

# Skin Cancer Patients' Psychological Well-Being: Identifying the Most 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 contextual factors (such as social support, personality, and age) have been found to be predictive of cancer patients' PWB. This study aimed to answer the question: Which group of contextual factors (individual, medical, social, lifestyle, or environmental) is the most significant predictor of skin cancer patients' psychological well-being? An anonymous survey distributed to several 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, 251 of which were complete and analyzed. Multivariate regression, analysis of variance (ANOVA), and t-tests were used to determine the most significant predictors of patients' PWB: conscientiousness, social support, stage of skin cancer, neuroticism, agreeableness, and mindfulness. Thus, the data suggest that individual factors (or more specifically, personalities) are most important in influencing patients' PWB. These results led to the development of several strategies to enhance skin cancer patients' PWB that could be implemented by cancer centers across the U.S. This could ensure that the next wave of incoming skin cancer patients doesn't just survive, but thrives.

## 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>1,2,3</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> These beliefs and impressions are not unfounded... In 2018, about 9.5 million people globally died of cancer, with one of the highest death rates belonging to the U.S.<sup>5,6,7</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>

Cancer’s impacts on patients’ physical health are widely understood, but its effects on patients’ mental health aren’t devoted equal attention. Dr. Lang-Rollin, a German psychiatrist, claims, “Cancer...leads to a broad variety of physical and psychosocial problems. These range from physical pain, fatigue, and loss of autonomous life to anxiety, depression, and strain on personal relationships and have a deep impact on quality of life.”<sup>9</sup> In a 2019 study of American cancer patients in the *Journal of Clinical Oncology*, “61% of patients experienced pain, 74% fatigue, and 46% distress.”<sup>10</sup> Accordingly, cancer patients have a lower quality of life than the average American.<sup>11</sup>

Over the past 50 years, there has been a growing focus on patients’ mental health, and a new 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 wellbeing, but the focus of this study was *psychological well-being* (PWB).<sup>13</sup> Dr. Carol Ryff, a psychology professor at 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 can improve both mental *and* physical health.<sup>15,16</sup><sup>17</sup> Therefore, psychological interventions aimed at improving one’s PWB could have major implications for the future of oncology, potentially improving a cancer patient’s prognosis. 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, a study in the *Journal of Clinical Oncology* determined that depression was associated with worse survival rates among lung 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, in order for psycho-oncologists to make beneficial psychological interventions for patients, it is essential for them to know which factors most impact psychological well-being. In this study, *contextual factors* will be defined as characteristics of a patient’s background, personality, culture, residence, medical history, or other

relevant variables that may influence their PWB. 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 has examined them collectively. This gap led to the research question of: Which group of contextual factors is the most significant predictor of skin cancer patients' psychological wellbeing? 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 in order for psycho-oncologists to improve the PWB of skin cancer patients and, potentially, their survival rates as well.<sup>19</sup>

## **Literature Review**

The contextual 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*. No study has examined the impact of gender on cancer patients' *PWB* specifically. However, in *Clinical Psychology Review*, McLean and Anderson explained that women are more prone to anxiety and fear than men, which likely impacts their PWB.<sup>20</sup> Furthermore, a study by Parker et al. examined gender differences in mental illnesses and quality of life among 351 cancer patients.<sup>21</sup> Their findings were consistent with the claims of McLean and Anderson as "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. Pudrovskaya 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 the findings of Parker et al.<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> Parker et al. found that older patients have higher PWB than younger patients, as these individuals experienced less anxiety and depression and a higher mental QOL.<sup>21</sup> Subsequently, Wu and Harden conducted a meta-analysis of 37 studies that analyzed the impact of various factors on cancer survivors' QOL.<sup>23</sup> Their results support the hypothesis that cancer patients' PWB improves with age.

Ethnicity has not been directly associated with 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>24, 4</sup> Traeger et al. analyzed the prevalence of depression among cancer patients by race and sex and found that depression rates were "highest among black men, followed by white women, black women, and white men."<sup>25</sup> Thus, black males' 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 no study has directly measured this using PWB as the dependent variable.<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 study by Grant et al. (2009) determined that extraversion, conscientiousness, and neuroticism were correlated with PWB.<sup>28</sup> Hicks et al. (2018) 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 neuroticism being the only trait with a negative correlation.<sup>29</sup> However, this study did not include cancer patients and the body of research analyzing the impact of personality factors among these individuals is limited to fewer traits. For example, recent studies among cancer patients indicate that neuroticism is associated with anxiety, depression, and a lower QOL.<sup>30, 31</sup> Thus, certain personality types have been associated with PWB, but the relationship has not been thoroughly studied in skin cancer patients.

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 study by Sullivan et al. found that the wellbeing 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> As found by Lechner et al., “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.

An individual’s lifestyle choices also have 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.

The American 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 proves that nutrition quality is related to PWB. Conversely, a study by Hingle et al. 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 meta-analysis by Ferrer et al. (2010) found that exercise interventions improved the QOL of cancer survivors, which is consistent with the findings of Dittus et al. (2017).<sup>44, 45</sup> Thus, patients who get more exercise likely have higher PWB.

Mindfulness, “the state of being attentive to and aware of what is taking place in the present,” has been proven to boost wellbeing and is becoming increasingly implemented in

cancer care.<sup>40, 41</sup> Brown and Ryan (2003) 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 an 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 by Carver et al. 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.

One of the greatest sources of social support for many individuals is marriage. A longitudinal study by Kim and McHenry found that marriage was significantly associated with PWB.<sup>48</sup> In a study of male cancer patients, Goldzweig et al. found that unmarried patients had the highest levels of psychological distress.<sup>49</sup> Thus, marital status has significant effects on cancer patients’ well-being.

The final category of factors is environmental. No research has been done on the impact of a skin cancer patient’s residence and/or its average UV index on their PWB. Contrary to what most would assume, the states with the highest rates of new melanoma (the most severe type of skin cancer) are Vermont, Utah, New Hampshire, and Minnesota, cold-weather states with moderate UV indices.<sup>51, 52</sup> Conversely, Hawaii, Texas, Louisiana, and Mississippi, states known



for hot weather, have some of the lowest rates of melanoma.<sup>51</sup> Based on the previous literature, it can be hypothesized that skin cancer patients living in states with relatively low UV indices would experience the poorest PWB due to their presumably low perceived risk.

Clearly, there is an abundance of literature establishing correlations between various contextual factors and aspects of cancer patients' PWB, but no study has examined them collectively to assess their relative significance. The purpose of this research was to identify the group of contextual factors most significantly associated with a skin cancer patient's PWB to determine which aspects to target with interventions.

## **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 contextual 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> The inner-reliability of each scale was confirmed using Cronbach's Alpha, a statistic that measures the relatedness of items in a group, which was greater than the benchmark value of .7 for each.<sup>57</sup>

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 due to irrelevance.

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. The sum of these subscale scores represents an individual's overall PWB. Cronbach's Alpha was .792, proving that it is a dependable measure.

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 that pertain to different aspects of social support, including "Contact with Family" and "Emotional Support Received." The questions relating to "Support Provided" and "Satisfaction with Support Received" were omitted due to irrelevance. The Cronbach's Alpha for this scale was .817 which justifies the inclusion of this measure.

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, and recreational activities, and sedentary behavior.<sup>61</sup>

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. The Cronbach's Alpha of .836 demonstrated that this was a valid measure.

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 UV index. In the analysis process, Google was used to determine the cities that these zip codes represented. 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 using multivariate regression, one-way ANOVAs, and independent sample t-tests to determine the most significant predictors of skin cancer patients' PWB.

### *Participants*

Approximately 470 skin cancer patients from 10 countries and 43 U.S. states responded to this 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. 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%). About 97% of participants were white/Caucasian, 2% were Hispanic/Latino, 1% were American Indian/Alaska Natives, and 0.4% were Asian. See Figures 1-4 below.

Figure 1: Age of Respondents

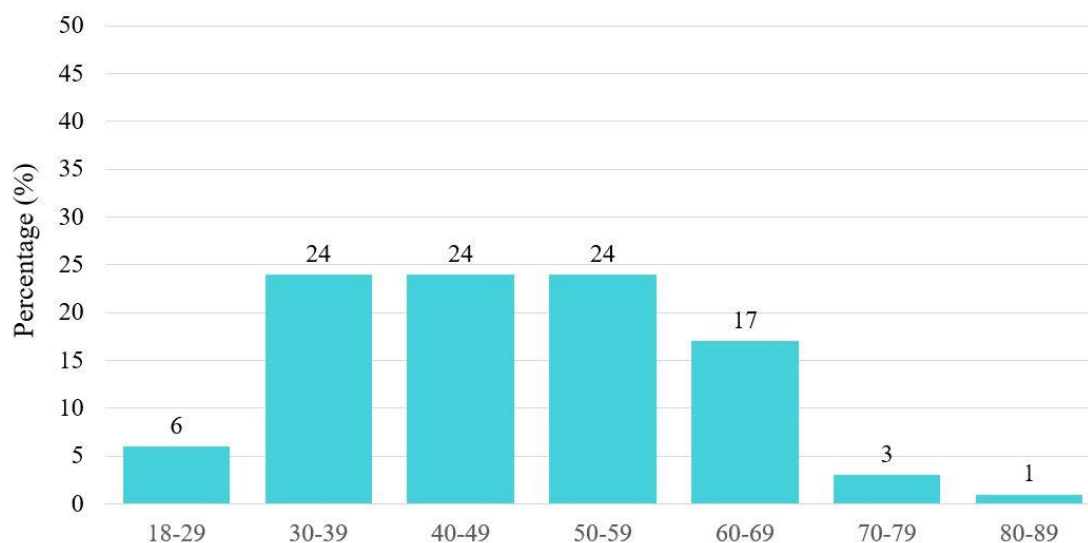


Figure 2: Gender of Respondents

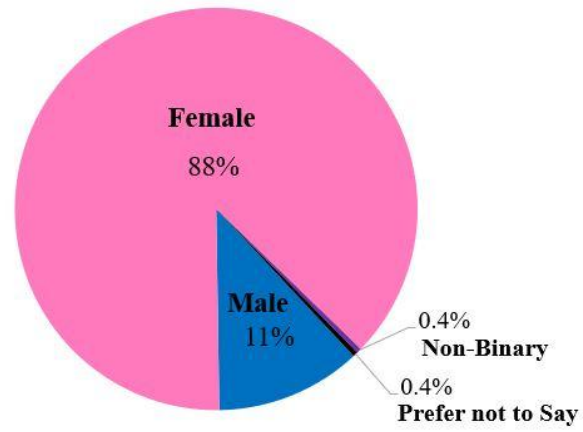


Figure 3: Marital Status of Respondents

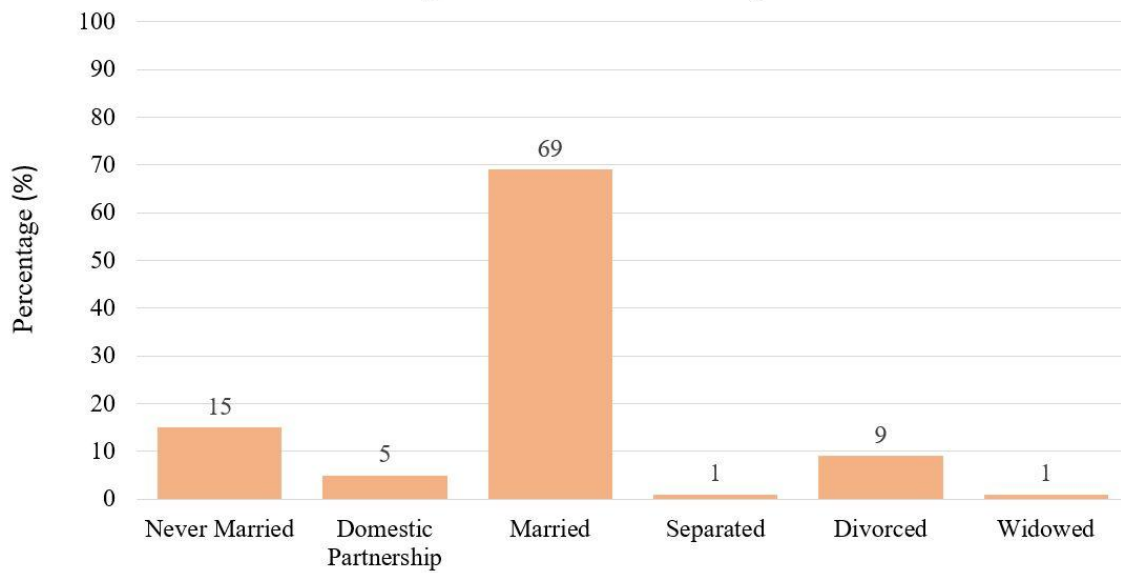
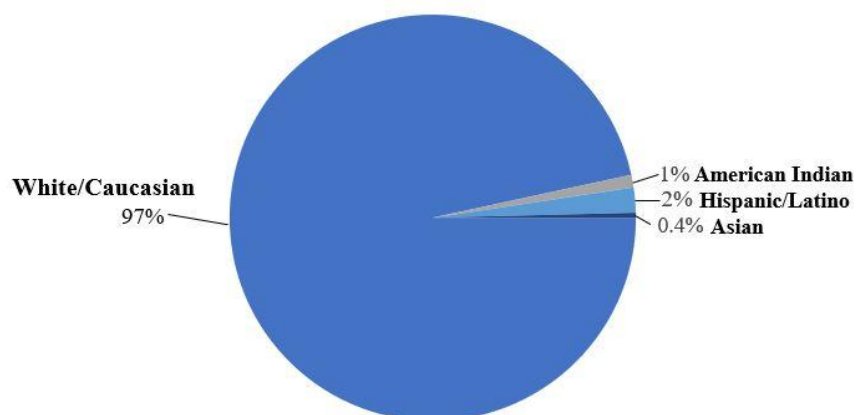


Figure 4: Ethnicity of Respondents



Most respondents (69%) were diagnosed with skin cancer between the present day and nearly two years ago or over eight years ago. The majority (88%) had melanoma as three of the organizations that promoted the survey were melanoma-focused. The second-most prevalent type 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). See Figures 5-9 below.

Figure 5: Time Since Diagnosis

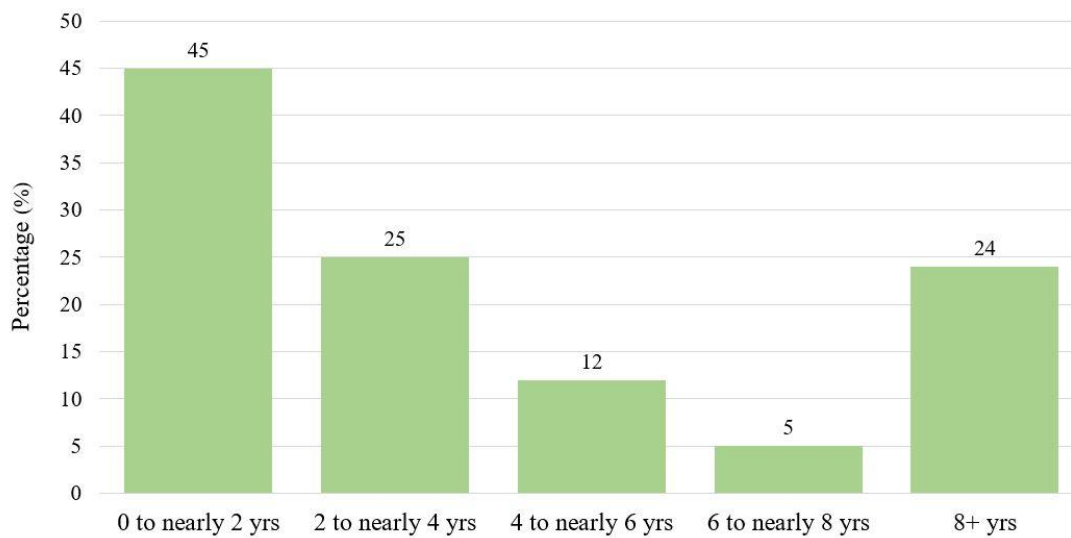


Figure 6: Skin Cancer Type

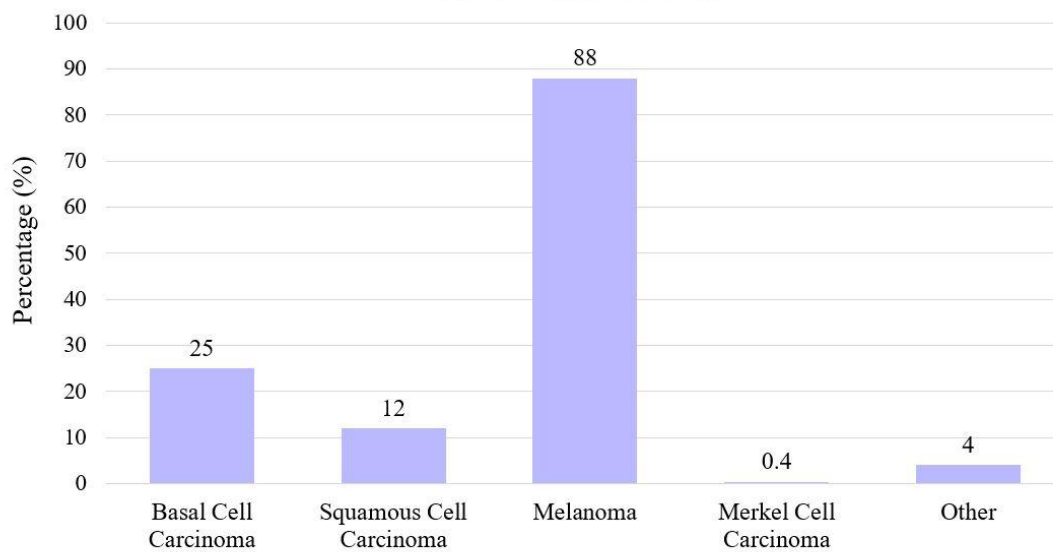


Figure 7: Treatment(s) Received

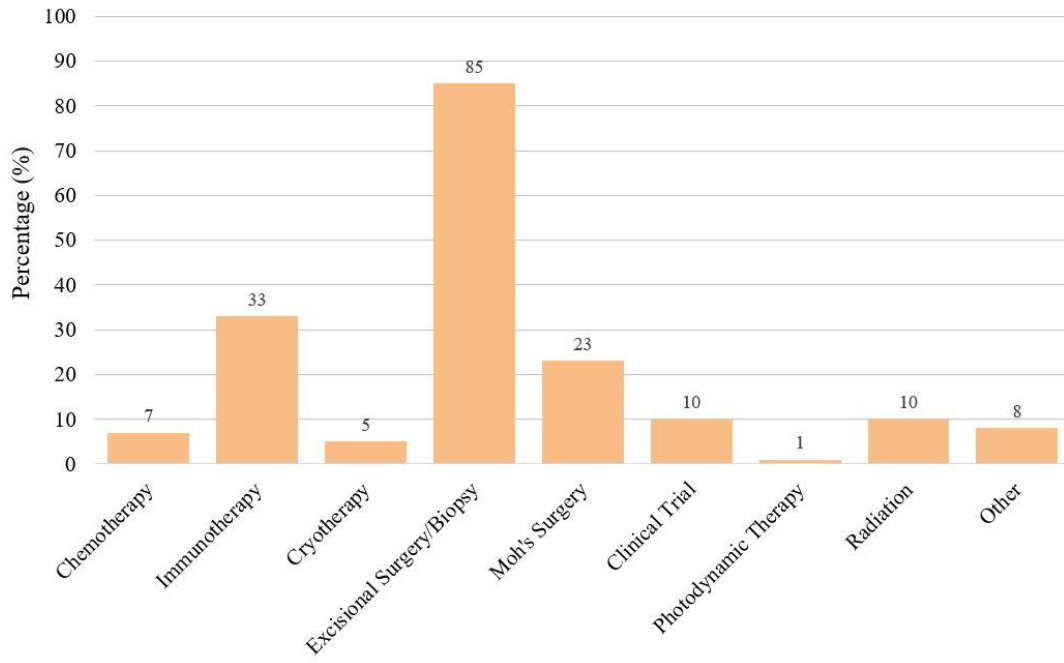


Figure 8: Stage of Skin Cancer

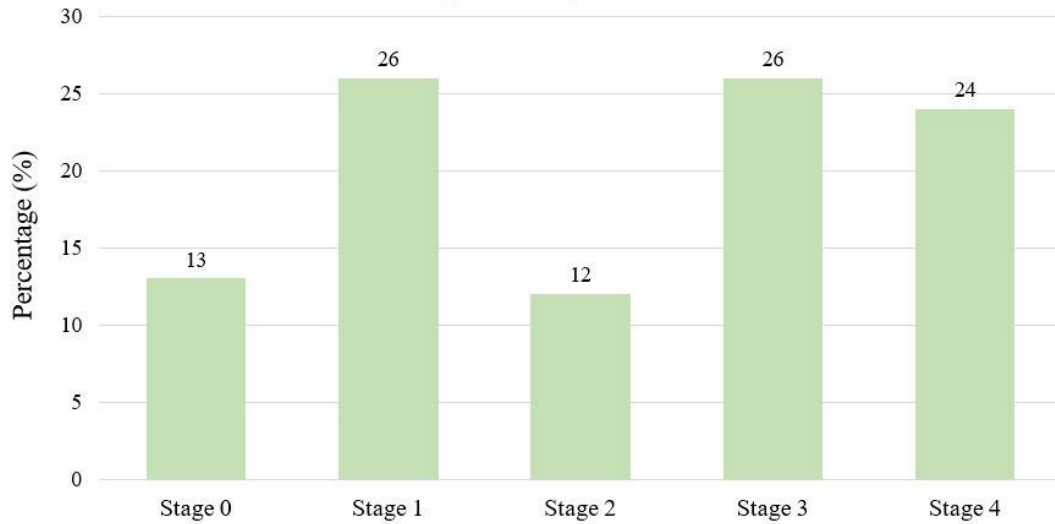
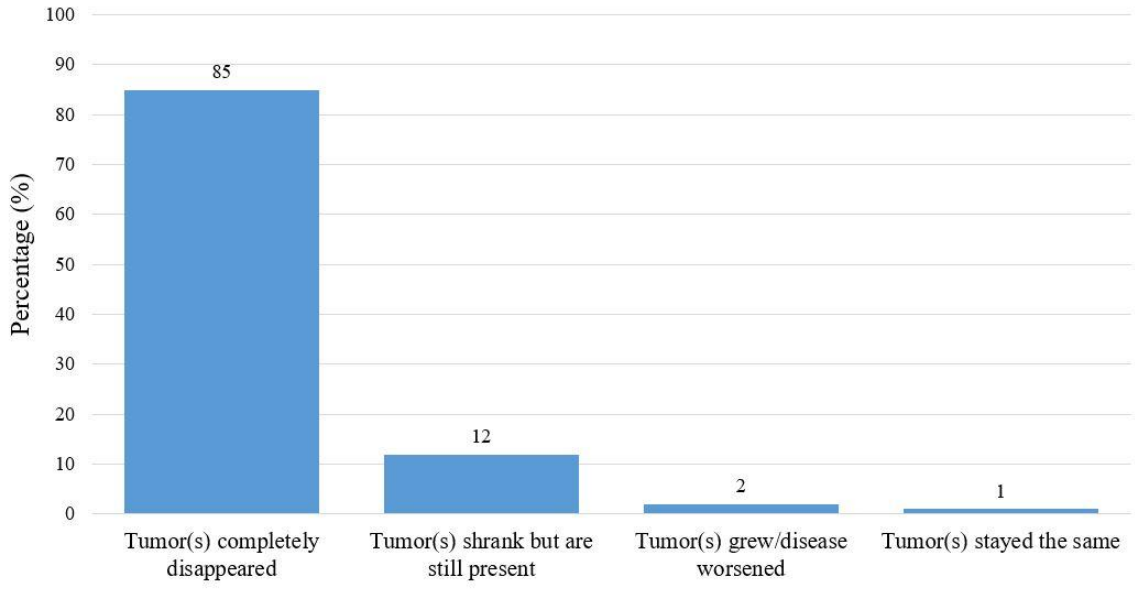




Figure 9: Response to Treatment



**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.

Table 1: Mean Index Scores

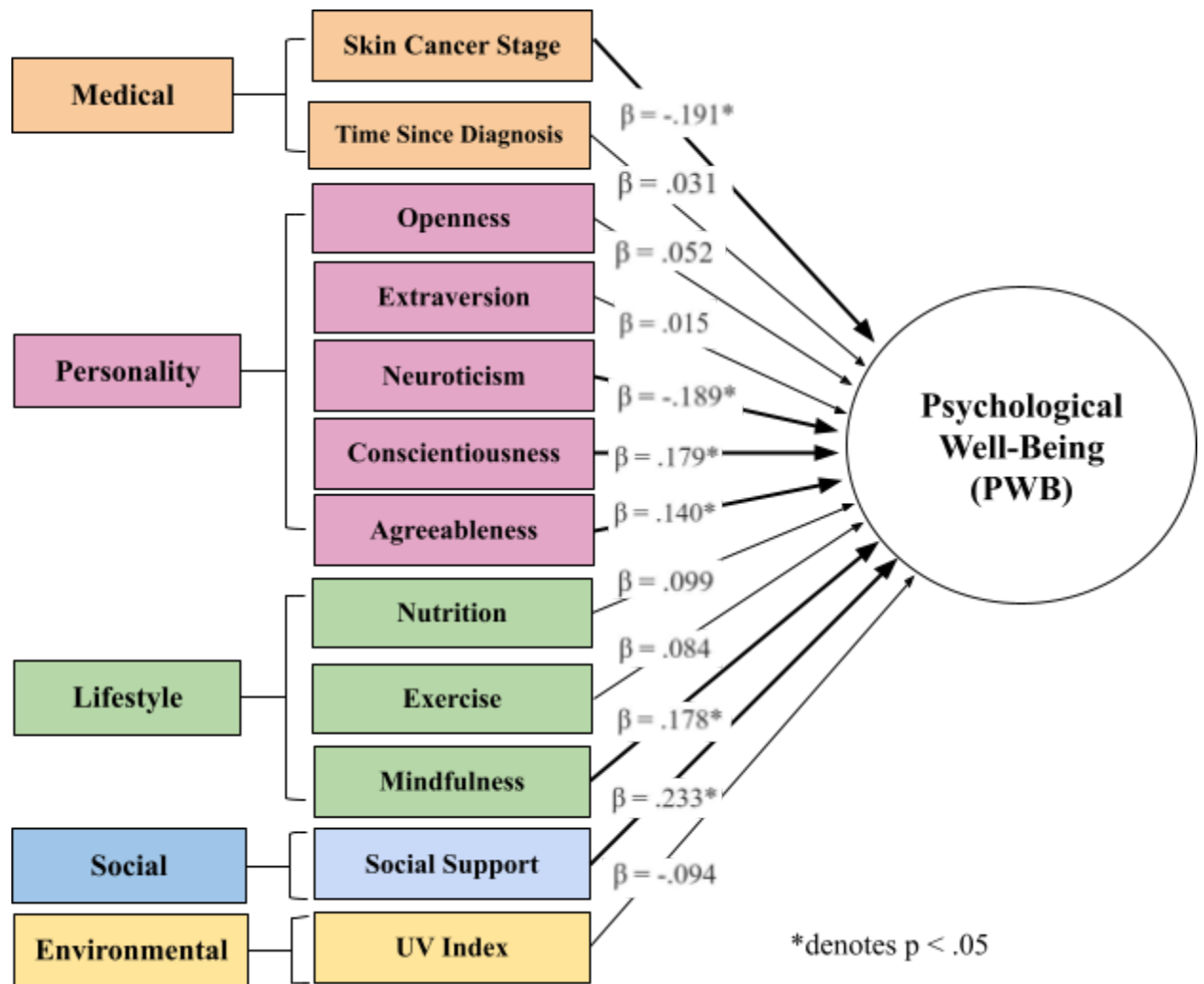
INDEX	SCALE	MEAN	STANDARD DEVIATION
PWB	1-5	3.91	.51
Conscientiousness	1-5	3.76	.54
Agreeableness	1-5	3.84	.55
Openness	1-5	3.51	.55
Extraversion	1-5	3.05	.74
Neuroticism	1-5	3.12	.76
Social Support	1-4	2.52	.42
Nutrition	N/A	4.38	4.97
Exercise	(-2)-14	2.98	3.36
Mindfulness	1-5	2.99	.89
UV	1-11	4.11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

The regression analysis (shown in Figure 10) 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.

A p-value is a “measure of the probability that an observed difference could have occurred just by random chance.”<sup>64</sup> P-values of less than .05 were required to classify an individual variable as significant. After the initial examination of p-values, the regression analysis was trimmed for precision to include only the variables that were proven to be significant in the first analysis. Six factors were proven to be significant predictors of skin cancer patients' PWB (in order of importance): *conscientiousness* ( $\beta = .239$ ,  $p = .000$ ), *social support* ( $\beta$

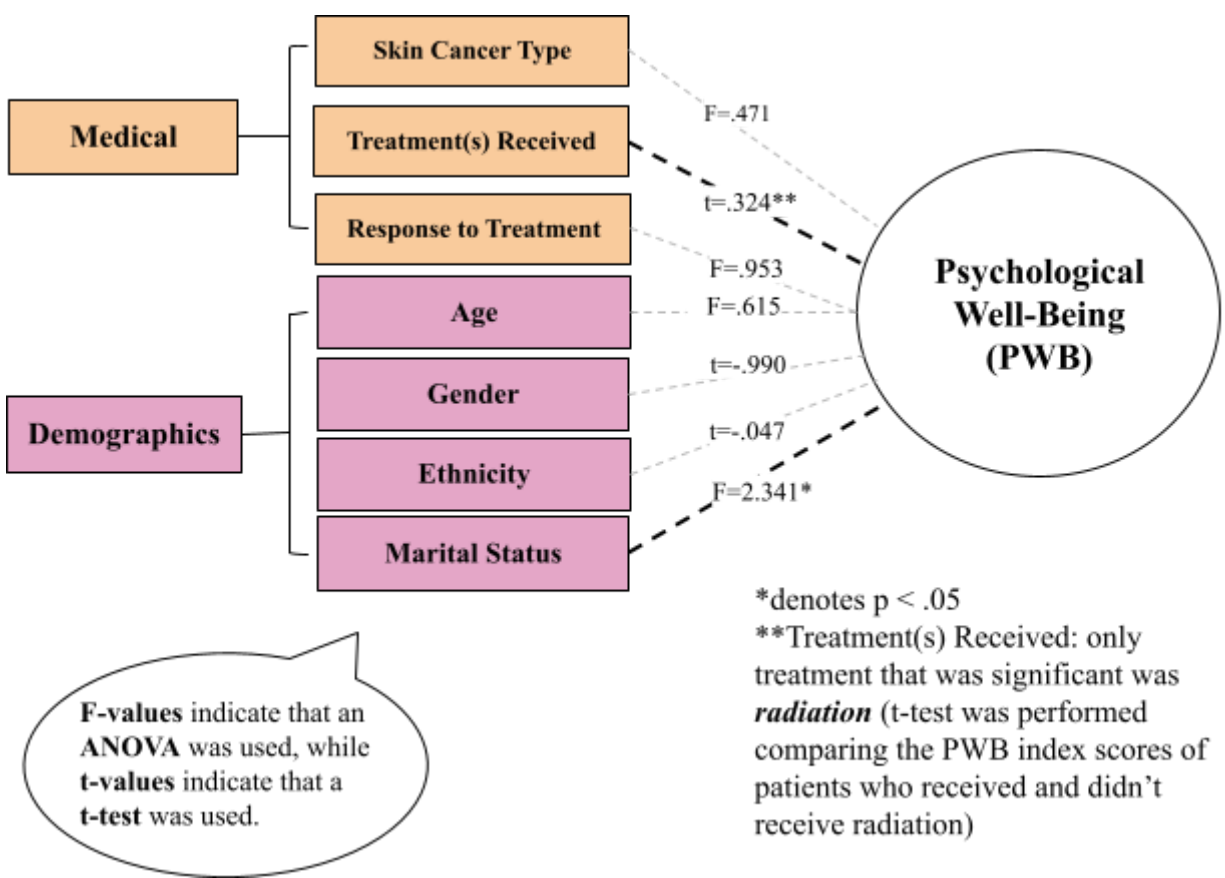
= .219, p = .000), *stage of skin cancer* ( $\beta = -.179$ , p = .001), *neuroticism* ( $\beta = -.188$ , p = .007), *agreeableness* ( $\beta = .145$ , p = .013), and *mindfulness* ( $\beta = .154$ , p = .019). Thus, three personality factors, one medical factor, one lifestyle factor, and one social factor were proven to be predictive of PWB.

Figure 10: Regression Analysis of Factors that Predict PWB

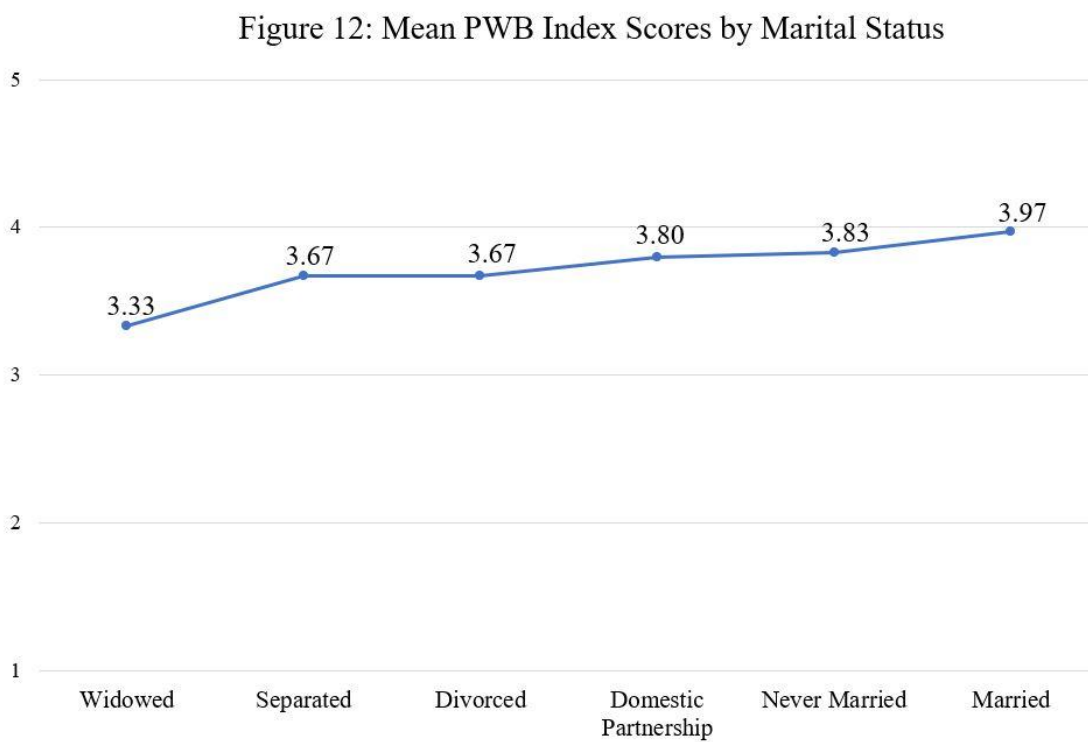


ANOVA (analysis of variance) was used to assess differences in mean PWB scores among variables with more than two categorical groups<sup>64</sup>: age, marital status, response to treatment, and type of skin cancer. Independent samples t-tests served the same purpose but for variables with only two possible groups: gender, ethnicity (white vs. non-white), and treatments received (radiation vs. no radiation). Figure 11 shows these factors and the tests used to assess the PWB differences (if any) among groups.

Figure 11: Analysis of Variance (ANOVA) & Independent Samples T-Tests

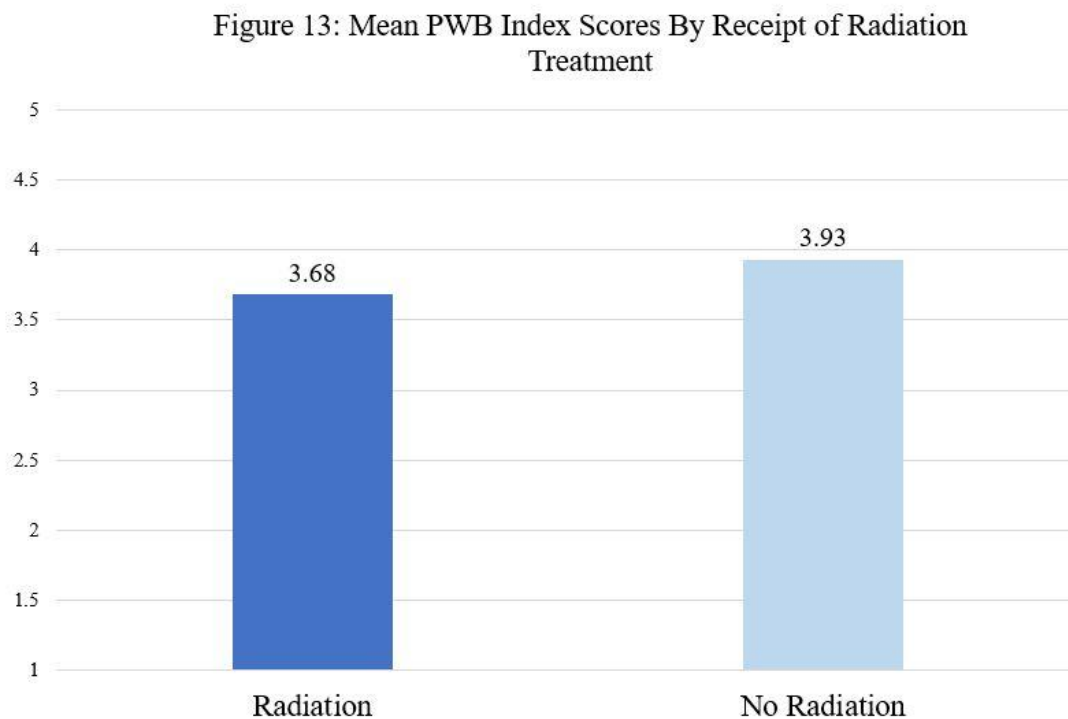


Among demographic variables, age, gender, and ethnicity were proven by ANOVAs to not have significant differences in PWB ( $p < .05$ ). However, marital status *was* shown to be significant [ $F(5, 242) = 2.341, p = .042$ ]. Figure 12 shows that married participants had the highest PWB, while widowed 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 13 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 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 5 categories (shown in Table 2): social, medical, personality, lifestyle, and miscellaneous.

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

	<b>RESPONSE THEMES</b>	<b>FREQUENCY</b>
<b>SOCIAL</b>	Family (children, siblings, parents, spouses/partners, etc.)	55
	Community Support System ( <i>non-skin cancer patients</i> : friends, coworkers, church group, neighbors, etc.)	36
	Support Groups ( <i>skin cancer patients/survivors</i> : in-person and social media)	20
	Religion	19
	Learning from Fellow Skin Cancer Patients ( <i>informally/unintentionally</i> )	15
	Advocating & Educating Others About Skin Cancer	11
<b>MEDICAL</b>	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>PERSONALITY</b>	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>LIFESTYLE</b>	Exercise	4
	Mindfulness/Meditation	2
	Balanced Nutrition	1
<b>MISCELLANEOUS</b>	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

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 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 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 really care." Another claimed that her "phenomenal Mohs surgeon" had been crucial to her cancer-free status. Though most types of treatments were proven 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.”

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.”

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

## **Discussion**

### ***Significant Factors***

The question that this study aimed to answer was: Which group of contextual factors is the most significant predictor of skin cancer patients’ psychological well-being? The findings suggest that personality (or more generally, individual factors) is the most significant variable in determining a skin cancer patient’s psychological well-being since three out of the six significant predictors of PWB were personality types (neuroticism, agreeableness, and conscientiousness). Consistent with the previous literature, patients with agreeable and conscientiousness personality types had higher psychological well-being, while patients exhibiting neuroticism had lower psychological well-being.<sup>28-31</sup> However, two out of the five Big 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 in order 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 fluid and malleable, and capable of being changed over time.<sup>68, 69</sup>

Social support was the second-most significant predictor of PWB. In the thematic analysis section, the majority of respondents’ answers to 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 12 shows that married skin cancer patients had the highest PWB, which is congruent with the verdicts of Kim & McHenry (2002) and Goldzweig et al. (2010).<sup>48, 49</sup> These conclusions

support prior findings that emphasize the role of social support in influencing cancer patients' psychological well-being.<sup>47-50</sup>

Another significant predictor of PWB was mindfulness. Mindfulness improves skin cancer patients' psychological well-being because it prevents them 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 examined the benefits of mindfulness for cancer patients.<sup>40-43</sup>

Consistent with the findings of Lechner et al. (2003),<sup>34</sup> stage of cancer was another significant predictor of PWB. However, the trend observed by Lechner et al. in which stage 2 and 3 patients had the highest PWB was not illustrated by the data. In this study, 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. This could be due to the fact that the word "radiation" has a negative connotation for cancer patients, many of whom have misconceptions about the safety of the treatment.<sup>70</sup> Thus, patients who receive this treatment may be apprehensive of the outcome, leading to worry and a drop in 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, health advertisers need to amend the reputation of radiation therapy in order to ensure that patients who receive this treatment are confident in its efficacy and maintain a healthy PWB.

### *Insignificant Factors*

Contrary to the findings of Parker et al. (2003), Wu & Harden (2015), and Traegar et al. (2014),<sup>21, 23, 25</sup> neither age, gender, nor ethnicity were found to be significantly related to PWB by ANOVAs. This could be attributed to the lack of ethnic diversity among respondents. Despite efforts to reach a wide sample, only 5% of respondents were Hispanic/Latino, American Indian, Asian, African American, or a Pacific Islander. Furthermore, 88% of respondents were female, which could explain why gender did not show differences in PWB. Moreover, the findings that patients' type of skin cancer, treatment type, and response to treatment(s) were not significant does not conflict with current research as no study has established a correlation between these variables and PWB.

Despite research suggesting that nutrition and exercise would 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.

Though mindfulness was a significant predictor of PWB, meditation (a common mindfulness practice) was not. This could be due to the fact that it takes time to experience the benefits of meditation and since all individuals are at different stages of the process, many may not be exhibiting mindfulness or experiencing positive side-effects yet.

Since UV index was not a significant predictor of PWB, patients living in sunnier areas where skin cancer awareness may be greater don't necessarily have poorer psychological well-being than patients living in cold areas where skin cancer is largely unknown. Patients of all geographic residences are of equal importance when it comes to addressing PWB.

Contrary to prior research,<sup>11</sup> the amount of time since patients' diagnosis was not shown to be a significant predictor of PWB in the regression analysis, despite several answers to the open-response question mentioning this theme. This could be due to the fact that patients are getting cured of their cancer quicker today due to advanced medicine. Thus, many no longer have time to experience the benefits of successfully coping with traumatic experiences.

### ***Thematic Analysis***

Many of the factors that participants mentioned in the open-response question were some of the same variables that were proven to be significant predictors of PWB in the regression analysis. For example, social support, mindfulness, and conscientiousness were all mentioned either 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  $R^2$  value of .487 indicates that approximately 50% of the variance in respondents' 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 higher stage patients have the poorest psychological well-being and provide these patients with interventions and

assistance first; 2) require cancer patients to complete a Big Five personality assessment following diagnosis in order to identify possible “red flags” to be aware of (e.g. a high neuroticism score) and find ways to improve their levels of conscientiousness and agreeableness; 3) implement mindfulness-based intervention practices; 4) ensure that patients have adequate social support using a questionnaire, and refer low-scoring patients to support groups.

Moreover, patients with mental disorders characterized by neuroticism (anxiety, OCD, etc.) should seek therapy to mitigate and/or eliminate the negative effects of this personality type.

### ***Limitations***

This study was not reviewed and approved by an Institutional Review Board (IRB), so 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, this survey could not assess *every* factor that could possibly be related to PWB since it had to be short enough for a sufficient number of patients to respond to its entirety. Finally, the majority of respondents were white females, so this study may not be generalizable to the global skin cancer patient population.

### **Conclusions**

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 see patients as people and not just bodies transformed by cancerous skin cells. 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 true, it is important to prioritize the psychological well-being of skin cancer patients in order to ensure that these individuals live happy, healthy lives.

The unique holistic approach utilized in this study yielded findings of high significance for cancer patients and their providers, addressing a significant gap in the field. All skin cancer patients should be aware of the factors that are most influential to their psychological well-being: conscientiousness, agreeableness, neuroticism, stage of cancer, mindfulness, and social support.

Skin cancer is likely never going to completely disappear. Therefore, all cancer centers have the responsibility to make the experience as positive and non-stressful 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' PWB could be a step towards amending the extremely negative connotation of the word "cancer," and ensuring that skin cancer patients have opportunities to achieve equal levels of long-term happiness and well-being as their peers.

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