ORIGINAL RESEARCH

Characteristics of choice and satisfaction regarding the use of ultraviolet blockers in the golf population in Republic of Korea: A quantitative study

Jiahn Choi[1,2] | Ki Han Kwon[3] ●

[1]Division of Beauty Arts Care, Department of Practical Arts, Graduate School of Culture and Arts, Dongguk University, Seoul, Republic of Korea

[2]CECI LAB Co., Seoul, Republic of Korea

[3]College of General Education, Kookmin University, Seoul, Republic of Korea

Correspondence
Ki Han Kwon, College of General Education, Kookmin University, Seoul 02707, Republic of Korea.
Email: kihan.kwon@kookmin.ac.kr

Abstract

Background and Aims: Korea's golf population surpassed 5 million (5.15 million) as of 2020 according to data analyzed by *Shinhan Financial Investment* in 2021. Due to the continuous increase in the golf population, it is necessary to study the use of specific sunscreens. Men and women are using sunscreen selective attributes based on the actual use and perception of sunscreens for life. A questionnaire survey was conducted for an analysis of the effect of product satisfaction.

Methods: Statistical processing of materials collected by the data analysis method is analyzed using the Statistical Package for Social Science WIN 25.0 statistical package program through the process of data coding and data cleaning.

Results: This exercise was done under 3–4 h of strong ultraviolet (UV) rays, so products that have ensured the durability of UV protection are needed. Among the demographic characteristics of the golf population, gender, age, academic background, occupation, marriage status, and monthly income were investigated, and it was confirmed that the information path of a particular product was affected by the choice of purchase, increasing satisfaction and repurchase.

Conclusion: An analysis of the paper's survey showed that men's awareness and interest in sunscreens increased. It is expected that differentiated strategies will be needed for products that match the actual conditions and aptitudes of the effective golf population.

KEYWORDS
brand, functionality, golf population, purchase, satisfaction, ultraviolet blockers

1 | INTRODUCTION

Sunscreens were originally protected and developed to minimize erythema, sunburn, the action spectrum of which shows that ultraviolet B (UVB) is about 1000 times more effective than UVA per unit dose (J/m^2). Accordingly, early sunscreens were primarily UVB absorbers. Erythema is the end point of the main index of sunscreen efficacy, namely the sun protection index (SPF), which is mainly, but not exclusively, an index of UVB protection. It was therefore recognized that for protection against damage other than sunburn, an ideal sunscreen should protect against the entire solar UVB/UVA range.[1,2] In addition, daily use of broad-

spectrum sunscreen containing antioxidant and antiaging active ingredients can effectively reduce extrinsic aging.[3] The evidence, although limited, supports beneficial effects of sunscreen application on the occurrence of skin cancers and skin photo-aging.[4] The United States Food and Drug Administration (USFDA) has proposed sunscreen final administrative order in 2022.[5] In particular, based on 18 holes of the golf course, sunscreens are commonly used to protect the skin from UV rays that can occur after 4 h of exercise, but side effects such as skin irritation and allergic contact dermatitis are reported.[6–8] A safety and implications for the future of US sunscreens in UV filters in the United States and European Union was reviewed.[7] A maximal topical applications of 6% bis-ethylhexyloxyphenol methoxyphe-nyl triazine in a model sunscreen formulation did not contribute to meaningful systemic exposure.[9] In light of the importance of the ingredients of sunscreens that affect skin problems, the choice, purchase, and satisfaction of the golf population has been identified. It is essential for sunscreens to be identified first. Whether it is a product suitable for your skin or not, it cannot help but be cautious from the stage of purchase. It is important to consider the selection of SPF-specific sunscreen suitable for your skin.[10] Laboratory testing of sunscreens on the US market finds lower in vitro SPF values than on labels and even less UVA protection.[11] Many golf populations rely heavily on information to use various types of sun cream, sun spray, sun stick, and sun cushion. The goal is to select the best sunscreen for the golf population. Moreover, the SPF is the definition that sun protection products block UVB. It was first introduced in 2017, adopted by the USFDA, and became a global standard.[12]

Therefore, in the present study, UV exposure selection, purchasing propensity, product functionality, brand preference, price adequacy, the reliability, and satisfaction of the selected product is chosen as a factor to investigate in golf population's perception and satisfaction.

2 | SUBJECTS AND METHODS

The tools of the survey were exploratory factor analysis and reliability analysis, a measure of the nature of the selection of sunscreens. A total of four factors of selective judgment, intent to purchase, product functionality, brand preference, and satisfaction with sunscreen were extracted. As a method of analysis, the final 365 questionnaires, excluding 16 of the 381 copies of the data collected, which were considered insincere responses, were analyzed using the Statistical Package for Social Science WIN 25.0 statistics program. All participants signed an informed consent form and could cancel their participation at any time during the study, in accord with the Helsinki II declaration.

First, frequency analysis was conducted to look at the characteristics of the subjects surveyed, the frequency of the use of sunscreen, and percentage. Second, according to the characteristics of the subject of the survey, the cross-tabulation analysis was conducted to ensure that the difference in the use of sunscreens was seen. Third, exploratory factor analysis and reliability analysis were conducted to ensure that the validity and internal consistency of the measure of the nature and satisfaction of the selection of sunscreens were seen. Fourth, descriptive statistics was calculated to look at the average and standard deviation of the nature and satisfaction scale of the selection of sunscreens. Fifth, independent sample t test and one-way analysis of variation (ANOVA) were conducted to look at the difference between the nature and satisfaction of the choice of sunscreens depending on the characteristics of those surveyed and the use of sunscreen. Sixth, Pearson's correlation analysis was conducted to look at the nature and satisfaction correlation of the selection of sunscreens. Seventh, multiple linear regression analysis was conducted to look at the impact of the nature of the selection of sunscreens on satisfaction. In this study, we verified under the significance levels $p < 0.05$, $p < 0.01$, and $p < 0.001$. Intervening studies involving animals or humans, and other studies that require ethical approval, must list the authority that provided approval and the corresponding ethical approval code.

3 | RESULTS

3.1 | The characteristics of variables related to the characteristics of the subject of the survey

3.1.1 | The characteristics of the subject of investigation

Of the 365 people surveyed, the number of men stood at 330 (90.4%), much higher than women with 35 (9.6%), followed by those in their 50s or older with 242 (66.3%), followed by those in their 40s with 97 (26.6%) and those in their 30s with 26 (7.1%). Looking at the final academic background, university students and graduates were the highest at 261 (71.5%), professional/office jobs were the highest at 247 (67.7%), and in terms of marriage, the number of married people was the highest at 298 (81.6%), and the average monthly income of <5 million won to 7 million won was the highest at 109 (29.9%).

3.1.2 | The status of use of sunscreen

The results of the frequency analysis to examine the use of sunscreens are as shown in Table 1. At the path of information,

TABLE 1 The status of use of sunscreen (N = 365).

Classification	Frequency (n)	Percentage (%)
The path of information		
Social Network Services	54	14.8
Skin specialist	20	5.5
Mass media (TV, radio)	111	30.4
Friends and acquaintances	143	39.2
Golf acquaintance	37	10.1
The age of initial use		
10s	13	3.6
20s	61	16.7
30s	123	33.7
40s	133	36.4
50s and over	35	9.6
The season of main use		
Spring	6	1.6
Summer	235	64.4
Fall	6	1.6
All four seasons	118	32.3
The part of main use		
Face	307	84.1
Neck	32	8.8
Arm or hand	26	7.1
The type of product used		
Sun cream	269	73.7
Sun stick	79	21.6
Sun spray	12	3.3
Sun cushion	5	1.4
The applying time of the day		
Every 2–3 h	56	15.3
Every 3–4 h	87	23.8
Every 4–5 h	48	13.2
Once a day	174	47.7

the number of friends and acquaintances was the highest with 143 (39.2%) and at the first age of use, the number of people in their 40s was the highest with 133 (36.4%). In addition, at the season of use, summer was the highest with 235 (64.4%), followed by faces with 307 (84.1%), neck with 32 (8.8%), and arms and hands with 26 (7.1%). At the types of products used, sunscreen was the most common with 269 people (73.7%) and sunscreen was applied once a day with 174 people (47.7%).

3.2 | The difference in the use of sunscreens according to the characteristics of the subjects of the survey

3.2.1 | The difference in the route of information according to the characteristics of the subject of the survey

The results of the cross-tabulation analysis conducted to examine the differences in the route of information according to the characteristics of the subject of the survey are as shown in Table 2. In gender, 42.1% of men get information through friends and acquaintances, up from 11.4% of women, but 20.0% of women get information through golf acquaintances, up from 9.1% of men (x^2 = 32.566, p < 0.001). Among those in their 50s and older, the percentage of information obtained through friends and acquaintances was the highest at 43.0%, and in the final academic background, the percentage of information obtained through mass media (TV and radio) was the highest at 80.0%. In jobs, the percentage of information obtained through friends and acquaintances was the highest at 50%, and in the case of marriage, the percentage of information obtained through mass media was the highest at 40.0%–60.0%, and the average monthly income of <2–3 million won was the highest at 58.8%.

3.2.2 | The difference in seasons that are mainly used according to the characteristics of the survey

The results of the cross-tabulation analysis conducted to look at the seasonal differences mainly used according to the characteristics of the subjects surveyed shown as Table 3. In gender, 67.0% of men was mostly used in summer, up from 40.0% of women, whereas 54.3% of women was used throughout the four seasons, up from 30.0% of women. In terms of age, the percentage of people in their 40s was the highest at 75.3% and, for the final academic background, the percentage of university graduation (including enrolled students) was the highest at 65.5%.

3.3 | The difference in the type of product used according to the characteristics of the subject of the survey

The results of the cross-tabulation analysis conducted to examine the differences in the types of products used according to the characteristics of the subjects of the survey are as shown in Table 4. In gender, the rate of the use of sun cream at 73.9% compared to 71.4% of women, the use of sun cream for those in their 30s was the highest at 80.8%. For the final academic background, the use of sun cream was the highest at

TABLE 2 The difference in the route of information according to the characteristics of the subject of the survey.

Classification	Social Network Services	Skin specialist	Mass media (TV, radio)	Friends and acquaintances	Golf acquaintance	Total	χ^2	p
Gender								
Male	44 (13.3%)	13 (3.9%)	104 (31.5%)	139 (42.1%)	30 (9.1%)	330 (100.0%)	32.566*	0.000
Female	10 (28.6%)	7 (20.0%)	7 (20.0%)	4 (11.4%)	7 (20.0%)	35 (100.0%)		
Age								
30s	7 (26.9%)	6 (23.1%)	3 (11.5%)	10 (38.5%)	0 (0.0%)	26 (100.0%)	58.829*	0.000
40s	27 (27.8%)	9 (9.3%)	28 (28.9%)	29 (29.9%)	4 (4.1%)	97 (100.0%)		
50s and over	20 (8.3%)	5 (2.1%)	80 (33.1%)	104 (43.0%)	33 (13.6%)	242 (100.0%)		
Final education								
High-school graduate	0 (0.0%)	0 (0.0%)	12 (80.0%)	3 (20.0%)	0 (0.0%)	15 (100.0%)	31.908*	0.000
University graduation (including enrolled students)	33 (12.6%)	16 (6.1%)	70 (26.8%)	108 (41.4%)	34 (13.0%)	261 (100.0%)		
Graduate school graduate or higher (including enrolled students)	21 (23.6%)	4 (4.5%)	29 (32.6%)	32 (36.0%)	3 (3.4%)	89 (100.0%)		
Occupation								
Professional/ office work	39 (15.8%)	15 (6.1%)	68 (27.5%)	106 (42.9%)	19 (7.7%)	247 (100.0%)	50.939*	0.000
Service/sales position	0 (0.0%)	0 (0.0%)	4 (40.0%)	4 (40.0%)	2 (20.0%)	10 (100.0%)		
Production/ technology jobs	2 (14.3%)	0 (0.0%)	5 (35.7%)	7 (50.0%)	0 (0.0%)	14 (100.0%)		
Full-time housewife	0 (0.0%)	0 (0.0%)	2 (28.6%)	0 (0.0%)	5 (71.4%)	7 (100.0%)		
Self-employment	11 (19.0%)	5 (8.6%)	17 (29.3%)	18 (31.0%)	7 (12.1%)	58 (100.0%)		
Etc.	2 (6.9%)	0 (0.0%)	15 (51.7%)	8 (27.6%)	4 (13.8%)	29 (100.0%)		
Marital status								
Single	15 (25.0%)	8 (13.3%)	24(40.0%)	13 (21.7%)	0 (0.0%)	60 (100.0%)	36.352*	0.000
Married	39 (13.1%)	12 (4.0%)	86 (28.9%)	127 (42.6%)	34 (11.4%)	298 (100.0%)		
Etc.	0 (0.0%)	0 (0.0%)	1 (14.3%)	3 (42.9%)	3 (42.9%)	7 (100.0%)		
Average monthly income								
<2 million won	0 (0.0%)	0 (0.0%)	10 (55.6%)	5 (27.8%)	3 (16.7%)	18 (100.0%)	40.760**	0.004
<2–3 million won	0 (0.0%)	0 (0.0%)	3 (17.6%)	10 (58.8%)	4 (23.5%)	17 (100.0%)		
<3–5 million won	13 (18.1%)	2 (2.8%)	23 (31.9%)	25 (34.7%)	9 (12.5%)	72 (100.0%)		
<5–7 million won	15 (13.8%)	12 (11.0%)	38 (34.9%)	31 (28.4%)	13 (11.9%)	109 (100.0%)		
<7–10 million won	14 (16.7%)	4 (4.8%)	23 (27.4%)	39 (46.4%)	4 (4.8%)	84 (100.0%)		
Over 10 million won	12 (18.5%)	2 (3.1%)	14 (21.5%)	33 (50.8%)	4 (6.2%)	65 (100.0%)		
Total	54 (14.8%)	20 (5.5%)	111 (30.4%)	143 (39.2%)	37 (10.1%)	365 (100.0%)		

*p < 0.001; **p < 0.01.

TABLE 3 The difference in seasons that are mainly used according to the characteristics of the survey.

Classification	The season most used				Total	χ^2	p
	Spring	Summer	Fall	All four seasons			
Gender							
Male	4 (1.2%)	221 (67.0%)	6 (1.8%)	99 (30.0%)	330 (100.0%)	13.886*	0.003
Female	2 (5.7%)	14 (40.0%)	0 (0.0%)	19 (54.3%)	35 (100.0%)		
Age							
30s	2 (7.7%)	13 (50.0%)	0 (0.0%)	11 (42.3%)	26 (100.0%)	16.215**	0.013
40s	2 (2.1%)	73 (75.3%)	2 (2.1%)	20 (20.6%)	97 (100.0%)		
50s and over	2 (0.8%)	149 (61.6%)	4 (1.7%)	87 (36.0%)	242 (100.0%)		
Final education							
High-school graduate	0 (0.0%)	8 (53.3%)	0 (0.0%)	7 (46.7%)	15 (100.0%)	4.574	0.600
University graduation (including enrolled students)	6 (2.3%)	171 (65.5%)	4 (1.5%)	80 (30.7%)	261 (100.0%)		
Graduate school graduate or higher (including enrolled students)	0 (0.0%)	56 (62.9%)	2 (2.2%)	31 (34.8%)	89 (100.0%)		
Occupation							
Professional/office work	6 (2.4%)	155 (62.8%)	6 (2.4%)	80 (32.4%)	247 (100.0%)	9.701	0.838
Service/sales position	0 (0.0%)	7 (70.0%)	0 (0.0%)	3 (30.0%)	10 (100.0%)		
Production/technology jobs	0 (0.0%)	12 (85.7%)	0 (0.0%)	2 (14.3%)	14 (100.0%)		
Full-time housewife	0 (0.0%)	4 (57.1%)	0 (0.0%)	3 (42.9%)	7 (100.0%)		
Self-employment	0 (0.0%)	40 (69.0%)	0 (0.0%)	18 (31.0%)	58 (100.0%)		
Etc.	0 (0.0%)	17 (58.6%)	0 (0.0%)	12 (41.4%)	29 (100.0%)		
Marital status							
Single	2 (3.3%)	31 (51.7%)	0 (0.0%)	27 (45.0%)	60 (100.0%)	8.522	0.202
Married	4 (1.3%)	200 (67.1%)	6 (2.0%)	88 (29.5%)	298 (100.0%)		
Etc.	0 (0.0%)	4 (57.1%)	0 (0.0%)	3 (42.9%)	7 (100.0%)		
Average monthly income							
<2 million won	0 (0.0%)	15 (83.3%)	0 (0.0%)	3 (16.7%)	18 (100.0%)	13.087	0.596
<2–3 million won	0 (0.0%)	9 (52.9%)	0 (0.0%)	8 (47.1%)	17 (100.0%)		
<3–5 million won	2 (2.8%)	40 (55.6%)	2 (2.8%)	28 (38.9%)	72 (100.0%)		
<5–7 million won	2 (1.8%)	75 (68.8%)	2 (1.8%)	30 (27.5%)	109 (100.0%)		
<7–10 million won	2 (2.4%)	56 (66.7%)	2 (2.4%)	24 (28.6%)	84 (100.0%)		
Over 10 million won	0 (0.0%)	40 (61.5%)	0 (0.0%)	25 (38.5%)	65 (100.0%)		
Total	6 (1.6%)	235 (64.4%)	6 (1.6%)	118 (32.3%)	365 (100.0%)		

*$p < 0.01$; **$p < 0.05$.

80.0%. In addition, for high-school graduates, the rate of service/sales position as a profession, the use of sun cream was the highest at 90.0%. Finally, for those who were not married, the use of sunscreen was the highest at 75.0% and the average monthly income of <2 million won was the highest at 83.3%.

3.4 | The difference of time applied per day according to the characteristics of the subject of the survey

According to the characteristics of the subjects of the survey, 47.9% of the time applied per day was applied

TABLE 4 The difference in the type of product used according to the characteristics of the subject of the survey.

| | The type of product used | | | | | | |
Classification	Sun cream	Sun stick	Sun spray	Sun cushion	Total	χ^2	p
Gender							
Male	244 (73.9%)	70 (21.2%)	12 (3.6%)	4 (1.2%)	330 (100.0%)	2.221	0.528
Female	25 (71.4%)	9 (25.7%)	0 (0.0%)	1 (2.9%)	35 (100.0%)		
Age							
30s	21 (80.8%)	4 (15.4%)	1 (3.8%)	0 (0.0%)	26 (100.0%)	2.098	0.910
40s	68 (70.1%)	23 (23.7%)	4 (4.1%)	2 (2.1%)	97 (100.0%)		
50s and over	180 (74.4%)	52 (21.5%)	7 (2.9%)	3 (1.2%)	242 (100.0%)		
Final education							
High-school graduate	12 (80.0%)	2 (13.3%)	0 (0.0%)	1 (6.7%)	15 (100.0%)	6.143	0.407
University graduation (including enrolled students)	187 (71.6%)	61 (23.4%)	10 (3.8%)	3 (1.1%)	261 (100.0%)		
Graduate school graduate or higher (including enrolled students)	70 (78.7%)	16 (18.0%)	2 (2.2%)	1 (1.1%)	89 (100.0%)		
Occupation							
Professional/office work	184 (74.5%)	52 (21.1%)	8 (3.2%)	3 (1.2%)	247 (100.0%)	21.104	0.134
Service/sales position	9 (90.0%)	1 (10.0%)	0 (0.0%)	0 (0.0%)	10 (100.0%)		
Production/technology jobs	10 (71.4%)	3 (21.4%)	0 (0.0%)	1 (7.1%)	14 (100.0%)		
Full-time housewife	4 (57.1%)	2 (28.6%)	0 (0.0%)	1 (14.3%)	7 (100.0%)		
Self-employment	38 (65.5%)	16 (27.6%)	4 (6.9%)	0 (0.0%)	58 (100.0%)		
Etc.	24 (82.8%)	5 (17.2%)	0 (0.0%)	0 (0.0%)	29 (100.0%)		
Marital status							
Single	45 (75.0%)	13 (21.7%)	2 (3.3%)	0 (0.0%)	60 (100.0%)	1.538	0.957
Married	219 (73.5%)	64 (21.5%)	10 (3.4%)	5 (1.7%)	298 (100.0%)		
Etc.	5 (71.4%)	2 (28.6%)	0 (0.0%)	0 (0.0%)	7 (100.0%)		
Average monthly income							
<2 million won	15 (83.3%)	2 (11.1%)	1 (5.6%)	0 (0.0%)	18 (100.0%)	6.938	0.959
<2–3 million won	12 (70.6%)	5 (29.4%)	0 (0.0%)	0 (0.0%)	17 (100.0%)		
<3–5 million won	54 (75.0%)	14 (19.4%)	3 (4.2%)	1 (1.4%)	72 (100.0%)		
<5–7 million won	80 (73.4%)	24 (22.0%)	3 (2.8%)	2 (1.8%)	109 (100.0%)		
<7–10 million won	62 (73.8%)	20 (23.8%)	2 (2.4%)	0 (0.0%)	84 (100.0%)		
Over 10 million won	46 (70.8%)	14 (21.5%)	3 (4.6%)	2 (3.1%)	65 (100.0%)		
Total	269 (73.7%)	79 (21.6%)	12 (3.3%)	5 (1.4%)	365 (100.0%)		

once a day for men in gender, up from 45.7% for women. For those in their 50s or older, the rate of application once a day was the highest at 50.4%. In the final academic background, the ratio of high-school graduates applied once a day was the highest at 60.0%. In the case of self-employed businesses, the rate of application once a day was the highest at 58.6%. In terms of whether to get married or not, the rate of being applied once a day for unmarried people was the highest at 53.3%. In terms of monthly average income, 55.6% of those with <2 million won were applied once a day. In previous overseas journals, different methods are being adopted for measuring the SPF index, which is the basis for the development of sunscreen products, and the experiments are slightly different.[13]

3.5 | The difference between the related variables according to the characteristics of the subject of the survey and the actual condition of the use of sunscreen

3.5.1 | Differences in the perception of the nature of choice according to the actual condition of the use of the subject of the survey

The results of the intensive simple *t* test and one-way ANOVA are the same as Table 5, to examine the differences in the nature of choice depending on the use of sunscreens. The average of skin experts was the highest at 4.42 (SD = 0.34), the age of those in their 50s or older was the highest at 4.17 (SD = 0.62), spring was the highest at an average of 4.56 (SD = 0.46) in the season when it is mainly used, the highest at 4.21 (SD = 0.38) in the case of the arm or hand, the highest at an average of 4.60 (SD = 0.43) in the case of sun cushion, and the daily application time was the highest at 3.97 (SD = 0.68). The average of the skin specialist was the highest at 4.15 (SD = 0.82), the first age of use was the highest at 4.41 (SD = 0.68), and in the season when it was mainly used, the durability of the four seasons was the highest at 4.05 (SD = 0.59) of the average, the highest at 3.96 (SD = 0.66), followed by an arm or hand, and the face was the lowest at 3.93 (SD = 0.72), but the difference was not significant.

If the type of product used was sun spray, it was the highest at 4.25 (SD = 0.67) on average, the time was applied for 2–3 h, which was the highest at 4.04 (SD = 0.88), and the difference in the preference of the brand depending on the use of sunscreens. In the information route, the average of skin experts was the highest at 4.37 (SD = 0.59). In the season when it was first used, spring was the highest at 4.44 (SD = 0.34), the area mainly used was the highest at 3.74 (SD = 0.76), the type of product used was the highest at 3.94 (SD = 0.66), and the daily application time was 2–380 (SD = 0.94), which was the highest. The average of social network service was the highest at 3.83 (SD = 0.61), the first age of use for those in their 50s or older was the highest at 3.76 (SD = 0.66), and spring was the highest at 4.00 (SD = 0.77) point in the season when it is mainly used, and the highest at 3.76 (SD = 0.32) point with an arm or hand. The type of product used was the highest at 3.89 (SD = 0.26) of the average when it was sun cushion, and the highest at 3.40 (SD = 0.99) when the application time of the day lasted 2–3 h.

3.5.2 | The difference in the perception of satisfaction according to the actual condition of using sunscreen

The results of the intensive simple *t* test and one-way ANOVA are the same as Table 6, to examine the differences in satisfaction depending on the use of sunscreens. In the path of information, the average of skin experts was the highest at 4.04 (SD = 0.79), the age of those in their 50s or older was the highest at 3.93 (SD = 0.46), and

spring was the highest at 3.89 (SD = 1.08) points in the season when it was mainly used, and the highest at 3.82 (SD = 0.47) points when followed by arm or hand. In the type of product used, sun spray was the highest at 4.14 (SD = 0.64) and the highest was 3.80 (SD = 0.79) for 2–3 h of application.

3.6 | Analysis of factors affecting satisfaction

3.6.1 | Correlation between related variables

The results of Pearson's correlation to examine the correlation between the nature of UV protection products' choice and satisfaction are as shown in Table 7. Looking at the correlation of satisfaction from subfactor of independent variables choice attributes to dependent variables, this study showed that there was a significant positive correlation between satisfaction and selective judgment (*r* = 0.688, *p* < 0.01), product functionality (*r* = 0.583, *p* < 0.01), brand preference (*r* = 0.573, *p* < 0.01), and intent to purchase (*r* = 0.475, *p* < 0.01).

3.6.2 | The effect of optional attribute of UV protection products on the satisfaction level of UV protection products

The results of the multiple regression analysis conducted to look at the impact of optional attribute of UV protection products on satisfaction with UV protection products are as shown in Table 8. The model's explanatory power was about 56.8% (*R* = 0.568), indicating that the model was suitable (*F* = 120.826, *p* <0.001). In addition, variance inflation factor was below the standard at 1.555–2.199, so the multicollinearity between independent variable was judged to be missing, and Durbin–Watson statistic was approximated to 2 at 1.982, indicating that there was no problem with independence assumption. The selective judgment followed by the subfactor of optional attribute (*t* = 10.175, *p* < 0.001), the functionality of the product (*t* = 6.286, *p* < 0.001), and the intent of the purchase (*t* = 2.946, *p* < 0.01) were found to have a positive effect on satisfaction. Among them, the influence was increased in the order of selective judgment (*β* = 0.453), product functionality (*β* = 0.270), and purchase intention (*β* = 0.127).

4 | DISCUSSIONS

In the present study, selective judgment, product functionality, brand preference, and the intention to purchase were investigated as four factors of exploratory factor analysis, a measure of optional attribute and reliability analysis, which were surveyed based on the characteristics of the general population, and the resulting satisfaction was extracted. The sunscreen is defined by the Cosmetics Act as a product that helps the skin burn beautifully or protect the skin from

TABLE 5 Differences in the perception of the nature of choice according to the characteristics of the subject of the survey.

Classification	N	Selective judgment				Functionality of the product				Brand preference				The intention of purchase			
		M	SD	t/F	p	M	SD	t/F	p	M	SD	t/F	p	M	SD	t/F	p
The path of informatio																	
Social Network Services	54	4.10	0.79	8.871*	0.000	4.08	0.74	7.024*	0.000	3.91	0.72	10.007*	0.000	3.83	0.61	9.097*	0.000
Skin specialist	20	4.42	0.34			4.15	0.82			4.37	0.59			3.72	0.54		
Mass media (TV, radio)	111	3.80	0.64			3.89	0.60			3.56	0.71			3.50	0.58		
Friends and acquaintances	143	4.00	0.62			4.02	0.61			3.78	0.62			3.57	0.46		
Golf acquaintance	37	3.45	1.08			3.41	1.07			3.32	0.92			3.12	0.83		
The age that is used for the first time																	
10s	13	4.03	0.46	1.370	0.244	4.41	0.68	2.538**	0.040	3.79	0.62	2.282	0.060	3.73	0.23	2.723**	0.029
20s	61	3.93	0.46			4.06	0.65			3.86	0.65			3.65	0.49		
30s	123	3.86	0.88			3.92	0.85			3.60	0.93			3.50	0.72		
40s	133	3.90	0.73			3.84	0.59			3.69	0.56			3.47	0.50		
50s and over	35	4.17	0.62			3.96	0.74			3.94	0.67			3.76	0.66		
The season that is mostly used																	
Spring	6	4.56	0.46	4.669***	0.003	4.00	1.30	1.422	0.236	4.44	0.34	3.942***	0.009	4.00	0.77	2.107	0.099
Summer	235	3.83	0.79			3.88	0.76			3.64	0.79			3.50	0.62		
Fall	6	3.78	0.34			3.89	0.62			3.89	0.46			3.61	0.46		
All four seasons	118	4.08	0.59			4.05	0.59			3.83	0.59			3.61	0.53		
The part that is usually used																	
Face	307	3.92	0.73	3.356**	0.036	3.93	0.72	0.026	0.974	3.74	0.76	0.940	0.392	3.54	0.62	2.428	0.090
Neck	32	3.71	0.88			3.95	0.74			3.58	0.52			3.42	0.52		
Arm or hand	26	4.21	0.38			3.96	0.66			3.62	0.59			3.76	0.32		
The type of product used																	
Sun cream	269	3.92	0.70	4.297***	0.005	3.92	0.70	1.051	0.370	3.71	0.72	0.407	0.748	3.29	0.86	1.164	0.323
Sun stick	79	3.80	0.82			3.93	0.79			3.70	0.79			3.22	0.82		
Sun spray	12	4.44	0.52			4.25	0.67			3.94	0.66			3.48	0.99		
Sun cushion	5	4.60	0.43			4.20	0.61			3.73	0.43			3.89	0.26		

TABLE 5 (Continued)

Classification	N	Selective judgment				Functionality of the product				Brand preference				The intention of purchase			
		M	SD	t/F	p	M	SD	t/F	p	M	SD	t/F	p	M	SD	t/F	p
The applying time of the day																	
Every 2–3 h	56	3.95	1.02	0.286	0.836	4.04	0.88	0.671	0.570	3.80	0.94	0.509	0.677	3.40	0.99	1.126	0.338
Every 3–4 h	87	3.95	0.66			3.95	0.70			3.71	0.74			3.35	0.86		
Every 4–5 h	48	3.97	0.68			3.94	0.81			3.77	0.78			3.38	0.75		
Once a day	174	3.89	0.67			3.89	0.64			3.68	0.64			3.21	0.82		

Note: Posthoc test: Scheffe ($a < ab < b$).

$*p < 0.001$; $**p < 0.05$; $***p < 0.01$.

TABLE 6 Differences in the perception of satisfaction according to the characteristics of the subject of the survey.

Classification	N	Satisfaction			
		M	SD	t/F	p
The path of information					
Social Network Services	54	3.94	0.56	6.765[*]	0.000
Skin specialist	20	4.04	0.79		
Mass media (TV, radio)	111	3.65	0.42		
Friends and acquaintances	143	3.71	0.59		
Golf acquaintance	37	3.40	0.78		
The age that is used for the first time					
10s	13	3.79	0.67	1.787	0.130
20s	61	3.77	0.57		
30s	123	3.67	0.68		
40s	133	3.66	0.53		
50s and over	35	3.93	0.46		
The season that is mostly used					
Spring	6	3.89	1.08	1.196	0.311
Summer	235	3.67	0.60		
Fall	6	3.72	0.31		
All four seasons	118	3.79	0.55		
The part that is usually used					
Face	307	3.72	0.60	2.269	0.105
Neck	32	3.52	0.58		
Arm or hand	26	3.82	0.47		
The type of product used					
Sun cream	269	3.72	0.59	3.156[**]	0.025
Sun stick	79	3.60	0.59		
Sun spray	12	4.14	0.64		
Sun cushion	5	3.83	0.42		
The applying time of the day					
Every 2–3 h	56	3.80	0.79	1.000	0.393
Every 3–4 h	87	3.73	0.56		
Every 4–5 h	48	3.77	0.62		
Once a day	174	3.66	0.52		

Note: Posthoc test: Scheffe ($a < ab < b$).

$*p < 0.001$; $**p < 0.05$.

UV rays.[14] Impact of Unit-Dosing of Sunscreen on Adherence at Golf Tournaments was performed in 2022.[13] Problems with UV rays and sunscreens have emerged through several studies, but sunscreens and UV protection components do not pose a threat to human health.[15] The sunscreens should be equipped with skin safety, formulation stability, and usability for the purpose of protecting the

TABLE 7 Correlation between related variables.

Classification		1	2	3	4	5
Optional attribute	1. Selective judgment	1				
	2. Functionality of the product	0.492*	1			
	3. Brand preference	0.596*	0.565*	1		
	4. Intention of purchase	0.450*	0.369*	0.588*	1	
	5. Satisfaction	0.688*	0.583*	0.573*	0.475*	1

*$p < 0.01$.

TABLE 8 The effect of optional attribute of UV protection products on the satisfaction level of UV protection products.

Dependent variables	Independent variables	Unstandardized coefficient		Standardized coefficient	t	p
		B	SE			
Satisfaction	(Constant)	0.879	0.132		6.642*	0.000
	Selective judgment	0.367	0.036	0.453	10.175*	0.000
	Functionality of the product	0.222	0.035	0.270	6.286*	0.000
	Brand preference	0.061	0.041	0.076	1.479	0.140
	Intention of purchase	0.088	0.030	0.127	2.946**	0.003
Durbin–Watson = 1.982, R = 0.573, Adj-R = 0.568, VIF = 1.555~2.199, F = 120.826						

*$p < 0.001$; **$p < 0.01$.

skin.[16] Additionally, block index A of blocker must meet more than one-third of SPF index, and block index B must meet SPF6 or higher requirements.[17,18] The harmful effects of exposure to sunlight are caused by blemishes, age spots, skin cancer, and wrinkles.[19] In particular, it is known that the main cause of skin cancer caused by UV rays is immunosuppression.[20] In skin health regarding UV rays, 57.1% of the surveyed subjects said UV rays were harmful to skin health.[21] In particular, golf activity is exposed to an average of 4 h of sunlight, which is said to have a negative effect on the skin due to external factors such as heat, wind, and UV rays. Despite the increased awareness of the harmfulness of exposure to UV rays, the use of sunscreen was still lacking, which was shown in the underestimation of the imperfections of UV rays and the time of exposure. As a result, it is believed that the information that the protection of UV rays in spring is essential for the deposition of photoaging and pigments is known. In terms of recognition and product use, for men, sun lotion, sun spray, sun cream, and sun balm are used a lot, and for women, blemish balm cream and make-up base are used a lot.[22]

Accordingly, the more the selective judgment, the greater the awareness of the functionality of the product and the intention of the purchase, the better the satisfaction with the UV protection product. Selective judgments have been shown to have a positive impact on satisfaction. In this study, exploratory factor analysis and reliability analysis were conducted to look at the use of sunscreens related to demographic characteristics, frequency analysis with seven extraction methods to increase the reliability of optional attribute, and the feasibility of the level of satisfaction with cross-tabulation analysis and internal consistency.

AUTHOR CONTRIBUTIONS
Ji A. Choi: Conceptualization, data curation, formal analysis, funding acquisition, investigation, methodology, project administration. **Ki H. Kwon**: Supervision. All authors have read and approved the final version of the manuscript, corresponding author had full access to all of the data in this study and takes complete responsibility for the integrity of the data and the accuracy of the data analysis.

CONFLICT OF INTEREST STATEMENT
The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT
The authors confirm that the data supporting the findings of this study are available within the article and/or its supplementary materials.

ETHICS STATEMENT
All procedures performed in studies involving human participants were in accordance with the Ethical Standards of Dongguk University and/or National Research Committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Providing questionnaires to voluntarily participating workers is not perceived as a hazardous activity that needs special screening. The study was not a clinical trial, and the data are robustly

anonymized and informed consent and thus did not require ethics committee approval.

TRANSPARENCY STATEMENT

The lead author Ki H. Kwon affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

ORCID

Ki Han Kwon http://orcid.org/0000-0001-6078-5899

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