer Patient Satisfaction, Psychosocial Factors, Healthcare Sustainability, STATA-SEM Analysis.

## INTRODUCTION

With the global incidence of cancer increasing, the context of healthcare services, particularly the intricate domain of cancer care emerges as an alluring area for scientific investigation. Sustainable health-care services are the center of attention in this field of study<sup>[1]</sup> because of their critical role in deciding patient outcomes. It is becoming increasingly apparent in the ever-expanding narrative of cancer care that complexities of psychological well-being and patient satisfaction are interconnected with medicinal treatments.<sup>[2]</sup> Despite the difficulties, researchers<sup>[3,4]</sup> are determined to uncover the complex processes that define the connection between long-term health care sustainability and the well-being of cancer patients who are facing treatment challenges. Notable contributions to this field of study have come from works such as Hlubocky *et al.*<sup>[5]</sup> and

Deshields *et al.*<sup>[6]</sup>, which offer insightful perspectives on how sustainable practices relate to the quality of patient experiences. Healthcare sustainability as it pertains to cancer care is emerging as a complicated tapestry with subtle colors and intricate subtleties as empirical evidence progresses further.<sup>[7]</sup>

As, recent studies<sup>[8,9]</sup> have shed light on the intricate dynamics of this important aspect by doing empirical research on the relationship between health-care advances and the cancer patients perspectives. Koshimoto *et al.*<sup>[10]</sup> conducted an extensive analysis of the impact of sustainable resource allocation on patient outcomes in cancer treatment settings. Their

**Address for Correspondence:** Department of Management, College of Business, King Faisal University, Al-Ahsa 31982, Saudi Arabia.  
Email: fmuthuswamy@kfu.edu.sa

**Submitted:** 17<sup>th</sup> September, 2023

**Received:** 28<sup>th</sup> December, 2023

**Accepted:** 12<sup>th</sup> January, 2024

**Published:** 30<sup>th</sup> January, 2024

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

**How to cite this article:** Muthuswamy V V, Chitramani P. Sustainability of Healthcare Services, Psychological Problems, and Patient Satisfaction in Cancer Care: Examining the Interplay. *J Nat Sc Biol Med* 2024;14:314-328

### Access this article online

Quick Response Code:



Website:

[www.jnsbm.org](http://www.jnsbm.org)

DOI:

[https://doi.org/10.4103/jnsbm.JNSBM\\_14\\_2\\_29](https://doi.org/10.4103/jnsbm.JNSBM_14_2_29)

findings showed a strong positive correlation, implying that long-term, efficient resource allocation improves patient outcomes. Lee *et al.*<sup>[11]</sup> also explored the effect of organizational efficiency on patient perceptions in the context of sustainable health care. The study's findings, which emphasized the crucial relevance of organizational performance in providing positive patient experiences, found that patient satisfaction was higher in firms that adopted sustainable methods.<sup>[12]</sup> looked at the accessibility and communication components of sustainable healthcare systems, adding to our understanding of this complex interaction. Ofei *et al.*<sup>[13]</sup> findings suggested that better accessibility and effective communication were two key elements influencing the overall patient experience in cancer care. Improved accessibility, clear communication, and long-term health care services have all been demonstrated to significantly improve patient satisfaction.<sup>[14]</sup> Overall, these empirical findings show the complicated relationship between cancer patients' quality of life and long-term access to healthcare, emphasizing the need for a patient-centered approach to healthcare delivery.

There are still a lot of significant gaps that need to be addressed in order to further investigate and improve the comprehension of the topic, even though prior empirical research<sup>[15,16]</sup> has produced insightful conclusions. One glaring gap is the delicate effect of sustainable resource allocation on certain aspects of patient satisfaction. Since Zhao *et al.*<sup>[17]</sup> concentrated on overall patient outcomes, there is opportunity for a more in-depth examination of the ways in which sustainable practices impact particular components, such as communication, emotional support, and the quality of treatment as perceived by patients. Understanding these little differences is critical to developing therapies that specifically address certain aspects of patient satisfaction in cancer treatment settings.<sup>[18]</sup> Furthermore, little is known about the broader contextual and cultural elements that influence the relationship between sustainability and patient satisfaction in the literature. Boichichio *et al.*<sup>[19]</sup> focused on organizational efficiency inside specific healthcare facilities rather than examining potential variations in the impact of sustainable practices across cultural and contextual contexts. Developing flexible and culturally sensitive healthcare practices that meet the particular needs and expectations of various patient communities requires an understanding of these distinctions.<sup>[20]</sup> Furthermore, previous studies have primarily focused on the effects of sustainable practices within the confines of companies, leaving out possible cross-system partnerships. While Muhamed *et al.*<sup>[21]</sup> highlighted the importance of communication and accessibility within the organizational setting, further research is needed to ascertain how collaborative sustainability activities throughout hospital networks can improve patient

satisfaction. Examining collaborative approaches may reveal chances and combined resources that enhance the general standard of living for cancer patients undergoing treatment.<sup>[22]</sup> These research gaps must be filled in order to generate more targeted and effective healthcare solutions. This will make it easier for us to comprehend the intricate connection between cancer patients' satisfaction and long-term healthcare services.

The resource-based view and the service quality model<sup>[23,24]</sup> provide theoretical evidence for the link between cancer patient satisfaction and sustainable health-care services. According to the service quality model, patient satisfaction is directly related to the quality of healthcare services, including sustainable practices. Furthermore, the resource-based view stresses the strategic use of resources, emphasizing how long-term resource allocation can improve organizational effectiveness and, ultimately, patient outcomes.<sup>[25]</sup> Building on these theoretical frameworks, the key goals of this study are to experimentally evaluate the complex aspects of sustainable health-care services that have a substantial impact on cancer patient satisfaction. This study attempts to improve our understanding of the complex relationship between patient happiness and sustainability in the specific environment of cancer care by overcoming the inadequacies of previous empirical studies.

## LITERATURE REVIEW

There is a growing body of academic research<sup>[7,11]</sup> that focuses on cancer care and investigates the psychological well-being of patients, the long-term viability of healthcare systems, and patient satisfaction. To better understand its intricate dynamics, academics in the field have looked at the topic from a number of angles.<sup>[3]</sup> Studies by van der Kruk *et al.*<sup>[26]</sup> and Lee *et al.*<sup>[11]</sup> looked at resource allocation, systemic approaches, and financial models from the perspective of sustainability in order to guarantee the long-term viability and effectiveness of healthcare services. Several studies have shed light on the emotional and financial burdens connected with cancer diagnosis and treatment, as well as the psychological obstacles that patients face.<sup>[2,27]</sup> One such study is the seminal one conducted by Schofield *et al.*<sup>[28]</sup>. Thus, psychosocial support would surely be a very beneficial complement to cancer treatment regimens. The importance of patient satisfaction has been highlighted by additional research, as demonstrated by the publications of Deshields *et al.*<sup>[6]</sup> and Bergerot *et al.*<sup>[15]</sup>. These findings highlight the need of implementing a patient-centered strategy that prioritizes clinical outcomes alongside communication, empathy, and the whole healthcare experience. The relevant literature<sup>[14,19]</sup> outlines the difficulties faced by medical professionals in providing cancer care and underscores the need of patient-centered procedures

that integrate psychological well-being and aim to improve cancer patients' long-term satisfaction.

A few components of sustainable health care services are organizational performance, efficient resource allocation, and long-term system sustainability.<sup>[8]</sup> It provides as an illustration of how healthcare services can effectively address present requirements without jeopardizing their capacity to address future ones. On the other hand, "cancer patient satisfaction" describes the general joy and contentment that patients have when interacting with their healthcare team.<sup>[10]</sup> It talks about being honest, personable, providing excellent care, and the patient's overall experience receiving cancer treatment. Empirical research techniques have been extensively employed in previous studies to examine the connection between patient satisfaction and the sustainability of healthcare.<sup>[16]</sup> Researchers Zhao *et al.*<sup>[17]</sup> and Bochicchio *et al.*<sup>[19]</sup> looked into how sustainable practices affected patient outcomes and healthcare quality. Additionally, research by Chan *et al.*<sup>[4]</sup> emphasized the significance of sustainable healthcare practices in guaranteeing favorable patient experiences while examining the various facets of patient satisfaction. When considered collectively, these research demonstrates a relationship between patient satisfaction and environmentally friendly medical services, suggesting that eco-friendly practices improve patient attitudes and contentment in general.<sup>[13]</sup> "Cancer patient satisfaction is significantly impacted by sustainable health-care services," is the hypothesis that is validated by the current empirical data. Previous studies<sup>[21,28]</sup> that demonstrate how sustainable healthcare practices enhance patient experiences and perceptions provide credence to this hypothesis. Empirical support from Hlubocky *et al.*<sup>[5]</sup> and Laprise<sup>[14]</sup> provide credence to this theory, demonstrating that offering cancer patients sustainable healthcare services is likely to boost their happiness to a large degree. It is reasonable to conclude that there is a strong and positive correlation between long-term health care services and cancer patient satisfaction based on the studies that are currently available.

H1: Sustainable health-care services significantly influence the cancer patient satisfaction.

A deep understanding exists about the complicated worries that cancer patients go through by suggesting that mental health problems have a big effect on their happiness.<sup>[29]</sup> A lot of research has shown that psychosocial factors have a big effect on how cancer people feel in many different ways. Several studies<sup>[30]</sup> have found a link between low patient satisfaction and psychosocial disorders such as anxiety, sadness, and social isolation. Treatments for cancer have a lot to do with the mental and social parts of care, which in turn affect how the patient feels about their whole experience.<sup>[31]</sup> It is important to deal with all of the physical, emotional, and social aspects of cancer, as studies have shown that people who are dealing with psychosocial problems are often unhappy with the

care they receive.<sup>[32]</sup> Untaru *et al.*<sup>[33]</sup> provided empirical support for this hypothesis by incorporating insights from healthcare providers in addition to patients. Researchers have found that adding psychological services to cancer treatment makes patients happier, more likely to stick with their treatment, healthier overall, and saves money on healthcare.<sup>[34]</sup> There are ways for people with psychosocial problems to feel less unhappy with their lives. These include therapy, support groups, and integrated mental health treatments.<sup>[32]</sup> Comprehensive and patient-centered cancer care is very important because real-world studies show that mental health issues have a big effect on how happy cancer patients are.

H2: Cancer patients' psychosocial problems significantly influence cancer patient satisfaction.

Literature has presented some advances in the field of cancer patients management by identifying that cancer patients' psychosocial problems affect the link between long-term healthcare efficiency and their happiness.<sup>[35]</sup> These findings have some deep roots which needs to be further explored. As, an expanding body of evidence suggests that the relationship between patient satisfaction and sustainable healthcare services is moderated by psychosocial challenges.<sup>[36]</sup> Sustainable health care services are linked to happier patients, but mental health problems of cancer patients may make this link stronger or weaker.<sup>[37]</sup> Cancer patients look at sustainable practices through the lens of psychosocial factors such as their mental health, social support, and ways to deal with stress, say experts and researchers in the field.<sup>[38,39]</sup> To help cancer patients get the most out of their treatments and make them more sustainable, healthcare professionals need to have a deep understanding of how psychological problems can change the way medicines work.<sup>[40]</sup> Nassi *et al.*<sup>[41]</sup> found that cancer patients have better general experiences when their mental health problems are treated in a more comprehensive way and sustainable healthcare practices are used. With psychosocial assistance, the bad effects of sustainable practices on patient satisfaction can be lessened and the good effects can be amplified.<sup>[42]</sup> Hawley *et al.*<sup>[43]</sup> demonstrate in their empirical synthesis that there are intricate and dynamic interrelationships among patient satisfaction, mental health, and sustainable healthcare services. Furthermore, the literature provides support for the hypothesis by explaining that the emotional and social well-being of cancer patients has an impact on the intricate network of relationships that link long-term health and patient satisfaction.<sup>[44]</sup> For cancer patients and the long-term health of healthcare systems, this means that healthcare plans need to be all-encompassing and tailored to the way these factors interact with each other.

H3: Cancer patients' psychosocial problems moderate the relationship of sustainable health-care services and cancer patient satisfaction.

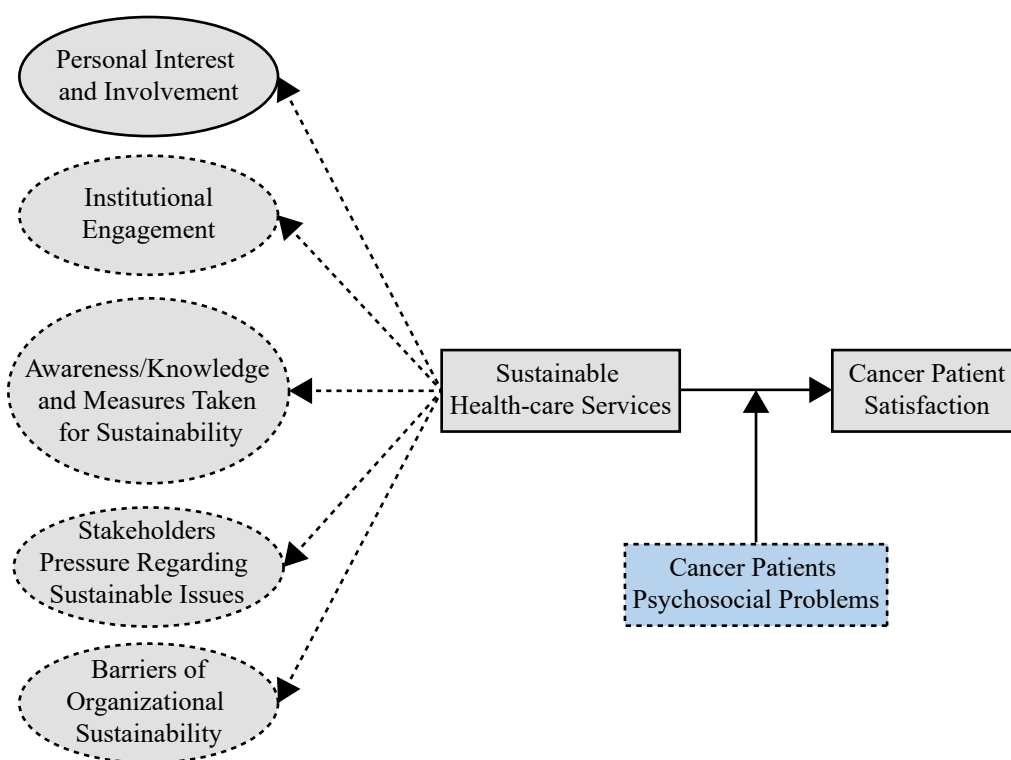


Figure 1: Theoretical Model.

## METHODOLOGY

The study involved a sample of 96 cancer patients residing in the Kingdom of Saudi Arabia. The selection criteria included individuals diagnosed with various forms of cancer, representing a diverse demographic and clinical profile. Participants were recruited through medical facilities, and their participation was voluntary, ensuring informed consent. The demographic composition of the sample encompassed variables such as age, gender, cancer type, and treatment history, contributing to the heterogeneity necessary for a comprehensive analysis. To measure the variables under investigation, scales were adopted from previous well-established research in the field. The scales measured cancer patients' psychological problems, sustainable healthcare services, and patient satisfaction (see appendix 1). The comparability and consistency of scales increased the promptness of findings, because of being adapted. Sustainable health-care services was measured on nineteen items scale<sup>[45]</sup> in this study with five dimensions (three items were for personal interest and involvement, four were for institutional engagement, three were for awareness/knowledge and measures taken for sustainability, three were for stakeholders' pressure regarding sustainable issues, and six items were for barriers of organizational sustainability). Cancer patients' psychosocial problems was measured on nine items scale of Bogaarts *et al.*<sup>[46]</sup>. Cancer patient satisfaction was measured on eighteen items scale of Al Ansari *et al.*<sup>[47]</sup>. The reliability and standardization of the data collection methods were ensured by experts, which were conducted

through structured interviews. The interview gave an edge in qualitative understanding of psychological factors more in-depth, making it all comprehensive to understand sustainable health care and patient satisfaction through the open experience of the participants. This article pursues the research by using the methodology of structural equation modeling (SEM) with STATA-SEM, so simultaneously varied relations can be studied. The direct and indirect relations were studied by this statistical method, which allowed an understanding of the moderating role of psychological problems on patient satisfaction.

## RESULTS

As shown in Table 1, the dependability study showed that the measuring tools used in the investigation were reliable. The Cronbach's Alpha values show that each variable is reliable. The Cronbach's Alpha score of 0.752 shows that sustainable health care services are very consistent with each other. A Cronbach's Alpha coefficient of 0.820 means that the items are very consistent and make sense, which means that the scale is very reliable for measuring the psychological worries of cancer patients. The Cronbach's Alpha score of 0.836 shows that the questions used to find out how much cancer patients enjoy their lives are very consistent with each other. This amount of internal consistency is like judging how happy cancer patients are with their care. These results show that the measure tools used in the study were correct, which gives people more faith in the data analysis and helps them better understand the complicated relationships that were studied.

**Table 1: Cronbach's Alpha.**

Variable	Cronbach's Alpha
Sustainable health-care services	0.752
Cancer patients' psychosocial problems	0.820
Cancer patient satisfaction	0.836

In Table 2, the measuring factors for the study are checked for validity and reliability. The Composite Reliability value for sustainable health care services was 0.714, for cancer patients' psychosocial issues it was 0.839, and for patient satisfaction it was 0.783. If the value is higher than 0.7, it means that the hidden variables

accurately reflect the constructs and that the constructs are internally consistent. They found that the average variance extracted (AVE) values for sustainable health care services, the psychological problems cancer patients face, and cancer patients' happiness are 0.591, 0.536, and 0.518, respectively. These numbers show the amount of construct variation that isn't caused by measurement error. Even though they are a little below the usual cutoff of 0.6, the AVE numbers show that there is convergent validity. The results of this study support the validity of the main ideas and the measurement model's ability to show how the factors being studied change over time.

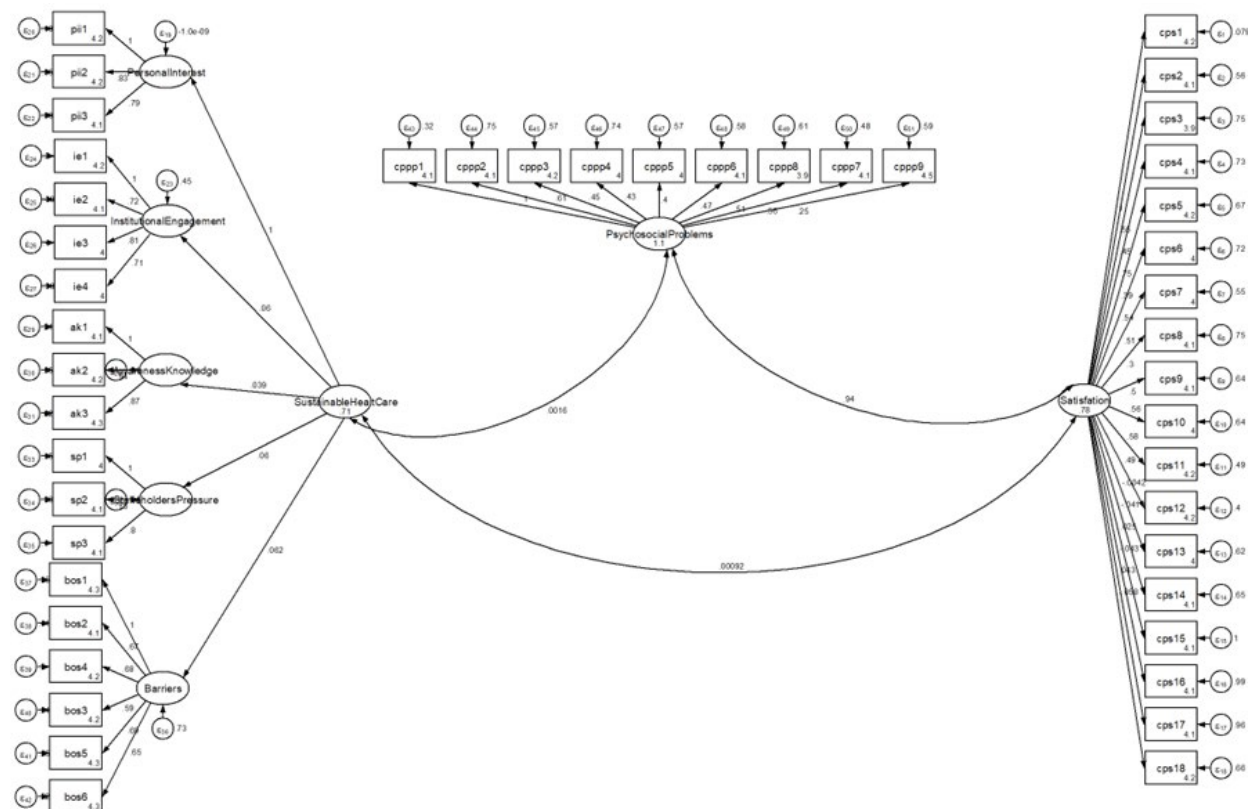


Figure 2: Estimated Model.

The numbers in Table 2 support the claim that this study followed strict procedures. As a way to judge how reliable a measuring tool is, composite reliability scores focus on the internal consistency of the underlying construct. The Mean Spread Out Theoretical dimensions are compared to the variables that have been observed to show that the constructs are true and the variables are converging. These results

support the reliability of the measurement scales and set the stage for future structural equation modeling studies. This means that the relationships in those studies will be based on solid measurements. The study's results were more reliable and useful when they were fully checked for validity and reliability. They were also better suited to the situation of cancer patients working with long-term healthcare providers.

**Table 2: Validity and Reliability Confirmation.**

Variable	Composite Reliability	Average Variance Extracted (AVE)
Sustainable health-care services	0.714	0.591
Cancer patients' psychosocial problems	0.839	0.536
Cancer patient satisfaction	0.783	0.518

As you can see in Table 3, the CFA data show that the study's hidden concepts are structurally valid. The

statistical values, standard errors, and standardized coefficients (OIM Coef.) of each observable show how

the latent variables are linked to the things that were observed. When it comes to the measurement model, indicators are good if their loadings on their hidden components are statistically significant. Items PII1, PII2, and PII3 that rate sustainable healthcare services add to the construct because they have big and positive loadings. There is a strong link between the underlying factors of a cancer patient and the signs of psychological problems (IE1–IE4). The table didn't have important goodness-of-

fit measures like the RMSEA, the Comparative Fit Index (CFI), or the Tucker-Lewis Index (TLI) that would have helped us figure out how well the model fit. Because the standardized values show that the structural model and its indicators for latent components work, they are both valid. The statistical rigor of Confirmatory Factor Analysis helps future route analyses because it makes sure that the study's assumed connections are based on a solid measurement model.

**Table 3: Confirmatory Factor Analysis.**

Measurement	OIM Coef.	Std. Err.	z	P >  z	[95% Conf. Interval]	
PII1	1	(constrained)				
PII2	0.738	0.068	10.506	0.000	0.604	0.871
PII3	0.542	0.061	8.665	0.000	0.424	0.661
IE1	1	(constrained)				
IE2	0.864	0.079	10.593	0.000	0.709	0.825
IE3	0.632	0.066	9.324	0.000	0.504	0.761
IE4	0.316	0.063	4.865	0.000	0.193	0.440
AK1	1	(constrained)				
AK2	0.840	0.079	11.863	0.002	0.692	0.853
AK3	0.590	0.063	9.130	0.000	0.467	0.713
SP1	1	(constrained)				
SP2	0.782	0.063	11.950	0.000	0.658	0.906
SP3	0.700	0.082	8.296	0.000	0.540	0.861
BOS1	1	(constrained)				
BOS2	0.883	0.069	12.386	0.000	0.747	0.824
BOS3	0.866	0.056	14.887	0.000	0.755	0.782
BOS4	0.750	0.061	11.460	0.000	0.631	0.869
BOS5	0.821	0.058	13.170	0.000	0.708	0.749
BOS6	0.727	0.069	13.662	0.000	0.683	0.879
CPPP1	1.000	(constrained)				
CPPP2	0.771	0.063	11.311	0.000	0.647	0.895
CPPP3	0.748	0.064	10.865	0.000	0.622	0.873
CPPP4	0.847	0.066	11.878	0.000	0.717	0.791
CPPP5	0.710	0.065	10.223	0.000	0.584	0.837
CPPP6	0.780	0.064	11.274	0.000	0.654	0.906
CPPP7	0.807	0.064	11.776	0.000	0.683	0.746
CPPP8	0.799	0.063	11.841	0.000	0.676	0.922
CPPP9	0.670	0.057	10.787	0.000	0.558	0.782
CPS1	1.000	(constrained)				
CPS2	0.855	0.063	12.548	0.000	0.732	0.794
CPS3	0.774	0.064	11.183	0.000	0.649	0.898
CPS4	0.801	0.063	11.681	0.000	0.677	0.740
CPS5	0.809	0.068	10.980	0.000	0.676	0.757
CPS6	0.738	0.060	11.303	0.000	0.620	0.856
CPS7	0.815	0.062	12.077	0.000	0.693	0.753
CPS8	0.842	0.061	12.658	0.000	0.722	0.778
CPS9	0.683	0.059	10.722	0.000	0.568	0.798
CPS10	0.822	0.075	10.077	0.000	0.674	0.785
CPS11	0.602	0.063	8.869	0.000	0.479	0.724
CPS12	0.301	0.060	4.628	0.000	0.183	0.418
CPS13	0.564	0.066	9.404	0.005	0.470	0.775
CPS14	0.799	0.075	11.285	0.002	0.658	0.812
CPS15	0.679	0.068	9.634	0.000	0.545	0.813
CPS16	0.863	0.068	12.377	0.000	0.731	0.802
CPS17	0.593	0.069	9.886	0.005	0.494	0.815
CPS18	0.809	0.068	10.980	0.000	0.479	0.724

Fitting data for the test items are shown in Table 4. This table also displays how well the indicator fits with each latent component. The Original Sample numbers show the standardized factor loadings, which show how much each indicator changes the accuracy of the measurement of the latent variable. All of the factors PII2, IE3, AK2,

and SP3 have large positive loads, and they all have a big impact on how sustainable health care services are designed. The CPPP4 and CPPP2 markers are useful for looking at the emotional side of mental health problems cancer patients face, as their significant standardized loadings of 0.838 and 0.774 show. There are strong

links between this idea and cancer patients' happiness on measures CPS17 (0.929), CPS12 (0.921), and CPS10 (0.862), which shows how important it is. By doing this, they strengthen the measurement model, make sure the latent variables are physically sound, and make sure the measurement items are correct.

**Table 4: Measurement Items Fitness Statistics.**

Variable	Indicator	Original Sample
Sustainable health-care services	PII1	0.794
	PII2	0.785
	PII3	0.699
	IE1	0.755
	IE2	0.813
	IE3	0.837
	IE4	0.862
	AK1	0.776
	AK2	0.921
	AK3	0.852
	SP1	0.573
	SP2	0.699
	SP3	0.902
	BOS1	0.849
	BOS2	0.883
	BOS3	0.834
	BOS4	0.802
	BOS5	0.663
BOS6	0.604	
Cancer patients' psychosocial problems	CPPP1	0.721
	CPPP2	0.774
	CPPP3	0.816
	CPPP4	0.838
	CPPP5	0.759
	CPPP6	0.648
	CPPP7	0.640
	CPPP8	0.569
	CPPP9	0.557
Cancer patient satisfaction	CPS1	0.589
	CPS2	0.864
	CPS3	0.762
	CPS4	0.756
	CPS5	0.787
	CPS6	0.804
	CPS7	0.655
	CPS8	0.633
	CPS9	0.837
CPS10	0.862	
CPS11	0.776	
CPS12	0.921	
CPS13	0.852	
CPS14	0.573	
CPS15	0.869	
CPS16	0.782	
CPS17	0.929	
CPS18	0.859	

Table 5 shows the Chi-square Fit data that can be used to judge how well the model fits. The 13991.839 Likelihood Ratio of the model shows that there is a big difference between the saturated model and the proposed model. The 0.001 p-value of this measure shows that it doesn't fit, so the null hypothesis is thrown out. The  $\chi^2_{bs}$  statistic is 12293.552 and the p-value is 0.001, which means there is a significant difference between the baseline model and the saturation model. Even though

sample size affects chi-square statistics, this study shows that the model needs to be changed. Chi-square tests are a good way to find models that don't fit when they are very complicated. To get a more in-depth look at how well the model fits, however, you need to use tools like the Comparative Fit Index (CFI) and Root Mean Square Error of Approximation (RMSEA).

**Table 5: Chi-square Fit Statistics**

Fit Statistic	Value	Description
Likelihood ratio	13991.839	model vs. saturated
p > $\chi^2$	0.001	
$\chi^2_{bs}$ (2356)	12293.552	baseline vs. saturated
p > $\chi^2$	0.001	

In Table 6, you can see how the Estimated Model and the Saturated Model compare in terms of Goodness of Fit. The Saturated Model had SRMRs of 0.060 and the Estimated Model had SRMRs of 0.079 when looking at the root mean square. The SRMR finds the standard deviation of the mean difference between what actually happened and what was expected. Values that are lower mean that the data fits the model better. When you compare the Estimated Model to the Saturated Model, its higher SRMR shows that it is not as good of a match. SRMR is useful, but it works best when used with other fit indices, such as CFI and RMSEA, to get a fuller picture of how well the model fits. Multiple fit indices, shown in Table 6, were used to see how well the structural model described how the study's variables were related to each other.

**Table 6: Model Goodness of Fit Statistics.**

	Saturated Model	Estimated Model
SRMR	0.060	0.079

For each latent variable in Table 7, the R-square numbers show how the model explains the variation in that variable. The R-squared values for the structural model show how well the external factors explain the changes in the endogenous variables. Based on an R-squared value of 0.596, the model's variables can explain 59.6% of the differences in long-term health care services. The model accounts for 25% of the differences in psychological problems among cancer patients, as shown by the R-squared value of 0.250. The model can explain 55% of the differences in how satisfied cancer patients are, with an R-squared value of 0.550. R-squared numbers show how much outside factors affect the variability of the endogenous constructs. This shows how well the model can predict the future. It is important to understand these numbers by looking at the specifics of the study and making sure the model works well.

**Table 7: R-square Statistics.**

Variable	R Square
Sustainable health-care services	0.596
Cancer patients' psychosocial problems	0.250
Cancer patient satisfaction	0.550

The Direct Path Analysis results are shown in Table 8. These results show how long-term healthcare services affect the mental health and happiness of cancer patients. The path coefficient is 0.266 and the standard error is 0.096, which shows that long-term health care services have an effect on how happy cancer patients are. It's clear that cancer patients are happier when they can get long-term medical care because there is a strong link between the two variables ( $z = 2.654, p < 0.001$ ). The link is more likely to be true since the 95% confidence range

is between 0.077 and 0.454. Psychosocial factors have a big effect on cancer patients' happiness, as shown by a route coefficient of 0.856 and a standard error of 0.477 that were found using direct path analysis. Even with a big standard error, the large coefficient ( $z = 1.722, p < 0.001$ ) shows that psychosocial problems have a big effect on patient happiness. The given correlation is strong, and the confidence interval (0.656 to 0.830) shows that dealing with psychological problems is necessary to make cancer patients feel better.

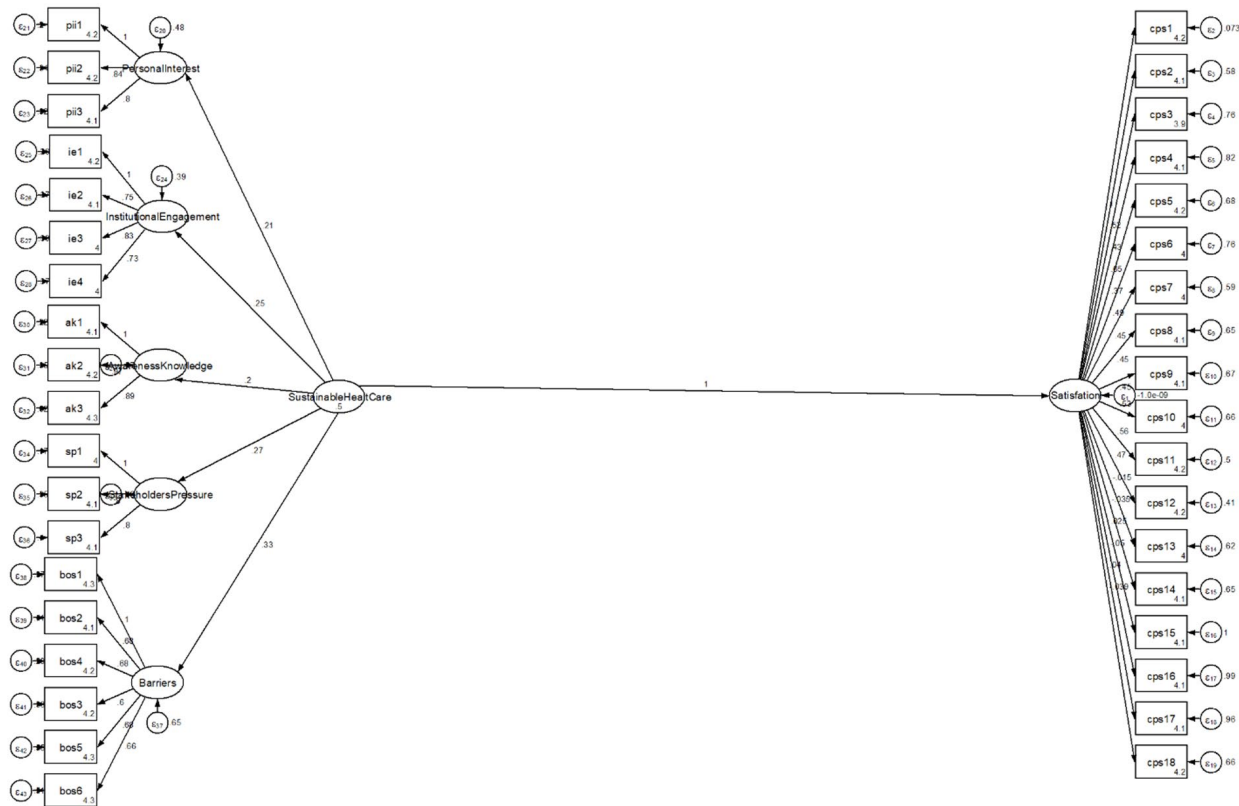


Figure 3: Structural Model for Direct Path Analysis.

When you look at cancer patients' happiness through the view of mental health, long-term healthcare, and social support, you can see how complicated the situation is. It is clear that solutions that are both good for the earth and good for using resources wisely make a big difference in how happy patients are with their health care. The fact that psychosocial factors have a big effect on patient happiness

shows how important it is to provide all-around cancer care that includes mental and emotional support. With these basic ways of talking to each other, we can figure out the complicated web of things that make cancer patients happy. This helps us focus our efforts and make policy choices that improve healthcare outcomes.

**Table 8: Direct Path Analysis.**

	OIM Coef.	Std. Err.	z	P>  z	[95% Conf. Interval]
Sustainable health-care services significantly influence the cancer patient satisfaction.	0.266	0.096	2.654	0.001	0.077 0.454
Cancer patients' psychosocial problems significantly influences the cancer patient satisfaction.	0.856	0.477	1.722	0.000	0.656 0.830

Based on the Moderating Path Analysis, the link between sustainable health care services and cancer patient happiness was looked at. Table 9 displays how the psychological

problems cancer patients face affect this link. There is a 0.098-point error range in the moderating effect pathway, which has a coefficient of 0.202. This coefficient is statistically

significant ( $z = 1.991, p = 0.008$ ), even though it is small. This suggests that mental health issues change the link between long-term health care and patient happiness. The strong stabilizing effect can be seen in the 95% confidence interval, which goes from 0.393 to 0.303. These data show

that the link between long-term healthcare and patient happiness is affected by the mental and social problems that cancer patients face. Because of this, long-term healthcare plans affect patient happiness by making it harder for cancer patients to deal with their mental and social problems.

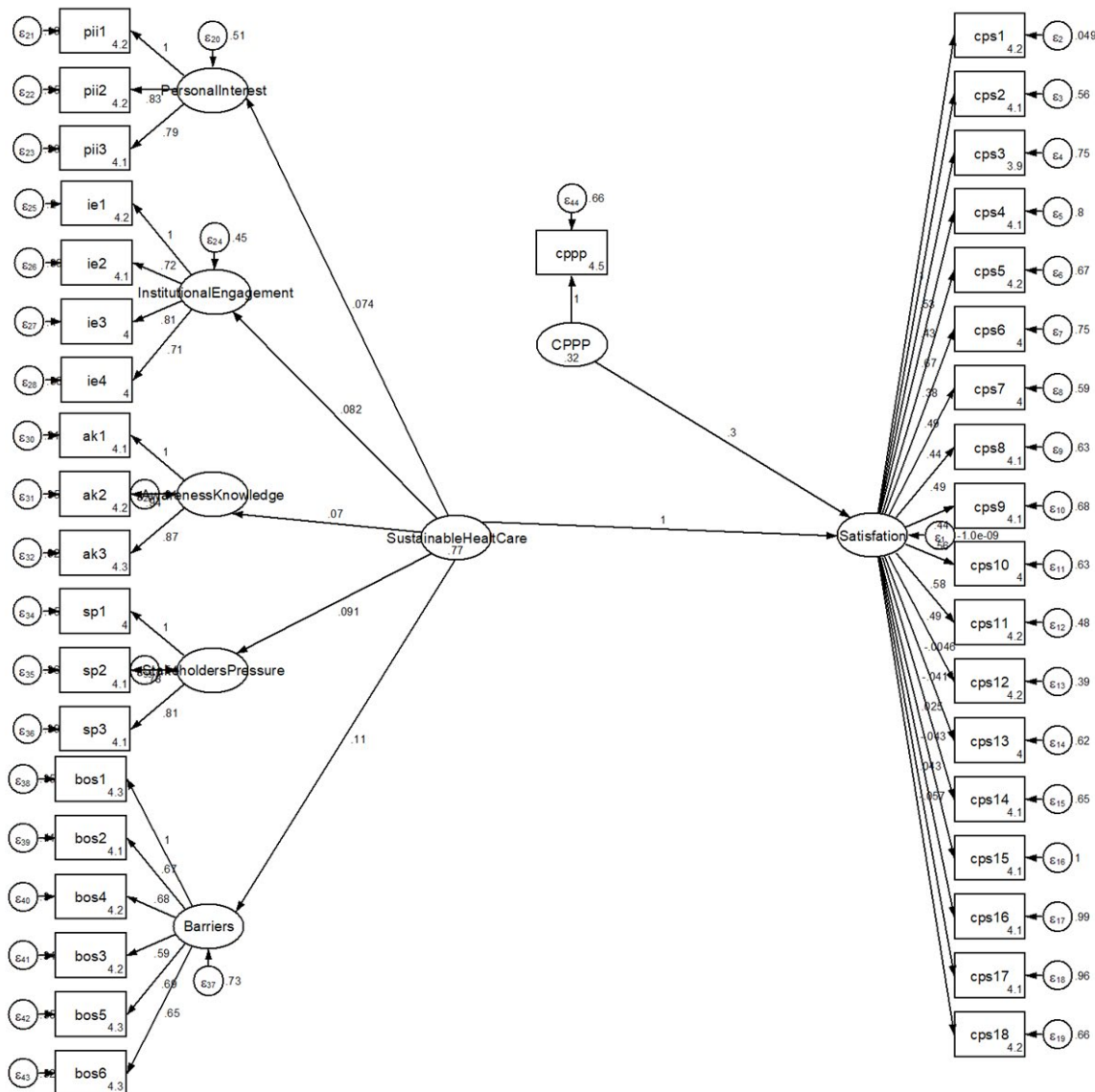


Figure 4: Structural Model for Moderating Path Analysis.

The moderating pathway analysis shows that environmental sustainability, psychological patient experience, and happiness are all closely linked. The moderating effect shows how important it is for healthcare to put the needs and wants of people first. There is evidence to back the idea that people who use health care services for a longer period of time benefit more from them. Cancer patients

might get more out of these classes if they take their feelings into account. For cancer study and patient care to move forward, it is important for academics, doctors, Republicans, and Democrats to work together. The results show that cancer treatment could be better if medications were made to fit the unique mental traits of each patient.

Table 9: Moderating Path Analysis.

	OIM Coef.	Std. Err.	z	P >  z	[95% Conf. Interval]
Cancer patients' psychosocial problems moderates the relationship of sustainable health-care services and cancer patient satisfaction.	0.202	0.098	1.991	0.008	0.393 0.303

## DISCUSSION

This study strives to focus on interrelations among psychological problems, sustainable health care, and patient satisfaction in cancer care dynamics. Being in a sensitive unit of cancer care specifically, the study was focused on understanding the factors shaping patients' overall experience. The acceptance of all the hypotheses led the study to gain more insight into the concept of psychological problems, sustainable health care services, and patient satisfaction in cancer care. The theory and empirical evidence collectively played a role in understanding this complex relation in terms of cancer care. The confirmation of each hypothesis establishes a foundation for future research endeavors and offers valuable insights for healthcare practitioners, policymakers, and researchers seeking to enhance the quality and sustainability of healthcare services.

The outcome of the research process is an engaging narrative that links improved levels of cancer patient satisfaction with sustainable healthcare services. As, acceptance of H1, which asserts that cancer patients' happiness is significantly impacted by sustainable health-care services, validates the critical role that organizational strategies have in improving the overall patient experience. Patient happiness, organizational performance, and sustainable resource allocation are thought to be positively associated. The study's outcomes support this theory by demonstrating the real benefits of sustainable practices on the standard of healthcare delivery.<sup>[15]</sup> These encouraging results imply that optimizing organizational productivity and creating a patient-centered, supportive culture are equally crucial to sustainable healthcare practices. This supports the notion that a thorough approach to sustainability improves patient satisfaction in cancer treatment settings and is consistent with Avancini *et al.*<sup>[7]</sup> focus on accessibility and communication within sustainable healthcare systems. A more thorough examination of the consequences for healthcare policy and practice is also necessary in light of the empirical evidence supporting H1. This research findings point to an integrative approach that places sustainability as the cornerstone of high-quality, patient-centered care, especially as organizations struggle with the constantly changing landscape of cancer treatment. The data substantiating our theories demonstrates that adopting sustainable practices boosts organizational efficacy and directly affects the subjective well-being and degree of satisfaction of cancer patients. Policymakers in the healthcare industry need to give this serious thought and include sustainability into all-encompassing cancer treatment plans.

Acceptance of the second hypothesis, which posits that cancer patient satisfaction is significantly influenced by psychological problems contributes a vital component to the intricate framework of cancer care. The findings show a link between cancer patients' subjective experiences with their care and their psychological health, highlighting the critical role that psychosocial elements play in patient satisfaction. The literature, including the seminal work by Lee *et al.*<sup>[11]</sup>, shows a favorable correlation between

psychological concerns and patient satisfaction. This stresses the need of addressing cancer patients' psychological and emotional issues. If this theory is correct, governments and medical specialists must understand the relationship between psychological variables and patient happiness before implementing comprehensive support networks that extend beyond pharmaceutical therapies. This insight is especially important in light of the changing nature of cancer care and the need to provide patients with a complete experience. Our findings highlight the importance of tailoring treatments to address the psychological aspects of cancer care, as well as prioritizing sustainable health-care services, in order to eventually improve and fulfill patient experiences.

Acceptance of the third hypothesis, which contends that psychological problems faced by cancer patients moderates the relationship of sustainable health-care services and cancer patient satisfaction, enhances the comprehension of the intricate dynamics of cancer care. This study emphasizes how important psychosocial variables are in forecasting how sustainable health care services would affect patient happiness. If this theory is right, treating cancer patients' psychosocial problems is the first step towards improving patient satisfaction through sustainable practices. This is consistent with other research, such that of Qan'ir *et al.*<sup>[48]</sup>, which highlights the necessity of customized treatments that take patients' mental health and organizational sustainability into account. Our results highlight the importance of implementing a comprehensive approach that acknowledges the relationship between psychosocial support and sustainable health-care services, as well as the latter's moderating function in the relationship between organizational strategies and patient satisfaction. This will have a significant impact on politicians and medical professionals since it will compel them to incorporate targeted psychological therapies into the long-term healthcare service design in order to enhance patient satisfaction outcomes. Acceptance of this concept increases the conversation on patient-centered and holistic cancer care by providing an essential new dimension to our understanding of the complex interaction among psychological variables, sustainability, and overall patient happiness.

This study's results back up earlier research that found that implementing healthcare services in a way that lasts helps patients' health. Vishwakarma *et al.*<sup>[40]</sup> found that patients were happier with their care when it was better for the environment and used fewer resources. Like other studies, this one show that making healthcare people happier over a long period of time is key. Previous study has shown that emotional and social factors affect the patient's overall experience.<sup>[49]</sup> This supports the idea that the psychosocial concerns of cancer patients affect how satisfied they are with their care. The healthcare community may be able to work together to give people treatment that takes into account all of their psychological and social needs because of this agreement.<sup>[43]</sup> Another interesting thing we learned from our research is that mental health issues can change the link between long-term health care services and patient

happiness. Moldovan *et al.*<sup>[50]</sup> have already done study on how patients' happiness is affected by procedures that are good for the environment and mental factors. Still, this work looks at the complicated relationship between these things. Al Fannah *et al.*<sup>[51]</sup> say that the mental and social health of cancer patients may affect how long they are able to stay in healthcare. These results show how complicated healthcare can be and how important it is to have treatments that can be changed to fit the needs of cancer patients. To make sure cancer patients are not feeling left out, a critical patient-centric approach is required. Aligning with previous studies, it is evident that the patient's mental health assures his satisfaction with therapy and long-term results. The results not only have theoretical implications for future research but also have a practical call for policymakers and healthcare stakeholders to form patient-centric and sustainable care centers for cancer patients. This study is a complete package for integrating a patient-centric design in cancer care for an exceptional patient experience.

## CONCLUSION

To conclude, this study has provided a great understanding of the relationship among cancer patients' psychological problems, sustainable healthcare services, and patient satisfaction. The acceptance of all the hypotheses led the study to gain more insight into the sustainable practices leading to more satisfaction among patients. The psychological problems of the patients further affirm the need for emotional and social dynamics in healthcare to provide an exceptional experience in healthcare units of cancer. The originality of this study lies in the identification of the moderating role of psychological problems in this relationship. These insights underscore the need for tailored and adaptive interventions that acknowledge the diverse psychosocial needs of individuals undergoing cancer treatment. As we navigate the evolving landscape of healthcare, these findings provide valuable guidance for practitioners, policymakers, and researchers, encouraging the integration of sustainable practices and comprehensive psychosocial support to optimize the quality and effectiveness of cancer care. This research contributes to the broader discourse on patient-centered and environmentally responsible healthcare, fostering a holistic approach that prioritizes both the physical and emotional well-being of individuals facing the challenges of cancer.

### Implications of the Study

The different points of view in this study make healthcare management, sustainability, and patient-centered care more solid in theory. To begin, healthcare facilities are more committed to being good environmental stewards because eco-friendly healthcare services make patients happier. Making sure sustainability is important for the standard of healthcare and the right thing to do. There is evidence that being environmentally conscious can make patients happier, and this study backs this up. This result supports sustainable healthcare because it shows that procedures that are good for the environment and use few resources

help cancer patients. When psychosocial problems are taken into account, the biopsychosocial model of health and patient-centered care are also supported. The study found that patient satisfaction isn't just based on clinical results, but also on social and emotional factors. These findings support theories that say healthcare workers should look at their patients' well-being as a whole and address their mental health needs along with their medical ones. Psychological factors should be included in theoretical models of healthcare customer satisfaction. This fits in with the ongoing discussion about how patients feel.

The results of this study can be used to help governments, organizations, and healthcare workers improve cancer treatment and make it last longer. To keep health care services going and make sure patients are happy, healthcare facilities should focus on and spend in ways that are good for the environment and use resources efficiently. Part of sustainable projects is using technology that uses less energy, cutting down on waste, and making infrastructure that is good for the environment. These acts meet their moral and environmental obligations while also making patients happier. When sustainable practices are part of certification standards and performance reviews, they can make patients happier and encourage people to be more environmentally friendly. According to this study, sustainable healthcare methods can be created and used when environmental experts and healthcare professionals work together. The fact that psychological factors affect patient happiness makes it even more clear how important it is for cancer care programs to offer comprehensive psychosocial support. To deal with the social and emotional parts of patients' lives, healthcare professionals should include psychological and social measures in medical treatments. There should be mental health professionals, support groups, and counseling programs in places where cancer patients get care to help them deal with the emotional and mental problems they face during treatment. Healthcare professionals can improve their patients' health and happiness by focusing on long-term solutions and emotional support. This way creates a more focused and all-encompassing environment for the patient. In the end, this study gives lawmakers and health care professionals suggestions they can use to make cancer care better. When healthcare organizations use sustainable practices, they might make patients happier, be more responsible with the environment, and handle psychosocial problems better. One study says it is very important for cancer treatment plans that put the needs of each patient first to include long-term survival and psychological support.

### Limitations and Future Research Directions

This study can give us useful information, but it can't be used in a broad way. Cross-sectional data were used in the study, which means that causal links could not be shown. Longitudinal or experimental studies can show that links change over time more strongly. Because it only includes cancer cases in Saudi Arabia, this set of data doesn't have a lot of external validity. The data may only be true in some places because of differences in culture,

geography, and health care systems. In the future, studies should use objective measurements or other data sources to get rid of response biases so that subjective scores are more reliable and accurate.

The findings of this study are significant for future research on patient well-being, psychological factors, and long-term health care systems. Longitudinal studies on sustainable practices, psychiatric problems, and patient happiness can show how these links change over time and follow different paths. A comparison study in various cultural and healthcare settings can show how the results can be used in other situations and how important cultural differences are in shaping patient experiences. To find out more about how certain environmentally friendly health care practices affect patient satisfaction, you can look at things like waste management techniques or technology that uses less energy. Healthcare leaders can learn a lot from policies and workplace practices that help the environment and people by providing psychosocial support. Approaches to qualitative study, such as focus groups and in-depth interviews, can help us learn more about the real lives of cancer patients and the psychological and social factors that affect their happiness. More study is needed to fully understand the complicated connections between sustainability, psychological factors, and patient well-being in a variety of healthcare settings.

### Acknowledgement

This work was supported through the Ambitious Funding track by the Deanship of Scientific Research, Vice Presidency for Graduate Studies and Scientific Research, King Faisal University, Saudi Arabia [Grant 5771]

### REFERENCES

- Ehlers SL, Davis K, Bluethmann SM, et al. Screening for psychosocial distress among patients with cancer: implications for clinical practice, healthcare policy, and dissemination to enhance cancer survivorship. *Transl Behav Med.* 2019; 9(2): 282-91. doi: <https://doi.org/10.1093/tbm/iby123>.
- Ferrara M, Langiano E, Falese L, De Marco A, De Vito E. Quality of Life and Psychosocial Impacts of the Different Restrictive Measures during One Year into the COVID-19 Pandemic on Patients with Cancer in Italy: An Ecological Study. *Int J Environ Res Public Health.* 2021; 18(13): 7161. doi: <https://doi.org/10.3390/ijerph18137161>.
- Han X, Robinson LA, Jensen RE, Smith TG, Yabroff KR. Factors Associated With Health-Related Quality of Life Among Cancer Survivors in the United States. *JNCI Cancer Spectr.* 2021; 5(1): pkaa123. doi: <https://doi.org/10.1093/jncics/pkaa123>.
- Chan RJ, Milch VE, Crawford-Williams F, et al. Patient navigation across the cancer care continuum: An overview of systematic reviews and emerging literature. *CA Cancer J Clin.* 2023; 73(6): 565-89. doi: <https://doi.org/10.3322/caac.21788>.
- Hlubocky FJ, Shanafelt TD, Back AL, et al. Creating a Blueprint of Well-Being in Oncology: An Approach for Addressing Burnout From ASCO's Clinician Well-Being Taskforce. *Am Soc Clin Oncol Educ Book.* 2021; 41: e339-e53. doi: [https://doi.org/10.1200/edbk\\_320873](https://doi.org/10.1200/edbk_320873).
- Deshields TL, Wells-Di Gregorio S, Flowers SR, Irwin KE, Nipp R, Padgett L, Zebrack B. Addressing distress management challenges: Recommendations from the consensus panel of the American Psychosocial Oncology Society and the Association of Oncology Social Work. *CA Cancer J Clin.* 2021; 71(5): 407-36. doi: <https://doi.org/10.3322/caac.21672>.
- Avancini A, Skroce K, Tregnago D, et al. "Running with cancer": A qualitative study to evaluate barriers and motivations in running for female oncological patients. *PLoS One.* 2020; 15(4): e0227846. doi: <https://doi.org/10.1371/journal.pone.0227846>.
- Batalik L, Winnige P, Dosbaba F, Vlazna D, Janikova A. Home-Based Aerobic and Resistance Exercise Interventions in Cancer Patients and Survivors: A Systematic Review. *Cancers (Basel).* 2021; 13(8): 1915. doi: <https://doi.org/10.3390/cancers13081915>.
- Fresno-Alba S, Leyton-Román M, Mesquita da Silva S, Jiménez-Castuera R. Predicting Quality of Life in Women with Breast Cancer Who Engage in Physical Exercise: The Role of Psychological Variables. *Healthcare (Basel).* 2023; 11(14): 2088. doi: <https://doi.org/10.3390/healthcare11142088>.
- Koshimoto S, Yamazaki T, Amano K, et al. Psychosocial Factors and the Need for Multidisciplinary Support in Nutrition Counselling for Cancer Chemotherapy Patients. *Nutrients.* 2023; 15(12): 2712. doi: <https://doi.org/10.3390/nu15122712>.
- Lee YS, Roh S, Hsieh YP, Park Y. Determinants of Life Satisfaction and Quality of Life Among American Indian Women Cancer Survivors: The Role of Psychosocial Resources. *J Evid Based Soc Work (2019).* 2023; 20(4): 536-55. doi: <https://doi.org/10.1080/26408066.2023.2185561>.
- Dobre C, Băjenaru L, Drăghici R, Prada GI, Balog A, Hergehelegiu AM. Sustainable Health-Related Quality of Life in Older Adults as Supported by the vINCI Technology. *Sensors (Basel).* 2023; 23(4): 2287. doi: <https://doi.org/10.3390/s23042287>.
- Ofei SD, Teye-Kwadjo E, Amankwah-Poku M, et al. Determinants of Post-Traumatic Growth and Quality of Life in Ghanaian Breast Cancer Survivors. *Cancer Invest.* 2023; 41(4): 379-93. doi: <https://doi.org/10.1080/07357907.2023.2181636>.
- Laprise C. It's time to take a sustainable approach to health care in the face of the challenges of the 21st century. *One Health.* 2023; 16: 100510. doi: <https://doi.org/10.1016/j.onehlt.2023.100510>.
- Bergerot CD, Dizon DS, Ilbawi AM, Anderson BO. Global Breast Cancer Initiative: A platform to address the psycho-oncology of cancer in low- and middle-income countries for improving global breast cancer outcomes. *Psychooncology.* 2023; 32(1): 6-9. doi: <https://doi.org/10.1002/pon.5969>.

16. Dewi IP, Gartika N, Sanusi S, Suryatiningsih D. Determinants of Spiritual Well-Being That Impact Breast Cancer Patients' Quality of Life. *J Holist Nurs*. 2023; 8980101231181272. doi: <https://doi.org/10.1177/08980101231181272>.
17. Zhao J, Kong Y, Xiang Y, Yang J. The research landscape of the quality of life or psychological impact on gynecological cancer patients: A bibliometric analysis. *Front Oncol*. 2023; 13: 1115852. doi: <https://doi.org/10.3389/fonc.2023.1115852>.
18. Pérez-Bilbao T, Alonso-Dueñas M, Peinado AB, San Juan AF. Effects of Combined Interventions of Exercise and Diet or Exercise and Supplementation on Breast Cancer Patients: A Systematic Review. *Nutrients*. 2023; 15(4): 1013. doi: <https://doi.org/10.3390/nu15041013>.
19. Bochicchio I, La Rosa VL, Marino G, et al. Psychological Well-Being of Cancer Patients before and during the Pandemic: The Impact of COVID-19 Peritraumatic Distress. *Int J Environ Res Public Health*. 2023; 20(5): 4106. doi: <https://doi.org/10.3390/ijerph20054106>.
20. Yabroff KR, Zhao J, Chen MH, Hoque J, Arias G, Han X, Zheng Z. Financial hardship and psychosocial well-being and quality of life among prostate cancer survivors in the United States. *Urol Oncol*. 2023; 41(9): 380-86. doi: <https://doi.org/10.1016/j.urolonc.2023.03.004>.
21. Muhamed AN, Bogale SK, Netere HB. Quality of Life and Associated Factors Among Adult Cancer Patients Undergoing Chemotherapy Treatment at Amhara National, Regional State, Ethiopia, 2021. *SAGE Open Nurs*. 2023; 9: 23779608231174866. doi: <https://doi.org/10.1177/23779608231174866>.
22. van Hof KS, Hoesseini A, Verdonck-de Leeuw IM, et al. Self-efficacy and coping style in relation to psychological distress and quality of life in informal caregivers of patients with head and neck cancer: a longitudinal study. *Support Care Cancer*. 2023; 31(2): 104. doi: <https://doi.org/10.1007/s00520-022-07553-x>.
23. Solikhah S, Perwitasari DA, Rejeki DSS. Cross-cultural adaptation and psychometric properties of the Indonesian version for quality of life among breast cancer patients. *Front Public Health*. 2023; 11: 1069422. doi: <https://doi.org/10.3389/fpubh.2023.1069422>.
24. Burg MA, Zebrack B, Walsh K, Maramaldi P, Lim JW, Smolinski KM, Lawson K. Barriers to accessing quality health care for cancer patients: a survey of members of the association of oncology social work. *Soc Work Health Care*. 2010; 49(1): 38-52. doi: <https://doi.org/10.1080/00981380903018470>.
25. Aaronson NK, Mattioli V, Minton O, et al. Beyond treatment - Psychosocial and behavioural issues in cancer survivorship research and practice. *EJC Suppl*. 2014; 12(1): 54-64. doi: <https://doi.org/10.1016/j.ejcsup.2014.03.005>.
26. van der Kruk SR, Butow P, Mesters I, et al. Psychosocial well-being and supportive care needs of cancer patients and survivors living in rural or regional areas: a systematic review from 2010 to 2021. *Support Care Cancer*. 2022; 30(2): 1021-64. doi: <https://doi.org/10.1007/s00520-021-06440-1>.
27. Lockett T, Goldstein D, Butow PN, et al. Psychological morbidity and quality of life of ethnic minority patients with cancer: a systematic review and meta-analysis. *Lancet Oncol*. 2011; 12(13): 1240-8. doi: [https://doi.org/10.1016/s1470-2045\(11\)70212-1](https://doi.org/10.1016/s1470-2045(11)70212-1).
28. Schofield P, Carey M, Bonevski B, Sanson-Fisher R. Barriers to the provision of evidence-based psychosocial care in oncology. *Psychooncology*. 2006; 15(10): 863-72. doi: <https://doi.org/10.1002/pon.1017>.
29. Ismaeil EM, Sobaih AEE. Enhancing Healing Environment and Sustainable Finishing Materials in Healthcare Buildings. *Buildings*. 2022; 12(10): 1676. doi: <https://doi.org/10.3390/buildings12101676>.
30. Pieters HC, Green E, Sleven M. "It Just Hit Me Like a Ton of Bricks": Improving the Patient Experience of Receiving a Breast Cancer Diagnosis at an Older Age. *Res Gerontol Nurs*. 2021; 14(2): 79-89. doi: <https://doi.org/10.3928/19404921-20210115-02>.
31. Yeung SC, Irwin MG, Cheung CW. Environmental Enrichment in Postoperative Pain and Surgical Care: Potential Synergism With the Enhanced Recovery After Surgery Pathway. *Ann Surg*. 2021; 273(1): 86-95. doi: <https://doi.org/10.1097/sla.0000000000003878>.
32. Permarupan PY, Al Mamun A, Samy NK, Saufi RA, Hayat N. Predicting Nurses Burnout through Quality of Work Life and Psychological Empowerment: A Study Towards Sustainable Healthcare Services in Malaysia. *Sustainability*. 2020; 12(1): 388. doi: <https://doi.org/10.3390/su12010388>.
33. Untaru E-N, Han H, Bălășescu S, Kim B, Ariza-Montes A. Green Atmospherics as Nature-Based Solutions and Patient Responses and Behaviors in Healthcare Establishments From Romania. *SAGE Open*. 2023; 13(1): 21582440231162531. doi: <https://doi.org/10.1177/21582440231162531>.
34. Urquhart R, Kendell C, Cornelissen E, et al. Identifying factors influencing sustainability of innovations in cancer survivorship care: a qualitative study. *BMJ Open*. 2021; 11(2): e042503. doi: <https://doi.org/10.1136/bmjopen-2020-042503>.
35. Memon AA, Rajput O, Kumar S, Benuyenah V, Afshan G, Anwar RS. Decomposing Green Communication Amidst COVID-19 (A Cross-Gender, Cross-Generations, Cross-Qualification and Cross-Continental Analysis). *SSRN Electronic Journal*. 2021: doi: <http://dx.doi.org/10.2139/ssrn.3946343>.
36. Shaikh F, Afshan G, Anwar RS, Abbas Z, Chana KA. Analyzing the impact of artificial intelligence on employee productivity: the mediating effect of knowledge sharing and well-being. *Asia Pacific Journal of Human Resources*. 2023; 61(4): 794-820. doi: <https://doi.org/10.1111/1744-7941.12385>.
37. Li Y, Pan X, Han Y, Taylor JE. Sustainable healthcare facilities: A scoping review. *J Constr Eng Manag*. 2021; 147(12): 03121007. doi: [https://doi.org/10.1061/\(ASCE\)CO.1943-7862.0002170](https://doi.org/10.1061/(ASCE)CO.1943-7862.0002170).

38. Toledano-Toledano F, Luna D, Moral de la Rubia J, Martínez Valverde S, Bermúdez Morón CA, Salazar García M, Vasquez Pauca MJ. Psychosocial Factors Predicting Resilience in Family Caregivers of Children with Cancer: A Cross-Sectional Study. *Int J Environ Res Public Health*. 2021; 18(2): 748. doi: <https://doi.org/10.3390/ijerph18020748>.
39. Rattan TK, Joshi M, Vesty G, Sharma S. Sustainability indicators in public healthcare: A factor analysis approach. *J Clean Prod*. 2022; 370: 133253. doi: <https://doi.org/10.1016/j.jclepro.2022.133253>.
40. Vishwakarma LP, Singh RK, Mishra R, Kumari A. Application of artificial intelligence for resilient and sustainable healthcare system: Systematic literature review and future research directions. *Int J Prod Res*. 2023; 1-23. doi: <https://doi.org/10.1080/00207543.2023.2188101>.
41. Nassi M, Riza E, Bouziani E. Sustainably Driven Telemedicine for Chronic Illness Patient Satisfaction: Pre and Post Pandemic. In: Leal Filho W, Dinis MAP, Moggi S, Price E, Hope A, Eds. *SDGs in the European Region*. Springer International Publishing; 2023:411-24. doi: [https://doi.org/10.1007/978-3-031-17461-2\\_99](https://doi.org/10.1007/978-3-031-17461-2_99).
42. Liska J, Mical M, Maillard C, et al. Mapping the Cardiometabolic Patient Experience and Self-Care Behaviors to Inform Design, Implementation, and Persistent Use of Digital Health Care Solutions: Mixed Methods Study. *JMIR Form Res*. 2024; 8: e43683. doi: <https://doi.org/10.2196/43683>.
43. Hawley N, Green J, Ahlich E, et al. Patient perspectives of weight stigma across the cancer continuum: A scoping review. *Cancer Med*. 2024; 1-12. doi: <https://doi.org/10.1002/cam4.6882>.
44. Bedson J, Jalloh MF, Pedi D, et al. Community engagement in outbreak response: lessons from the 2014-2016 Ebola outbreak in Sierra Leone. *BMJ Glob Health*. 2020; 5(8): e002145. doi: <https://doi.org/10.1136/bmjgh-2019-002145>.
45. Calabrese M, Suparaku S, Santovito S, Hysa X. Preventing and developmental factors of sustainability in healthcare organisations from the perspective of decision makers: an exploratory factor analysis. *BMC Health Serv Res*. 2023; 23(1): 797. doi: <https://doi.org/10.1186/s12913-023-09689-w>.
46. Bogaarts MP, Den Oudsten BL, Roukema JA, Van Riel JM, Beerepoot LV, De Vries J. Development of the Psychosocial Distress Questionnaire-Breast Cancer (PDQ-BC): a breast cancer-specific screening instrument for psychosocial problems. *Support Care Cancer*. 2011; 19(10): 1485-93. doi: <https://doi.org/10.1007/s00520-010-0968-9>.
47. Al Ansari A, Al Alawi S, Al Qahtani M, Darwish A. Outpatient parenteral antimicrobial therapy (OPAT) in the Kingdom of Bahrain: efficacy, patient satisfaction and cost effectiveness. *Open Infect Dis J*. 2013; 7(1): 90-95. doi: <http://dx.doi.org/10.2174/1874279301307010090>.
48. Qan'ir Y, Guan T, Idiagbonya E, et al. Quality of life among patients with cancer and their family caregivers in the Sub-Saharan region: A systematic review of quantitative studies. *PLOS Glob Public Health*. 2022; 2(3): e0000098. doi: <https://doi.org/10.1371/journal.pgph.0000098>.
49. Ramz MK. Level of burnout in staff, sustainable quality service and patient satisfaction in healthcare institutions during healthcare crisis. Master's thesis, İstanbul Gelişim Üniversitesi Lisansüstü Eğitim Enstitüsü; 2022. Available from: <https://hdl.handle.net/11363/4134>.
50. Moldovan F, Moldovan L, Bataga T. Assessment of Labor Practices in Healthcare Using an Innovative Framework for Sustainability. *Medicina (Kaunas)*. 2023; 59(4): 796. doi: <https://doi.org/10.3390/medicina59040796>.
51. Al Fannah J, Al Sabahi S, Al Harthi H, Al Bahrani M, Al Salmi Q. Towards a green hospital approach in Oman: A case study of quantifying an environmental impact. *Int J Health Plann Manage*. 2023; 38(5): 1583-89. doi: <https://doi.org/10.1002/hpm.3662>.

## APPENDIX 1

### *Sustainable Health-care Services*

1. To what extent do you perceive the healthcare facility implementing environmentally friendly waste disposal practices?
2. How often does the healthcare facility utilize energy-efficient technologies in its operations?
3. In your opinion, how committed is the healthcare facility to reducing its carbon footprint?
4. How well do you think the healthcare facility incorporates sustainable water usage practices?
5. To what extent does the healthcare facility promote the use of reusable and recyclable materials?
6. How satisfied are you with the healthcare facility's efforts in minimizing paper usage through digitalization?
7. Do you perceive the healthcare facility to be actively involved in community health and environmental awareness programs?
8. To what extent does the healthcare facility prioritize the use of eco-friendly cleaning products and practices?
9. How well is the healthcare facility equipped with energy-efficient lighting systems?
10. In your view, does the healthcare facility implement sustainable transportation practices for staff and patients?
11. How often does the healthcare facility conduct assessments to identify and minimize its environmental impact?
12. How satisfied are you with the healthcare facility's initiatives to reduce water and energy consumption?
13. Do you believe the healthcare facility considers sustainable sourcing in its procurement processes?
14. How well does the healthcare facility engage in initiatives to promote biodiversity on its premises?
15. To what extent does the healthcare facility incorporate green building design principles in its infrastructure?
16. How satisfied are you with the healthcare facility's efforts to manage and reduce its overall waste production?
17. Do you perceive the healthcare facility to be actively involved in sustainable healthcare policy advocacy?
18. How well does the healthcare facility involve patients in sustainability initiatives and awareness?
19. How satisfied are you with the overall commitment of the healthcare facility towards sustainable health-care services?

### *Cancer Patients' Psychosocial Problems*

1. How frequently do you experience anxiety related to your cancer diagnosis and treatment?
2. To what extent do you feel socially isolated due to your cancer diagnosis?
3. How often do you encounter challenges in coping with the emotional aspects of your cancer journey?
4. How satisfied are you with the support provided for managing stress associated with your cancer treatment?

5. To what extent do you feel that your cancer diagnosis has affected your relationships with family and friends?
6. How often do you experience feelings of sadness or depression related to your cancer diagnosis?
7. How satisfied are you with the availability of mental health support services to address your psychosocial needs?
8. To what extent does your cancer diagnosis impact your overall quality of life?
9. How often do you face difficulties in discussing your psychosocial concerns with healthcare professionals?

### *Cancer Patient Satisfaction*

1. How satisfied are you with the clarity of information provided about your cancer diagnosis and treatment options?
2. To what extent do you feel involved in decision-making regarding your cancer treatment plan?
3. How satisfied are you with the accessibility of healthcare professionals for addressing your concerns?
4. How well do healthcare professionals communicate with you about the potential side effects of your cancer treatment?
5. How satisfied are you with the coordination of care among different healthcare providers involved in your treatment?
6. To what extent are your physical comfort and well-being addressed during your cancer treatment?
7. How satisfied are you with the emotional support provided by healthcare professionals during your cancer journey?
8. How well do healthcare professionals involve you in setting goals for your cancer treatment and recovery?
9. How satisfied are you with the convenience of scheduling appointments and receiving timely care?
10. To what extent are your preferences and values considered in tailoring your cancer treatment plan?
11. How satisfied are you with the level of privacy and confidentiality during your interactions with healthcare professionals?
12. How well do healthcare professionals address your concerns about the financial aspects of your cancer treatment?
13. How satisfied are you with the accessibility of supportive services, such as counseling and support groups?
14. To what extent do healthcare professionals involve you in discussions about potential treatment alternatives?
15. How satisfied are you with the overall communication between healthcare professionals and yourself?
16. How well do healthcare professionals address your concerns about the potential impact of cancer on your daily life?
17. How satisfied are you with the continuity of care as you transition between different phases of your cancer treatment?
18. To what extent do you feel that healthcare professionals respect your cultural and personal values throughout your cancer journey?