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How Does Illness Perception Affect the Quality of Life and Sun Protection Behaviors of Rosacea Patients?

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ABSTRACT

Background: Previous studies have noted the link between rosacea severity and quality of life, but there is limited understanding of how disease perception impacts these aspects. Additionally, sun exposure is identified as a common trigger for rosacea flare-ups, emphasizing the importance of sun protection practices in managing the condition. This cross-sectional study aims to fill the gap in the literature by investigating the relationship between clinical severity, disease perception, quality of life, and sun protection behaviors in rosacea patients.

Methods: Questionnaires assessing the quality of life, illness perception, sun protection behaviors, sun protection decisional balance, and its potential predictors were completed by 120 rosacea patients and 120 controls.

Results: Patients exhibited a higher prevalence of sun protection behaviors than the control group (24.15 ± 5.76 vs. 17.63 ± 5.56, $p < 0.001$) and demonstrated greater determination in adhering to sun protection practices (13.43 ± 2.37 vs. 9.40 ± 3.09, $p < 0.001$). Hierarchical linear regression analyses showed that quality of life was related to clinical severity, illness perception (consequences, illness coherence, emotional representations), causal attribution (risk factors, immunity), and sun protection decisional balance variables ($R^2 = 0.45$, $F = 7.39$, $p < 0.001$). Also, the perceived pros and cons of sun protection behaviors were predicted by illness perception (treatment control), causal attribution (risk factors, immunity, chance/accident), and quality of life variables ($R^2 = 0.24$, $F = 2.59$, $p = 0.004$).

Conclusions: Providing more information to rosacea patients can improve their disease perception and quality of life, increasing adherence to sun protection behaviors.

1 | Introduction

Rosacea is a persistent inflammatory skin disorder identified by recurrent or lasting redness, papules, pustules, telangiectasia, and phymatous alterations, predominantly affecting the central area of the face [1]. This skin disorder most commonly affects female patients aged 30 and above. It has varying prevalence rates ranging from 1% to 22% among countries [2]. Rosacea is less frequently reported among individuals with skin of color than those with white skin [3]. Beyond its cosmetic implications, it has the potential to significantly impact patients' quality of life (QoL) through secondary symptoms like itching, burning, and stinging [4].

Rosacea can impact various significant social outcomes, including choices related to selecting a partner, making hiring decisions, and determining social interactions [5]. As rosacea primarily manifests in prominent areas of the face, it can impact the cosmetic aspect and influence the social and occupational interactions of the affected individual. Consequently, this adversely affects the patient's QoL and mental well-being [6]. A study on facial dermatoses causing discoloration found that rosacea patients had a lower QoL than those with lentigo and melasma [4]. This finding highlights the importance of examining the factors that impact the QoL and how rosacea patients perceive the disease.

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While studies have indicated a correlation between clinical severity in rosacea patients and its impact on QoL, there is a lack of research exploring its influence on disease perception [5, 7]. Clinicians typically overlook the perception of the illness while generally determining the appropriate treatment based on the severity of the disease. However, assessing illness perception can provide valuable insights into its impact on patients' QoL, sun protection behaviors (SPBs), and adherence to rosacea treatment.

In addition to being a key factor in the development of rosacea, sun exposure is frequently reported as a common trigger for rosacea flare-ups [8]. The occurrence of rosacea is significantly linked to a person's lifelong exposure to ultraviolet (UV) radiation, making it the most crucial environmental factor [9]. Hence, adherence to sun protection practices is linked to treatment response and the frequency of rosacea flare-ups [8]. Recent literature mentioned that QoL and disease perception affect SPBs in different dermatoses [10–12]. However, there has been no reported study evaluating the effects of these features on SPBs in patients with rosacea until now.

In this cross-sectional study, our objective was to assess the sociodemographic and clinical characteristics as well as the QoL of individuals with rosacea. Additionally, we aimed to investigate the correlation between illness perception, QoL, and SPBs.

2 | Materials and Methods

2.1 | Selection of Patients and Data Collection Forms

From December 2021 to May 2023, 120 rosacea patients and 120 age- and gender-matched controls were recruited from the Dermatology Department at Dokuz Eylül University Faculty of Medicine. Ethics approval (no:2022/04-30) and informed consent were obtained. The study included patients aged 18 and over diagnosed with erythematotelangiectatic, papulopustular, and phymatous rosacea. Patients with other facial dermatoses or a history of skin cancer were excluded.

Personal characteristics and clinical features of participants were collected by the face-to-face method, and the lesions were evaluated by clinical examination. Their Rosacea Severity Scores (RSS) were determined using the updated scoring system established by the National Rosacea Society Expert Committee [1]. The skin types of patients were also determined according to the Fitzpatrick classification (I–VI) [12].

2.2 | Quality of Life, Illness Perception, and Sun Protection Behaviors

The Rosacea QoL Scale (RosaQol) was used for QoL assessment [13, 14]. The dimensions of the "illness perception subscale" and "causal attribution subscale" of the Revised Illness Perception Questionnaire (IPQ-R) were used to assess the illness perception of the patients. The "illness perception subscale" of IPQ-R consists of seven dimensions defined as (i) timeline (acute/chronic), (ii) timeline (cyclical), (iii) consequences, (iv) personal control, (v) treatment control, (vi) illness coherence, and (vii) emotional representations. Elevated scores on the timeline (acute/chronic; cyclical), consequences, and emotional representation dimensions signify the chronic nature, cyclical patterns, negative outcomes, and negative emotional impact of the illness, respectively. High scores on the dimensions of personal control, treatment control, and illness coherence reflect positive perceptions regarding the manageability of the illness and an individual's comprehension of the condition [12].

The "causal attribution subscale" of IPQ-R assesses individuals' personal beliefs regarding the potential causes of their illness. It encompasses four attributions: psychological factors (such as stress/anxiety, family issues, and personality traits), risk factors (including hereditary factors, smoking, alcohol consumption, and aging), immunity (such as exposure to germs/viruses, changes in immunity), and chance or accident (like bad luck, accidents, injuries) [12].

To assess individuals' SPBs, Sun Protection Behavior Scale (SPBS) was utilized. This scale includes questions evaluating the frequency of SPBs (such as wearing hats, using sunscreen, and time spent in the shade), with higher scores indicating more frequent engagement in SPBs [15].

To measure patients' commitment to sun protection, the Sun Protection Decision Balance Scale (SPDBS) was utilized. Decisional balance helps to understand the motivational factors that influence a person's decision to practice or not practice sun protection. This scale consists of two subscales assessing perceptions of pros and cons regarding sun protection. A high score in perceived pros and a low score in perceived cons indicate an individual's commitment to the importance of sun protection [16].

2.3 | Statistical Analysis

Descriptive statistical analysis was used to examine the demographic and clinical characteristics. The chi-square test compared demographic and clinical characteristics ratios. Comparison of median and mean values of RosaQol, SPBS, and SPDBS between patients and controls was performed using independent samples *t*-test and Mann–Whitney *U* test. Kruskal–Wallis *H* test compared scales by skin type. The relationship between clinical severity, SPBS, and SPDBS scores and RosaQol, illness perception subscale, and causal attribution subscale was analyzed using Pearson correlation analysis. Factors influencing RosaQol, SPDBS pros, and SPDBS cons subscores were analyzed using Hierarchical Linear Regression Analysis. A significance level of $p < 0.05$ was set for all analyses. IBM SPSS 26.0 program was used for the analysis.

3 | Results

The majority of patients (88.3%) are women, with an average age 45.96 ± 12.60 years. Detailed sociodemographic data of the patient and control groups are presented in Table 1. The most common clinical type was erythematotelangiectatic rosacea (58.3%), followed by papulopustular (33.3%), and phymatous type (8.3%). Among the patients, 62 (51.7%) had mild rosacea clinical severity, 46 (38.3%) had moderate severity, and 12 (10%) had high severity.

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3.1 | Evaluation of the Sun Protection Behaviors and the Sun Protection Decision Balances in Rosacea and Control Groups

Among rosacea patients, 87.5% reported seeking shade, 54.1% "often/always" used sunscreen, and 16.6% used protective hats. Additionally, 85% of the patients considered sun exposure as the cause of their disease. The comparison of SPBS scores and SPDBS scores between the rosacea group and the control group is shown in Table 2.

3.2 | Correlations Between Clinical Severity, SPBS, SPDBS, RosaQol, and Illness Perception

The correlations among clinical severity, SPBS, SPDBS, RosaQol, and the "illness perception subscale" and "causal attribution subscale" of the IPQ-R are presented in Table 3. A positive correlation was determined between the patients' RosaQol function domain scores and the SPBS-total score ($r = 0.288$, $p < 0.001$), SPBS-sun avoidance ($r = 0.241$, $p < 0.001$), and SPBS-sunscreen usage ($r = 0.213$, $p < 0.005$) scores.

3.3 | Assessment of Factors Influencing RosaQol and SPDBS

Table 4 details significant predictors of QoL in rosacea patients, including clinical severity, IPQ-R illness perception subdimensions, IPQ-R causal attribution subdimensions, SPBS, and SPDBS scores. Higher clinical severity scores were associated with higher RosaQol scores ($\beta = 0.201$, $p = 0.001$). In contrast, patients who had a clear understanding of their illness had lower RosaQol scores ($\beta = -0.033$, $p = 0.002$). Additionally, higher determination of sun protection was associated with higher RosaQol scores ($\beta = 0.043$, $p = 0.020$).

TABLE 1 | Demographic and clinical characteristics of the rosacea and control groups.

	Rosacea group		Control group		
	n	**%**	***n***	**%**	***p***
Gender					
Female	106	88.3	104	86.7	0.696[a]
Male	14	11.7	16	13.3	
Education					
Primary school	33	27.5	31	25.8	0.418[a]
Secondary school	11	9.2	7	5.8	
High school	24	20.0	34	28.3	
University	52	43.3	48	40.0	
Marital status					
Single	30	25.0	23	19.2	0.276[a]
Married	90	75.0	97	80.8	
Income level					
Low	34	28.3	38	31.7	0.788[a]
Middle	83	69.2	80	66.7	
High	3	2.5	2	1.7	
Fitzpatrick skin type					
Skin type 2	55	45.8	23	19.2	**<0.001**[a]
Skin type 3	30	25.0	24	20.0	
Skin type 4	24	20.0	27	22.5	
Skin type 5	11	9.2	46	38.4	
	Mean	**SD**	**Mean**	**SD**	
Age (years)	45.96	12.60	47.83	10.87	0.222[b]

Note: The bolded values in the "Fitzpatrick skin type" row indicate significance at the $p < 0.001$ level, highlighting differences between the rosacea and control groups in this characteristic.
Abbreviation: SD, standard deviation.
[a]Chi-square test.
[b]Independent samples *t*-test.

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TABLE 2 | SPBS and SPDBS scores of the rosacea and control groups.

	Rosacea group		Control group		
	Mean	**SD**	**Mean**	**SD**	***p***
Overall SPBS	24.15	5.76	17.63	5.56	<0.001
Sun avoidance	11.83	2.84	8.73	3.47	<0.001
Sunscreen use	8.54	3.47	5.31	2.75	<0.001
Hat use	3.78	2.60	3.41	2.00	<0.001
SPDBS pros	13.43	2.37	9.40	3.09	<0.001
SPDBS cons	6.71	2.59	7.56	2.67	0.013

Note: Independent samples *t*-test.
Abbreviations: SD, standard deviation; SPBS, Sun Protection Behavior Scale; SPDBS, Sun Protection Decision Balance Scale.

The hierarchical multiple regression model revealed that beliefs about controlling their illness through treatment ($\beta = 0.205$, $p = 0.043$), attributing the disease to risk factors ($\beta = 0.149$, $p = 0.019$), immunity ($\beta = -0.354$, $p = 0.013$), or chance/accident ($\beta = -0.346$, $p = 0.031$), and RosaQol ($\beta = 1.506$, $p = 0.003$) can predict their determination SPBs (Table 5).

4 | Discussion

In our study, there were no statistically significant differences between the rosacea and control groups in terms of age, gender, economic status, education level, and marital status. This contributes to a clearer evaluation of the association between SPB-related data obtained in our study and its connection to rosacea disease. Despite this, patients with rosacea were observed to have a higher prevalence of Fitzpatrick skin types 1 and 2 compared with the control group. This finding is consistent with the information that fair-skinned individuals (Fitzpatrick skin types 1, 2), experience rosacea disease more frequently than darker-skinned individuals (Fitzpatrick skin types 4, 5) [3]. In previous reports, it has been noted that individuals with high sensitivity to UV rays (Fitzpatrick skin types 1–3) tended to be more proactive in sun protection and exhibited higher SPBs compared to those with low sensitivity (Fitzpatrick skin types 4, 5) [12, 17]. Based on this, the tendency of our patient group to have fairer skin compared with the control group may influence the more frequent occurrence of SPBs, which is a limitation of our study.

UV radiation is a significant factor in the onset of rosacea. UV light is involved in all major aspects of rosacea, including skin inflammation, neoangiogenesis, telangiectasia, and fibrosis, and could potentially trigger the onset of rosacea. While strict sun protection is fundamental in rosacea treatment, the literature on photoprotection in this disorder is quite limited [8]. In recent studies, sunscreen usage has been shown at a rate of 59% in photosensitive disorders, 45%–57% in individuals with a history of melanoma, and 30%–100% in outdoor workers [18]. In our study, 54.1% of rosacea patients used sunscreen and 85% of the patients considered sun exposure as the main cause of their disease. SPBs such as avoiding sun exposure (11.83 ± 2.84 vs. 8.73 ± 3.47, $p < 0.001$), wearing hats (3.78 ± 2.60 vs. 3.41 ± 2.00, $p < 0.001$), and applying sunscreen (8.54 ± 3.47 vs. 5.31 ± 2.75, $p < 0.001$) were more prevalent compared with the control group. Furthermore, rosacea patients scored higher on the SPDBS—Pros (13.43 ± 2.37 vs. 9.40 ± 3.09, $p < 0.001$) and lower on the SPDBS—Cons (6.71 ± 2.59 vs. 7.56 ± 2.67, $p = 0.013$), indicating they were also more determined in sun protection. These findings suggest that the majority of rosacea patients attribute their illness to sun exposure (85%) and adhere to SPBs.

We observed that disease severity did not have a significant impact on SPBs. Similarly, research on lupus erythematosus patients demonstrated that ethnicity, awareness, and cutaneous involvement played an important role in good SPBs, whereas disease severity did not [19]. Another study on vitiligo patients revealed no significant correlation between disease severity and SPBs. However, those undergoing phototherapy and with a longer disease duration tended to use sunscreen, sunglasses, and seek shade more often [20]. Our study revealed that as the QoL declined, patients became more determined to adhere to SPBs ($\beta = 0.043$, $p = 0.020$). Likewise, a Spanish study reported that actinic keratosis patients with decreased QoL were more likely to protect themselves from the sun [11]. Likewise, a study revealed that formal sun protection education significantly reduced disease severity and enhanced QoL in patients with actinic keratosis and polymorphic light eruption [21]. Even though frequent SPBs did not worsen patients' QoL ($\beta = 0.012$, $p = 0.128$), we observed that a strong commitment to sun protection negatively affected their overall QoL ($\beta = 0.043$, $p = 0.020$). This outcome may be linked to strict sun protection causing individuals to feel restricted in their lifestyle, potentially leading to stress.

When sun protection is considered as an important step in rosacea treatment, it can be expected that disease perception would also influence patients' SPBs and determination toward sun protection. Indeed, our study observed that individuals who perceived the disease as chronic had more frequent SPBs. A study evaluating the impact of disease perception on SPBs in melanoma patients found that those who believed melanoma significantly affected their lives spent less time in the sun [10]. According to our study, the use of sunscreen and protective clothing/hats, as well as habits of staying in the shade, did not differ among rosacea patients who believed they could control their disease personally or through treatment. Although the study conducted by Nazlı et al. on patients with melasma yielded similar results [12], we found that patients who believed their condition could be controlled with treatment were more determined to SPBs.

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TABLE 3 | Correlations between clinical severity, SPBS, SPDBS, RosaQol, IPQ-R illness perception subdimensions, and IPQ-R causal attribution subdimensions.

	Clinical Severity Score	SPDBS pros	SPDBS cons	Overall SPBS	SPBS-sun avoidance	SPBS-sunscreen use	SPBS-hat use
RosaQol	**0.365****	0.156	−0.075	0.123	0.100	0.152	−0.041
RosaQol—emotion	**0.327****	0.144	−0.082	0.080	0.086	0.113	−0.066
RosaQol—symptom	**0.314****	0.068	−0.079	0.056	0.040	0.105	−0.060
RosaQol—function	0.177	0.173	−0.130	**0.288****	**0.241****	**0.213***	0.092
IPQ-R illness perception timeline (acute/chronic)	**−0.198***	**0.185***	**−0.255****	**0.209***	**0.187***	**0.221***	−0.037
IPQ-R illness perception consequences	**0.222***	0.017	−0.153	0.015	0.161	−0.039	−0.091
IPQ-R illness perception personal control	−0.123	0.103	0.120	−0.143	−0.100	−0.054	−0.136
IPQ-R illness perception treatment control	0.041	0.128	0.165	−0.103	−0.007	−0.137	−0.037
IPQ-R illness perception illness coherence	−0.023	0.081	0.132	0.095	0.082	0.047	0.057
IPQ-R illness perception timeline (cyclical)	−0.054	−0.143	−0.008	0.052	0.025	0.077	−0.014
IPQ-R illness perception emotional representations	**0.308****	0.024	−0.050	−0.022	0.075	−0.014	−0.112
IPQ-R causal attribution psychological	0.103	0.134	0.030	0.149	0.021	**0.185***	0.061
IPQ-R causal attribution risk factors	−0.020	0.152	−0.035	0.177	0.106	0.108	0.133
IPQ-R causal attribution immunity	−0.001	−0.070	−0.100	0.000	−0.003	0.027	−0.032
IPQ-R causal attribution chance/accident	0.009	−0.014	0.013	0.027	−0.016	0.019	0.053

Note: r, Pearson correlation analysis; *<0.05, **<0.01. Bold values represent statistically significant correlations, specifically at the $p < 0.05$ (*) and $p < 0.01$ (**) levels.
Abbreviations: IPQ-R, Revised Illness Perception Questionnaire; RosaQol, Rosacea QoL Scale; SPBS, Sun Protection Behavior Scale; SPDBS, Sun Protection Decision Balance Scale.

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TABLE 4 | Predicting RosaQol from clinical severity, IPQ-R illness perception subdimensions, IPQ-R causal attribution subdimension, SPBS, and SPDBS scores in patients with rosacea.

	RosaQol			
			% 95 CI	
	β	*p*	LB	UB
(Constant)	0.116	0.904	−1.785	2.017
Clinical severity	0.201	**0.001**	0.079	0.323
IPQ-R timeline (acute/chronic)	0.010	0.242	−0.007	0.027
IPQ-R consequences	0.025	**0.032**	0.002	0.049
IPQ-R personal control	0.014	0.261	−0.011	0.040
IPQ-R treatment control	−0.012	0.519	−0.050	0.025
IPQ-R illness coherence	−0.033	**0.002**	−0.053	−0.012
IPQ-R time line (cyclical)	0.037	0.449	−0.060	0.135
IPQ-R emotional representations	0.047	**0.000**	0.026	0.067
IPQ-R causal attribution psychological	−0.005	0.722	−0.031	0.021
IPQ-R causal attribution risk factors	−0.030	**0.011**	−0.053	−0.007
IPQ-R causal attribution immunity	0.062	**0.021**	0.009	0.114
IPQ-R causal attribution chance/accident	0.056	0.058	−0.002	0.115
SPDBS pros	0.043	**0.020**	0.007	0.079
SPDBS cons	0.012	0.451	−0.020	0.044
SPBS	0.012	0.128	−0.003	0.026

Note: $R^2 = 0.45$, $F = 7.39$, $p < 0.001$. The bolded values are p-values themselves.
Abbreviations: IPQ-R, Revised Illness Perception Questionnaire; RosaQol, Rosacea QoL Scale; SPBS, Sun Protection Behavior Scale; SPDBS, Sun Protection Decision Balance Scale.

In our study, it was observed that those who attribute their illness to risk factors such as hereditary factors, smoking, alcohol consumption, and aging are more determined about SPBs ($\beta = 0.149$, $p = 0.019$). In contrast, those who attribute it to immunity ($\beta = -0.354$, $p = 0.013$) and chance/accident factors ($\beta = -0.346$, $p = 0.031$) are less determined. However, a study investigating causal attributions in melasma patients showed that patients with higher clinical severity of melasma considered chance and risk factors more frequently as the cause of melasma. Still, no difference was found in terms of SPBs [12]. In this study, while the rate of "often and always" staying in the shade (ours: 87.5% vs. theirs: 74%) was lower compared with our study, the rates of sunscreen usage (ours: 54.1% vs. theirs: 56%) and hat-wearing (ours: 16.6% vs. theirs: 32%) were found to be higher [12].

Studies have examined factors affecting disease perception and its impact on QoL and treatment adherence in chronic dermatoses like psoriasis, polymorphic light eruption, alopecia, and vitiligo, but no such study has been found for rosacea patients [22–25]. Our study revealed that patients with significantly impaired quality of life believed their condition had serious negative consequences and experienced negative emotions. Similarly, research in psoriasis and nonscarring alopecia has shown that disease perception, especially regarding chronicity and negative emotional impact, significantly affects dermatological QoL and treatment adherence [22, 24]. Moreover, Chiang et al. found that cicatricial alopecia patients with significantly impaired QoL believed their condition had serious negative consequences and experienced negative emotions [26]. We found a lower QoL with rosacea patients who struggled to understand their condition. Based on this, we can comment that enhancing patients' understanding of their rosacea disease may improve their QoL. However, a study in Korea found that rosacea awareness and knowledge did not affect QoL [27]. On the contrary, patients with polymorphic light eruption showed that negative emotional responses (such as feeling depressed, angry, upset, worried, anxious, or afraid about their disease) were strongly influenced by patients' beliefs about their condition. These responses were primarily predicted by the consequences individuals associated with their condition, the number of symptoms they linked to it, and their comprehension of their condition [25].

In this study, the most important limitations are its cross-sectional nature, the possibility of misinterpretation of the questions by the patients, and observer bias. Additionally, our findings cannot be attributed to the general population and all rosacea patients, because the vast majority of subjects were women and only patients admitted to the hospital were included. Moreover, the tendency of our patient group to have fairer skin compared with the control group may influence the more frequent occurrence of SPBs.

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TABLE 5 | Predicting SPDBS scores from clinical severity, IPQ-R illness perception subdimensions, IPQ-R causal attribution subdimension, SPBS, and RosaQol in patients with rosacea.

	SPDBS pros				SPDBS cons			
			% 95 CI				% 95 CI	
	β	*p*	LB	UB	*β*	*p*	LB	UB
(Constant)	11.717	0.021	1.791	21.644	7.651	0.194	−3.946	19.248
Clinical severity	−0.531	0.128	−1.215	0.154	0.036	0.929	−0.764	0.836
IPQ-R timeline (acute/chronic)	0.084	0.065	−0.005	0.174	−0.124	**0.021**	−0.229	−0.019
IPQ-R consequences	−0.040	0.531	−0.167	0.087	−0.093	0.217	−0.241	0.055
IPQ-R personal control	0.033	0.634	−0.102	0.168	0.091	0.253	−0.066	0.249
IPQ-R treatment control	0.205	**0.043**	**0.006**	**0.403**	0.059	0.614	−0.173	0.291
IPQ-R illness coherence	0.072	0.216	−0.043	0.186	0.090	0.183	−0.043	0.224
IPQ-R timeline (cyclical)	−0.538	0.051	−1.055	−0.022	−0.111	0.716	−0.714	0.493
IPQ-R emotional representations	−0.049	0.424	−0.171	0.072	−0.002	0.973	−0.144	0.139
IPQ-R psychological attributions	0.096	0.172	−0.043	0.235	0.050	0.543	−0.112	0.212
IPQ-R causal attribution risk factors	0.149	**0.019**	0.025	**0.274**	−0.010	0.887	−0.156	0.135
IPQ-R causal attribution immunity	−0.354	**0.013**	**−0.633**	**−0.075**	−0.197	0.234	−0.523	0.129
IPQ-R causal attribution chance/ accident	−0.346	**0.031**	**−0.659**	**−0.033**	−0.015	0.933	−0.381	0.350
RosaQol	1.506	**0.003**	**0.508**	**2.505**	0.204	0.730	−0.963	1.370

Note: SPDBS pros: $R^2 = 0.24$, $F = 2.59$, $p = 0.004$, SPDBS cons: $R^2 = 0.14$, $F = 1.27$, $p = 0.246$. The bold values include the upper and lower confidence limits along with the *p*-values for the significant predictors in the regression models.
Abbreviations: IPQ-R, Revised Illness Perception Questionnaire; RosaQol, Rosacea QoL Scale; SPDBS, Sun Protection Decision Balance Scale.

5 | Conclusion

In summary, we have demonstrated the impact of rosacea patients' perceptions of illness and beliefs on their QoL and adherence to SPBs for the first time. It was already known that sun exposure plays a key role in the development and triggering of rosacea. In our study, it was found that patients who understood their illness experienced an improvement in their QoL and SPBs. Therefore, patients should be provided with information about strict sun protection measures. Moreover, the management of patients with rosacea should involve expert psychological support to manage the negative beliefs and emotions surrounding the condition, alongside the dermatological treatment of clinical symptoms and signs.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

References

1. R. L. Gallo, R. D. Granstein, S. Kang, et al., "Standard Classification and Pathophysiology of Rosacea: The 2017 Update by the National Rosacea Society Expert Committee," *Journal of the American Academy of Dermatology* 78, no. 1 (2018): 148–155.

2. J. Spoendlin, J. J. Voegel, S. S. Jick, and C. R. Meier, "A Study on the Epidemiology of Rosacea in the U.K.," *British Journal of Dermatology* 167, no. 3 (2012): 598–605.

3. A. F. Alexis, V. D. Callender, H. E. Baldwin, S. R. Desai, M. I. Rendon, and S. C. Taylor, "Global Epidemiology and Clinical Spectrum of Rosacea, Highlighting Skin of Color: Review and Clinical Practice Experience," *Journal of the American Academy of Dermatology* 80, no. 6 (2019): 1722–1729.

4. T. T. Yang and C. C. E. Lan, "Impacts of Skin Disorders Associated With Facial Discoloration on Quality of Life: Novel Insights Explaining Discordance Between Life Quality Scores and Willingness to Pay," *Journal of Cosmetic Dermatology* 21, no. 7 (2022): 3053–3058.

5. F. Yang, Q. Zhang, D. Song, X. Liu, L. Wang, and X. Jiang, "A Cross-Sectional Study on the Relationship Between Rosacea Severity and Quality of Life or Psychological State," *Clinical, Cosmetic and Investigational Dermatology* 15 (2022): 2807–2816.

6. B. Halioua, B. Cribier, M. Frey, and J. Tan, "Feelings of Stigmatization in Patients With Rosacea," *Journal of the European Academy of Dermatology and Venereology* 31, no. 1 (2017): 163–168.

7. D. Böhm, P. Schwanitz, S. Stock Gissendanner, G. Schmid-Ott, and W. Schulz, "Symptom Severity and Psychological Sequelae in Rosacea: Results of a Survey," *Psychology, Health & Medicine* 19, no. 5 (2014): 586–591.

16000781, 2024, 5, Downloaded from https://onlinelibrary.wiley.com/doi/10.1111/phpp.12998 by Ceylan Avc - Dokuz Eylul University , Wiley Online Library on [29/08/2024]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

8. D. Morgado-Carrasco, C. Granger, C. Trullas, and J. Piquero-Casals, "Impact of Ultraviolet Radiation and Exposome on Rosacea: Key Role of Photoprotection in Optimizing Treatment," *Journal of Cosmetic Dermatology* 20, no. 11 (2021): 3415–3421.

9. N. Aldrich, M. Gerstenblith, P. Fu, et al., "Genetic vs. Environmental Factors That Correlate With Rosacea," *JAMA Dermatology* 151, no. 11 (2015): 1213–1219.

10. M. V. Zivković, I. Dediol, I. Ljubičić, and M. Situm, "Sun Behaviour Patterns and Perception of Illness Among Melanoma Patients," *Journal of the European Academy of Dermatology and Venereology* 26, no. 6 (2012): 724–729.

11. I. Longo and C. Serra-Guillén, "Quality of Life, Behaviour and Attitudes Towards Actinic Keratosis in Spain: The PIQA Study," *Actas Dermo-Sifiliográficas* 109, no. 4 (2018): 331–339.

12. E. C. Nazli, C. Avcı, and S. Akarsu, "The Effect of Patient Characteristics on Illness Perception and Sun Protection Behaviors in Melasma," *Journal of Cosmetic Dermatology* 21, no. 12 (2022): 7107–7115.

13. M. Tosun and Y. Karagöz, "Rosacea-Specific Quality of Life Scale (RosaQoL): The Study of Adaptation and Validation for Turkish Rosacea Patients," *Clinical and Experimental Health Sciences* 12, no. 4 (2022): 999–1004.

14. K. Nicholson, L. Abramova, M. M. Chren, J. Yeung, S. Y. Chon, and S. C. Chen, "A Pilot Quality-of-Life Instrument for Acne Rosacea," *Journal of the American Academy of Dermatology* 57, no. 2 (2007): 213–221.

15. O. Aygun and A. Ergun, "Validity and Reliability of Sun Protection Behavior Scale Among Turkish Adolescent Population," *Asian Nursing Research (Korean Society Nursing Science)* 9, no. 3 (2015): 235–242.

16. O. Aygun and A. Ergun, "Decisional Balance and Self-Efficacy for Sun Protection: Measurement Among Turkish Adolescents," *Nursing Research* 63, no. 5 (2014): 309–319.

17. M. Falk and C. D. Anderson, "Influence of Age, Gender, Educational Level and Self-Estimation of Skin Type on Sun Exposure Habits and Readiness to Increase Sun Protection," *Cancer Epidemiology* 37, no. 2 (2013): 127–132.

18. M. B. C. Maymone, H. H. Neamah, S. A. Wirya, N. M. Patzelt, P. Q. Zancanaro, and N. A. Vashi, "Sun-Protective Behaviors in Patients With Cutaneous Hyperpigmentation: A Cross-Sectional Study," *Journal of the American Academy of Dermatology* 76, no. 5 (2017): 841–846.

19. W. D. Abdul Kadir, A. Jamil, S. S. Shaharir, N. Md Nor, and A. H. Abdul Gafor, "Photoprotection Awareness and Practices Among Patients With Systemic Lupus Erythematosus and Its Association With Disease Activity and Severity," *Lupus* 27, no. 8 (2018): 1287–1295.

20. L. Baykal Selçuk, E. Katkat, D. Aksu Arıca, S. Yaylı, and S. Bahadır, "Sun-Protection Habits and Knowledge of Patients With Vitiligo," *Acta Dermatovenerologica Alpina, Panonica et Adriatica* 29, no. 1 (2020): 7–10.

21. C. Huang, S. Yan, J. Ren, et al., "A Quantitative Assessment of the Effects of Formal Sun Protection Education on Photosensitive Patients," *Photodermatology, Photoimmunology & Photomedicine* 29, no. 5 (2013): 261–265.

22. T. Cartwright, N. Endean, and A. Porter, "Illness Perceptions, Coping and Quality of Life in Patients With Alopecia," *British Journal of Dermatology* 160, no. 5 (2009): 1034–1039.

23. K. M. AlGhamdi, "Beliefs and Perceptions of Arab Vitiligo Patients Regarding Their Condition," *International Journal of Dermatology* 49, no. 10 (2010): 1141–1145.

24. M. Scharloo, A. A. Kaptein, J. Weinman, et al., "Illness Perceptions, Coping and Functioning in Patients With Rheumatoid Arthritis, Chronic Obstructive Pulmonary Disease and Psoriasis," *Journal of Psychosomatic Research* 44, no. 5 (1998): 573–585.

25. H. L. Richards, T. C. Ling, G. Evangelou, et al., "Psychologic Distress in Polymorphous Light Eruption and Its Relationship to Patients' Beliefs About Their Condition," *Journal of the American Academy of Dermatology* 56, no. 3 (2007): 426–431.

26. Y. Z. Chiang, C. Bundy, C. E. M. Griffiths, R. Paus, and M. J. Harries, "The Role of Beliefs: Lessons From a Pilot Study on Illness Perception, Psychological Distress and Quality of Life in Patients With Primary Cicatricial Alopecia," *British Journal of Dermatology* 172, no. 1 (2015): 130–137.

27. Y. R. Woo, S. Kim, S. H. Cho, and H. S. Kim, "Rosacea Understanding Among Korean Patients: A Multi-Center Questionnaire Study," *Dermatologica Sinica* 41, no. 4 (2023): 214–221.

16000781, 2024, 5, Downloaded from https://onlinelibrary.wiley.com/doi/10.1111/phpp.12998 by Ceylan Avc - Dokuz Eylul University , Wiley Online Library on [29/08/2024]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License