

# Skin Cancer Patients' Psychological Well-Being: Identifying the Statistically Significant Predictors

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**ABSTRACT:** Skin cancer is one of the most frequently diagnosed cancers across the world and studies have shown that patients with low psychological well-being (PWB) may have a poorer disease prognosis. Many factors, including social support, personality, and age, are predictive of cancer patients' PWB. This study aimed to answer the question: Which factors are statistically significant predictors of skin cancer patients' psychological well-being? An anonymous online survey promoted by national and international skin cancer organizations was utilized to answer this question. Four hundred seventy skin cancer patients from 10 countries and 43 U.S. states responded, and 251 responses were complete and analyzed. Multivariate regression, analysis of variance (ANOVA), and t-tests determined the statistically significant predictors of patients' PWB: conscientiousness, social support, stage of skin cancer, neuroticism, agreeableness, and mindfulness. Awareness of these factors by patients and medical teams alike and implementation of the strategies suggested in this paper to improve patients' PWB may ensure that the next wave of incoming skin cancer patients doesn't just survive but thrives.

**KEYWORDS:** Behavioral and Social Sciences; Physiological Psychology; Skin Cancer; Psychological Well-Being; Significant Predictor.

## ■ Introduction

Over many centuries, the word "cancer," a disease caused by the overgrowth of cells and named for the crab-like shape of the tumors it can produce, has developed a connotation distinct from its definition, evoking feelings of pain, grief, and fear in many individuals. Cancer has become one of the most widely feared and infamous diseases across the world.<sup>1-3</sup> Moreover, cancer fatalism, the belief that cancer will inevitably cause death regardless of treatment or intervention, has spread widely in ethnic groups, minorities, and the less-educated demographic.<sup>1,3,4</sup> But these beliefs are not unfounded... In 2018, about 9.5 million people died of cancer globally, with one of the highest death rates in the U.S.<sup>5-7</sup>

This study will focus on skin cancer, the most frequently diagnosed cancer in America.<sup>8</sup> Skin cancer is primarily diagnosed as basal, squamous, or Merkel cell carcinoma or melanoma.<sup>6</sup> More than two people die of skin cancer in the U.S. every hour and one in five Americans will develop the disease by the time they are 70.<sup>8</sup>

Over the past 50 years, there has been a growing focus on patients' mental health, and a field dedicated to the psychological needs of cancer patients has emerged.<sup>9</sup> Psycho-oncology is an interdisciplinary field focused on "the study of psychological, behavioral, and psychosocial factors involved in the risk, detection, course, treatment, and outcome (in terms of survival) of cancer."<sup>12</sup> Psycho-oncologists are less concerned with the outcome of the disease as their main focus is to improve patients' quality of life.<sup>9</sup>

One major component of quality of life (QOL) is well-being, a cornerstone of modern psycho-oncologic research. Well-being has many classifications, including emotional, physical, and social well-being, but the focus of this study was psychological well-being (PWB).<sup>13</sup> Dr. Carol Ryff of the

University of Wisconsin-Madison is best recognized for her 6-factor model of psychological well-being, which illustrates PWB as a product of self-acceptance, positive relations with others, autonomy, environmental mastery, purpose in life, and personal growth.<sup>14</sup>

Furthermore, well-being is a state that is associated with higher levels of mental and physical health.<sup>15-17</sup> Therefore, psychological interventions aimed at improving one's PWB could have major implications for the future of oncology. Many longitudinal studies and meta-analyses affirm that psychological well-being, whether defined as "flourishing," positive mental health, etc., correlates with lower mortality rates and optimal disease prognosis.<sup>15-17</sup> On the other hand, depression has been associated with worse survival rates among cancer patients.<sup>18</sup>

There is a clear correlation between a patient's psychological well-being and the outcome of diseases, including skin cancer. However, for psycho-oncologists to make beneficial psychological interventions for patients, they need to know which factors most impact psychological well-being. Prior research has primarily focused on the impact of one factor or group of factors (e.g., solely demographics) on cancer patients' well-being, but no study that the author is aware of has examined them collectively. This gap led to the research question: Which factors are statistically significant predictors of skin cancer patients' psychological well-being? As the number of cancer patients and survivors in the U.S. is expected to increase to 26.1 million by 2040, finding the answer to this question is paramount for psycho-oncologists to improve the PWB of skin cancer patients and, potentially, their survival rates as well.<sup>19</sup>

### Literature Review:

The factors that will be examined can be grouped into five categories: individual, medical, lifestyle, social, and environmental.

Beginning with individual factors, the sub-factors that will be investigated are demographics (gender, ethnicity, and age) and personality. The author is not aware of a study that has examined the impact of gender on cancer patients' PWB specifically. However, women are more prone to anxiety and fear than men, which likely impacts their PWB.<sup>20</sup> Furthermore, a study examining gender differences in mental illnesses and quality of life among 351 cancer patients found that "in general, women experienced more depression, anxiety and poorer QOL (quality of life) than men did."<sup>21</sup> However, some mental health trends in the general population don't apply to cancer patients. Further research illuminated gender differences in depression among cancer patients and the general population in a longitudinal study of 10,317 individuals; men without cancer generally had fewer depressive symptoms than women, while men with cancer generally had more depressive symptoms, which is contradictory to earlier findings.<sup>22</sup> In summary, there isn't a consensus on which gender experiences poorer psychological well-being following cancer diagnosis and the subsequent development of mental illnesses.

While it is unclear how gender impacts PWB, numerous studies have indicated that age is positively correlated with the psychological well-being of cancer patients.<sup>21,23</sup> Thus, older patients generally have higher PWB than younger patients, as these individuals experienced less anxiety and depression and a higher mental QOL.<sup>21</sup> Subsequently, a meta-analysis of 37 studies analyzing the impact of various factors on cancer survivors' QOL also found that cancer patients' PWB improves with age.<sup>23</sup>

Ethnicity has not been directly associated with cancer patients' PWB, but the growth of various ideologies like cancer fatalism in certain ethnic groups may indirectly affect it.<sup>1-4</sup> The prevalence of cancer varies between ethnicities, with non-Hispanic black males having the highest incidence overall, despite having a lower perceived risk and fewer cancer worries.<sup>4,24</sup> An analysis of the prevalence of depression among cancer patients by race and sex found that depression rates were "highest among black men, followed by white women, black women, and white men."<sup>25</sup> Thus, black men's apathy towards cancer may contribute to depression once the reality of their diagnosis sets in. These studies hint that the psychological well-being of black skin cancer patients would be poorer than that of Caucasians due to their fatalistic beliefs and depression rates, but the author is not aware of a study that has directly measured this.<sup>1-4,24,25</sup>

The next individual factor, personality, is defined by the American Psychological Association as "individual differences in characteristic patterns of thinking, feeling and behaving."<sup>26</sup> Research has affirmed that personality impacts a patient's adaptation to cancer and possibly their prognosis.<sup>27</sup> This study will focus on the Big Five personality traits: *extraversion*, being outgoing and sociable; *agreeableness*, being cooperative, trusting, and sympathetic; *openness*, being

curious, creative, and imaginative; *conscientiousness*, being organized, diligent, and self-disciplined; and *neuroticism*, being anxious, stressed, and irritable.<sup>56</sup> A 2009 study determined that extraversion, conscientiousness, and neuroticism were correlated with PWB.<sup>28</sup> A later study advanced this notion by analyzing the impact of all Big Five personality traits on an individual's PWB using a survey of 286 Australian individuals.<sup>29</sup> All traits were significantly correlated with PWB, with an individual's lifestyle choices also having significant impacts on their physical and psychological well-being.<sup>35-45</sup> This study will focus on three main lifestyle choices: nutrition, physical activity, and mindfulness practice.

Moreover, certain personality traits like resilience may explain the variation in cancer patients' PWB at different stages of the disease, which leads into the next category of factors: medical. Most types of skin cancer have five stages (0-4) that are classified based on the tumor's size and level of invasiveness.<sup>32</sup> A retrospective observational found that the well-being of early-stage cancer patients is generally lower than that of the general population, while that of late-stage cancer patients is sometimes even higher than that of the general population.<sup>11</sup> These disparities could be attributed to post-traumatic growth (PTG) or the act of benefit-finding (BF), two names for a phenomenon in which resilient individuals who actively cope with traumatic experiences gain a positive outlook on life and undergo personal betterment.<sup>33,34</sup> "Individuals with stage 2 disease had significantly higher BF scores than those with stage 4 or stage 1 cancer. Time since diagnosis [was] not related to BF."<sup>34</sup> Therefore, a patient's stage of cancer is the only medical factor that is currently believed to impact their psychological well-being. Based on the current literature, it can be hypothesized that skin cancer patients in the middle stages (2 and 3) would have the highest PWB.

Cancer Society claims that nutrition is essential to cancer patients' wellbeing.<sup>35</sup> A meta-analysis by Li *et al.* expounded this notion by analyzing 21 studies regarding diet and depression from 10 countries and determining that the Western dietary pattern (consisting of red meat, refined starches and sweets, and high-fat foods) was associated with an increased risk of depression,<sup>37</sup> which suggests that nutrition quality is related to PWB. Conversely, a study involving 100,000 women determined that diet quality has a positive correlation with optimism, which also contributes to PWB.<sup>38,39</sup>

Cancer patients are also encouraged to get physical activity to mitigate symptoms.<sup>36</sup> A 2010 meta-analysis found that exercise interventions improved the QOL of cancer survivors, which is consistent with later findings.<sup>44,45</sup> Thus, patients who exercise are more likely to have higher PWB.

Mindfulness, "the state of being attentive to and aware of what is taking place in the present," has been shown to boost wellbeing and is becoming increasingly implemented in cancer care.<sup>40,41</sup> One study determined that mindfulness was "associated with higher pleasant affect, positive affectivity, vitality, life satisfaction, self-esteem, optimism, and self-actuality" among cancer patients.<sup>41</sup> Furthermore, a study of Japanese breast cancer patients found that mindfulness-based

cognitive therapy improved patients' PWB.<sup>43</sup> Thus, mindfulness has a definite impact on cancer patients' psychological well-being, but the relative significance of this variable is unknown.

Numerous studies have shown that social support, "the provision of assistance or comfort to others, typically to help them cope with biological, psychological, and social stressors," improves one's well-being.<sup>46-50</sup> For example, a study conducted using questionnaires and health surveys taken by 351 cancer patients determined that social support was positively correlated with psychological adjustment and QOL.<sup>47</sup> Therefore, patients with greater social support have higher PWB.

## ■ Methods

An online survey was chosen as the research instrument for this study because of its ability to reach a diverse sample of skin cancer patients, its convenience for individuals with internet access, and the relatively short time commitment required to participate.

### *Measures/Instruments:*

The survey included 16 constructs that assessed the factors that could influence a skin cancer patient's PWB. No personally identifiable information was collected in this anonymous survey and respondents were asked for their consent before beginning.

Medical variables were measured using 5 research-developed questions that assessed the patient's time of diagnosis, treatment history, type and stage of skin cancer, and response to treatments.<sup>32,53-55</sup>

Personality types were measured using the Big Five Personality Assessment developed by John and Srivastava in 1999, a 44-item questionnaire that measures extraversion, conscientiousness, agreeableness, openness, and neuroticism using a 5-point Likert scale.<sup>56</sup> Individuals' scores for each item relating to a certain trait were averaged to calculate their overall score for each of the five personality traits.

Nutrition was measured using an assessment developed by the Vitality Group, a global organization that helps individuals live healthier, for use by health insurance companies.<sup>58</sup> The assessment consists of 11 questions that measure various aspects of one's diet, including fruit and vegetable intake, salt consumption, and refined carbohydrate consumption. The question concerning diet satisfaction was omitted. Scores were calculated by summing all items.

Carol Ryff's 18-item psychological well-being scale, developed for the 2004-2006 Midlife in the United States (MIDUS) study, was utilized to measure PWB.<sup>59</sup> This scale measures autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance (the 6 facets of PWB) using a 7-point Likert scale. Overall PWB scores were calculated by averaging individuals' subscale scores. Cronbach's Alpha was 0.792.

The Perceived Support Scale developed by Krause and Borawski-Clark was used to measure social support.<sup>60</sup> It consists of ten categories of questions on a 4-point scale that measure how often, ranging from "never" or "not at all" to

of social support, including "Contact with Family" and "Emotional Support." The questions relating to "Support Provided" and "Satisfaction with Support Received" were omitted. Scores were calculated by averaging all items. The Cronbach's Alpha for this scale was 0.817.

The exercise was measured using a condensed version of the Global Physical Activity Questionnaire (GPAQ), an assessment developed by the World Health Organization that asks questions about exercise related to work, travel, recreational activities, and sedentary behavior.<sup>61</sup> Patients' scores were calculated by summing all items.

The Mindful Awareness Attention Scale (MAAS), developed and validated by Brown and Ryan in 2003, assessed patients' mindfulness.<sup>41</sup> This 15-question instrument evaluates the frequency that one experiences certain incidents or emotions using a 6-point Likert scale. Redundant questions were removed, which condensed the scale to 10 questions. Scores were calculated by averaging all items. The Cronbach's Alpha was 0.836.

Next, respondents were asked questions regarding four aspects of their demographic background: age, gender, ethnicity, and marital status.<sup>62</sup>

Respondents were asked for their zip code to assess the UV index. In the analysis process, Google was used to determine the cities represented by these zip codes. Then, the cities were searched on Weather Atlas (a website with global climate data) to determine the average year-round UV index in each city.<sup>63</sup>

An open-response question was written to conclude the survey: "If you would like, please share what has helped you the most during your skin cancer experience."

### *Procedures:*

Several national and international skin cancer organizations were contacted and asked to promote the survey. The Melanoma Research Alliance, the AIM at Melanoma Foundation, the Melanoma Research Foundation, the Skin Cancer Foundation, and Outrun the Sun posted the survey on at least one of their social media platforms, including Twitter, Instagram, Facebook, and YouTube.

The data were analyzed in SPSS version 26 using multivariate regression, one-way ANOVAs, and independent sample t-tests to determine the statistically significant predictors of skin cancer patients' PWB.

### *Participants:*

Approximately 470 skin cancer patients from 10 countries and 43 U.S. states responded to the survey, 251 of which submitted nearly complete responses and were included in the data analysis. Twenty-four percent of respondents were in each of the age ranges of 30-39, 40-49, and 50-59. In addition, 88% of respondents were female and 11% were male. About 97% of participants were white or Caucasian, 2% were Hispanic or Latino, 1% were American Indian or Alaska Native, and 0.4% were Asian. Most participants (74%) were either married or in a domestic partnership, while the others were never married (15%), separated or divorced (10%), or widowed (1%).

Most respondents (69%) were either diagnosed with skin cancer between the present day and nearly two years ago or over eight years ago. The majority (88%) had melanoma which is likely because three of the organizations that promoted the survey were melanoma-focused. The second-most prevalent type of skin cancer was basal cell carcinoma (25%). Furthermore, stages 1 and 3 patients each represented 26% of survey respondents, while stage 4 patients represented 24%. Respondents received a variety of treatments, with excisional surgery (85%) and immunotherapy (33%) being the most common. Most respondents' tumors exhibited a complete response to treatment (i.e., disappeared completely).

## ■ Results

### Quantitative:

Multivariate linear regression, a statistic that determines if independent variables are predictive of the dependent variable, was performed comparing 12 quantitative variables to PWB. Variables that were included were conscientiousness, agreeableness, openness, extraversion, neuroticism, social support, nutrition, exercise, mindfulness, UV index, stage of cancer, and time since diagnosis. The questions measuring these variables were grouped into indices, which gave participants a score for each index. Means for each index are displayed in Table 1

The regression analysis shown in Figure 1 indicated that these 12 variables accounted for approximately 48.7% of the variance in respondents' PWB ( $R^2 = .487$ ) and collectively were statistically significant predictors of PWB.

P-values of less than .05 were required to classify an individual variable as significant.<sup>64</sup> After the initial examination of p-values, the regression analysis was trimmed for precision to include only the variables that were shown to be significant in the first analysis. Six factors were shown to be significant predictors of skin cancer patients' PWB (in order of importance): *conscientiousness* ( $\beta = .239$ ,  $p = .000$ ), *social support* ( $\beta = .219$ ,  $p = .000$ ), *stage of skin cancer* ( $\beta = -.179$ ,  $p = .001$ ), *neuroticism* ( $\beta = -.188$ ,  $p = .007$ ), *agreeableness* ( $\beta = .145$ ,  $p = .013$ ), and *mindfulness* ( $\beta = .154$ ,  $p = .019$ ).

ANOVA (analysis of variance) was used to assess differences in mean PWB scores among variables with more than two categorical groups<sup>64</sup>: age, marital status, response to treatment, and type of skin cancer. Independent samples t-tests served the same purpose but for variables with only two possible groups: gender, ethnicity (white vs. non-white), and treatments received (radiation vs. no radiation). Figure 2 shows these factors and the tests used to assess the PWB differences among groups.

Among demographic variables, age, gender, and ethnicity were shown by ANOVAs to not have significant differences in PWB ( $p > .05$ ). However, marital status was shown to be significant [ $F(5, 242) = 2.341$ ,  $p = .042$ ]. Figure 3 shows that married participants had the highest PWB, while widowed patients had the lowest PWB.

Analysis of the medical variables revealed that the amount of time since diagnosis, type of skin cancer, and response to treatment(s) did not show significant differences in PWB ( $p > .05$ ). In terms of treatments received, chemotherapy,

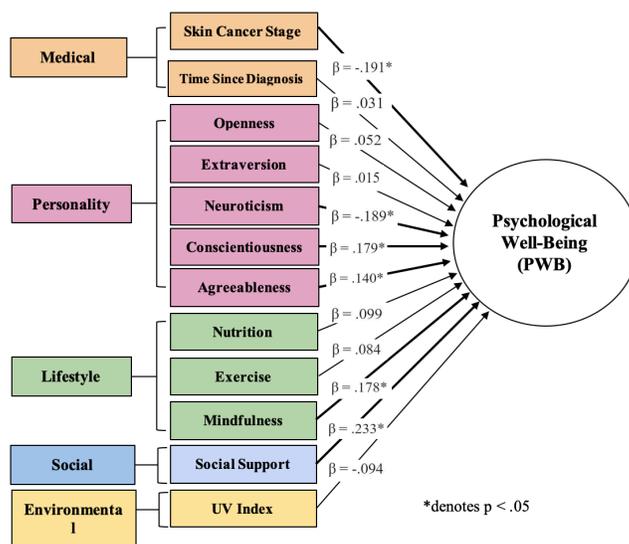
immunotherapy, cryotherapy, excisional surgery, Mohs surgery and photodynamic therapy were all insignificant as well ( $p > .05$ ). However, radiation treatment was significant to respondents' PWB [ $t(249) = .324$ ,  $p = .020$ ]. Figure 4 shows that patients who were treated with radiation experienced lower PWB than those who were not.

### Qualitative:

Out of the 470 total responses, 307 responded to the

**Table 1:** Mean index scores.

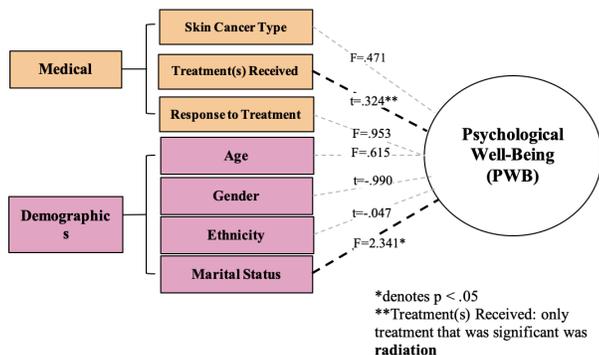
INDEX	SCALE	MEAN	STANDARD DEVIATION
PWB	1-5	3.91	.51
Conscientiousness	1-5	3.76	.54
Agreeableness	1-5	3.84	.55
Openness	1-5	3.51	.55
Extraversion	1-5	3.05	.74
Neuroticism	1-5	3.12	.76
Social Support	1-4	2.52	.42
Nutrition	N/A	4.38	4.97
Exercise	-2-14	2.98	3.36
Mindfulness	1-5	2.99	.89
UV	1-11	4.11	.95



**Figure 1:** Regression analysis of factors that predict skin cancer patients' PWB.

open-response prompt. After each response was analyzed, 28 themes were deduced, each of which was exhibited in at least one response, while some responses displayed more than one. These themes were divided into five categories (shown in Table 2): social, medical, personality, lifestyle, and miscellaneous.

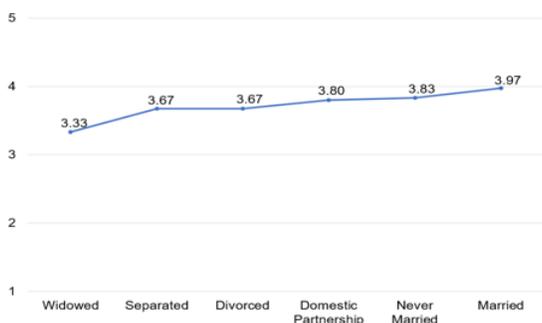
The most frequently expressed theme was family, which included one’s immediate and extended family and spouses/partners. A quote that exemplifies this theme is from a



**Figure 2:** ANOVAs and t-tests.

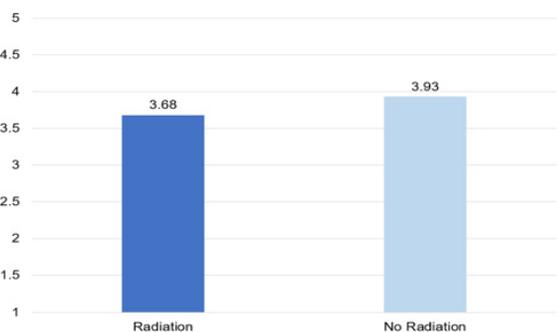
respondent who claimed that what helped the most was “looking at my daughter and knowing she needs me and I need her.” Another wrote, “My wife for her care and concern.”

The second most prevalent theme was centered around medical teams, which was mentioned in 44 out of 307 responses and ranged from discussion of oncologists and



**Figure 3:** Mean PWB index scores by marital status.

surgeons to nurses and physicians’ assistants. Care, skill, honesty, and patience were the most cited characteristics of a good medical team. One respondent wrote, “My oncologist is very thorough, and she seems to care.” Another claimed that her “phenomenal Mohs surgeon” had been crucial to her cancer-free status. Though most types of treatment were found to be insignificant to PWB, many respondents mentioned that they were more pleased with medical teams who were “up on all of the latest treatments.”



**Figure 4:** Mean PWB index scores by receipt of radiation treatment.

The next most frequently expressed theme was a community support system, which included friends, co-workers, neighbors, etc. One patient wrote that the most beneficial things were “close people in my life who listened and cared about my experience and fears.” Another patient wrote that “having supportive people who didn’t see melanoma as ‘just skin cancer’...helped immensely as well.”

**Table 2:** Thematic analysis: “If you would like, please share what has helped you the most during your skin cancer experience.”

	RESPONSE THEMES	FREQUENCY
SOCIAL	Family (children, siblings, parents, spouses/partners, etc.)	55
	Community Support System (non-skin cancer patients: friends, coworkers, church group, neighbors, etc.)	36
	Support Groups (skin cancer patients/survivors: in-person and social media)	20
	Religion	19
	Learning from Fellow Skin Cancer Patients (informally/unintentionally)	15
	Advocating & Educating Others About Skin Cancer	11
	<b>TOTAL</b>	<b>156</b>
MEDICAL	Skilled, Caring & Honest Medical Teams (oncologists, dermatologists, nurses, surgeons, etc.)	44
	Self-Advocacy	5
	Early Diagnosis	5
	Good Healthcare System & Health Insurance	4
	Clinical Trial	2
	<b>TOTAL</b>	<b>60</b>
PERSONALITY	Conscientiousness (getting skin checks, wearing sunscreen & hats, taking care of oneself, etc.)	16
	Positivity	10
	Acceptance	10
	Gratitude	3
	Perseverance	2
	Humor	2
	Openness	2
	Curiosity	2
	<b>TOTAL</b>	<b>47</b>
LIFESTYLE	Exercise	4
	Mindfulness/Meditation	2
	Balanced Nutrition	1
	<b>TOTAL</b>	<b>7</b>
MISCELLANEOUS	Information/Education (and their sources)	22
	Time	4
	Living Life/Not Dwelling on Disease	3
	Handling Personal Problems	2
	Adapting to Physical Limitations	2
	Reading	2
	<b>TOTAL</b>	<b>35</b>

Overall, the majority of responses were heavily focused on social support, whether it was from family, friends, or fellow skin cancer patients.

**Discussion**

The question that this study aimed to answer was: Which factors are statistically significant predictors of skin cancer patients’ psychological well-being?

Interestingly, three out of the six significant predictors of skin cancer patients’ PWB were personality types (neuroticism, agreeableness, and conscientiousness). Consistent with the previous literature, patients with high levels of agreeableness and conscientiousness had higher psychological well-being, while patients exhibiting high levels of neuroticism had lower psychological well-being.<sup>28-31</sup> However, two out of the five personality traits (extraversion and openness) were not significant to PWB, contradictory to prior research.<sup>29</sup>

Conscientious individuals have a “tendency to be responsible, organized, hard-working, goal-directed, and to adhere to norms and rules.”<sup>66</sup> Patients with this personality type may be more likely to follow their treatment plans and

doctor's instructions, get frequent skin checks, and be diligent about wearing sunscreen, hats, and protective clothing to prevent further skin damage. These habits could reduce patients' stress and give them peace of mind.

Agreeable individuals are kind, cooperative, polite, and empathetic.<sup>67</sup> This could contribute to higher PWB because these individuals are more likely to develop positive relationships with others (including their oncologist) and establish a strong support system, which has been shown by this study and numerous others to increase PWB.

Neuroticism, the only Big Five personality trait that is negatively correlated with PWB, contributes to anxiety and depression.<sup>30, 31</sup> Skin cancer patients who are neurotic likely worry about their disease progressing, dwell on their past mistakes, and fear death. Thus, these findings stress the importance of diligence, cooperation, and stability in cancer patients. Fortunately, studies have shown that personality is malleable and capable of being changed over time.<sup>68, 69</sup>

Overall, social support was the statistically significant predictor of PWB with the second-highest Beta coefficient. In the thematic analysis section, most respondents answer the question asking about beneficial aspects of their experience related to social support. Furthermore, ANOVAs illustrated that marital status (a major facet of social support) was significantly related to PWB. The means plot in Figure 3 shows that married skin cancer patients had the highest PWB, which is consistent with prior findings.<sup>48, 49</sup>

Another significant predictor of PWB was mindfulness. Mindfulness is related to higher levels of psychological well-being because it may prevent skin cancer patients from dwelling on the past or thinking too far into the future, which is important for an unpredictable disease like cancer. This conclusion is in line with previous studies that determined the benefits of mindfulness for cancer patients.<sup>40-43</sup>

Consistent with prior findings,<sup>34</sup> stage of cancer was a significant predictor of PWB. However, the trend observed in previous research in which patients in stages 2 and 3 had the highest PWB was not illustrated by the data. In this study, the stage of cancer was negatively correlated with patients' PWB; patients in higher stages had poorer PWB.

Nearly all of the most common skin cancer treatments (excisional surgery, chemotherapy, immunotherapy, cryotherapy, Mohs surgery, and photodynamic therapy) showed no significant differences in PWB. However, patients who received radiation had significantly lower PWB than those who did not. Unfortunately, the word "radiation" has a negative connotation for many cancer patients who have misconceptions about its safety.<sup>70</sup> Thus, patients who receive this treatment may be apprehensive of the outcome, leading to worry and decreased PWB. In reality, radiation is considered a successful treatment for basal and squamous cell carcinomas as 90% of patients who receive it are cured within 5 years.<sup>71</sup> Therefore, healthcare providers should work to amend the reputation of radiation therapy to ensure that patients who receive this treatment are confident in its efficacy and maintain high PWB.

The regression analysis suggested that nutrition, exercise, meditation, UV index, and time since diagnosis were not statistically significant predictors of PWB. Contrary to prior findings,<sup>21,23,25</sup> neither age, gender, nor ethnicity was found to be significantly related to PWB by ANOVAs.

#### ***Thematic Analysis:***

Many of the factors that participants mentioned in the open-response question were also found to be significant predictors of PWB in the regression analysis. For example, social support, mindfulness, and conscientiousness were all mentioned directly or indirectly by at least one respondent. However, some variables that were not measured in the survey were mentioned in the qualitative section, including religion, gratitude, and humor. This makes sense as the R-squared value of 0.487 indicates that approximately 50% of the variance in skin cancer patients' PWB was accounted for by variables not included in the survey. Thus, future research should attempt to identify the remaining variables that are significant predictors of skin cancer patients' PWB.

#### ***Implications:***

The findings of this study led to the creation of four strategies that psycho-oncologists could pursue to improve the PWB of skin cancer patients: 1) recognize that patients in higher stages have the poorest psychological well-being and provide these patients with more intense interventions; 2) suggest that cancer patients complete a personality assessment following diagnosis to identify psychological strengths and weakness to tailor their psychological intervention plan around; 3) implement mindfulness-based intervention practices; 4) ensure that patients have adequate social support and recommend support groups to patients who are lacking in this area.

Moreover, patients with mental disorders characterized by neuroticism (anxiety, OCD, etc.) should be referred for psychological assessment and intervention to mitigate the negative effects of this personality type on their psychological well-being.

#### ***Limitations:***

Due to COVID-19, the distribution of the survey was restricted to skin cancer organizations' social media platforms as opposed to hospitals and cancer centers, which could have reached a larger and more diverse sample of patients.

In addition, the survey could not assess every factor that could be related to PWB since it had to be short enough for a sufficient number of patients to respond to its entirety.

Despite research suggesting that nutrition and exercise may be predictive of patients' PWB,<sup>35-38,44,45</sup> these factors were not shown to be significant in the regression analysis. A possible cause of this could be that the assessment used to evaluate patients' nutrition was not widely used and/or validated in research.

Furthermore, there was a lack of ethnic diversity among respondents as 97% of respondents were Caucasian, which may have prevented PWB differences from being observed based on ethnicity. In addition, 88% of respondents were female, which could explain why gender did not show differences in PWB either. Since the majority of respondents were white

females, this study may not be generalizable to the global skin cancer patient population.

### ■ Conclusion

Oncology is a field that is constantly evolving, with new advancements in treatments, screening techniques, and surgical methods being discovered rapidly. But the vital aspect of cancer care that is often unacknowledged is tending to patients' psychological well-being. Research in psycho-oncology has greatly ameliorated this relative lack of attention, helping doctors better understand patients' needs. A quote by William Osler, "the father of modern medicine," best exemplifies this philosophy: "The good physician treats the disease; the great physician treats the patient who has the disease."<sup>72, 73</sup>

It is especially important to ensure that cancer patients are conscious and attentive to their psychological well-being due to the likely relationship between PWB and cancer prognosis. Whether or not this theory holds, it is important to prioritize the psychological well-being of skin cancer patients to ensure that these individuals live happy, healthy lives.

The unique holistic approach utilized in this study yielded important findings for skin cancer patients and their providers, addressing a major gap in the field. All skin cancer patients should be aware of the factors that are most predictive of high psychological well-being: high levels of the personality traits of conscientiousness and agreeableness and low levels of neuroticism; earlier stages of cancer; mindfulness; and social support.

Skin cancer is likely never going to disappear. Therefore, all cancer centers have the responsibility to make the experience as stress-free as possible for their patients. With increasing numbers of Americans predicted to develop cancer in the coming years, it is paramount that psycho-oncologists ensure that patients thrive, not just survive. Implementing the interventions proposed in this study to enhance patients' psychological well-being could be a vital step toward ensuring skin cancer patients can achieve equal levels of long-term happiness and well-being as their peers.

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