

Golfers' Intention to Adopt UV Specialized Clothing as Innovation: Based on Rogers Theory

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골퍼의 자외선 차단복의 수용 의도: Rogers의 혁신확산이론을 중심으로

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Abstract

In the U.S., outdoor enthusiasts such as golfers have been focused on skin cancer prevention practices since their outdoor activities lead to extensive sun exposure during peak sun hours. The purposes of this study were to investigate golfers current sun protection behaviors and five attributes and their impacts on the intention to adopt UV specialized clothing based on Rogers' theory. UV specialized clothing as a preventive innovation is related to sun protection behaviors. However, there has been little effort to explain the intention to adopt a preventive innovation regarding health-related practices. With a convenience sampling method, a total of 158 useful questionnaires were collected. Ninety one percent were male golfers, and their age ranged from 16 to 80 years old(mean age=30 years). About 25% reported to practice sun protection behaviors. About 70% disagreed on the relative advantage, compatibility, observability, and triability of UV specialized shirts and reported the low intention to purchase it. Current sun protection behaviors and five attribute variables were entered in the multiple regression equation to explain the dependent variable of intention to adopt the innovation. Triability was the best predictor of the intention to adopt UV specialized shirts, followed by current sun protection behaviors, compatibility, and relative advantage. With four predictors, 45% of the variance of intention to adopt was explained. The present study provides how the golfers current sun protection behaviors play important roles in explaining the intention to adopt the preventive innovation. Physical and functional features of UV specialized clothing were also significantly associated with their intentions to adopt it.

Key words: Attributes of innovation, Intention to adopt, UV protective clothing, Sun protection behaviors, Golfers; 인지된 혁신속성, 수용의도, 자외선 차단복, 햇빛 차단행동, 골퍼

I. Introduction

Since the major factor of developing skin cancer and aging skin is associated with excessive exposure to ultraviolet(UV) radiation, outdoor enthusiasts, such as golfers, need to be targeted on sun precau-

tion practices. In order to reduce the incidence of skin cancer, the American Cancer Society(2002) recommends limiting or avoiding sun exposure during the midday hours, from 10 a.m. to 4 p.m. Golfers are more at risk than the average person as Gravel (1997) indicated, because they often spend more

than five hours in the sun during peak sun hours for a game of golf. Nevertheless, little effort is being made to target outdoor recreational groups regarding the practice of sun safety with the exception of sunbathing habits (Newman et al., 1996).

UV specialized clothing, the innovation for this study, is specially designed to maximize UV protection by using fabrics that are specialized with UV radiation absorbers. Wearing UV specialized clothing could be more convenient than using sunscreen for golfers since individuals have to reapply sunscreen frequently while playing golf for effective protection during the prolonged exposure. Actually, most skin cancer prevention campaigns are inclined to focus on the use of sunscreen (Glanz et al., 1999), so it is helpful to determine whether the alternative practices, such as use of sun protective clothing, are equivalent or more effective. Based on Rogers diffusion theory (2003), investigating golfers perceived attributes of UV specialized clothing would assist to understand their intention to adopt it.

II. Literature review

1. Preventive Innovation

An innovation, like UV specialized clothing is defined as a preventive innovation that an individual adopts the innovation in advance with the intention of preventing or reducing the probability of some future unwanted event (Rogers, 2003). Thus, adoption of this innovation is related to skin cancer prevention practices. Previous studies have focused on preventive health campaign like smoking cessation or AIDS prevention (Rogers, 2003).

An innovation can be described by five attributes that influence the rate of adoption of the innovation. Studying attributes of innovation is important due to its predictive potential to assist in actual diffusion. Yet, attributes of an innovation in clothing diffusion has been insufficiently studied (Park, 2000), especially with respect to the preventive innovation. Most research of attributes of innovations has been conducted in the area of technolog-

ical innovations (Agarwal & Prasad, 1997; Johnson et al., 1998).

2. Attributes of Innovation

Five attributes of innovations, Rogers identifies, are relative advantage, compatibility, complexity, triability, and observability. Relative advantages, defined as the degree to which an innovation is perceived as being better than the idea it supersedes, include different kinds of advantages such as economic, social prestige, or other non-economic benefits depending on the nature of an innovation (Rogers, 2003). For this study, relative advantage was subdivided into economic advantage, social prestige, and overall usefulness. Economic advantage represents cost effectiveness by adopting the innovation. Since price is an important criterion in clothing purchase decisions (Eckman et al., 1990), it is crucial to incorporate the economic aspect of relative advantage. Rogers emphasized social prestige as a predictor especially in clothing diffusion. Since clothing is highly associated with status-giving innovation, social prestige is an important cue to fashion diffusion to members of the social system. Overall usefulness is another dimension of relative advantage, defined as "the extent to which a potential adopter views the innovation as offering an advantage over previous ways of performing the same task" (Agarwal & Prasad, 1997, p. 562). This dimension was applied in this study by determining to what extent the potential users would perceive UV specialized clothing as better than typical golf clothing in terms of fashionability or effectiveness of UV prevention.

Compatibility, defined as the degree to which an innovation is perceived as consistent with the existing values, needs, and past experiences of potential adopters. People do not accept an innovation if it is too different from their previous experience with comparable products. Compatibility for this study is viewed in terms of compatibility with the existing wardrobe as Littrell and Miller (2001) used for their study of clothing diffusion. This notion is applicable to versatility or matching function of clothing. In

addition, appropriateness for the social or situational events is included. Compatibility with social norms can inhibit or encourage the likelihood of adoption so that it is an important criterion in purchasing dress. People tend to wear garments similar to their peers because of a desire for conformity or acceptance from their social groups (Blackwell et al., 2001). Accordingly, although preventive innovation is perceived superior to traditional golf wear, if it is not compatible with the group norm of the potential adopters, the probability to adopt would be low.

Complexity is defined as the degree to which an innovation is perceived as relatively difficult to understand and use, and negatively associated with the probability of adoption. Littrell and Miller (2001) argued that complexity of clothing would be high when additional learning of garment construction, fabric, silhouette, or fasteners were required due to lack of familiarity with the garment. For this study, complexity is focused on difficulty in understanding the function of UV prevention with respect to the preventive innovation.

Triability is defined as "the extent to which potential adopters perceive that they have an opportunity to experiment with the innovation prior to committing to its usage" (Agarwal & Prasad, 1997, p. 562). A trial period with a 30-day return policy among commercial products would encourage the level of triability. If golfers have an opportunity to try on the innovation before actual adoption, it would reduce uncertainty about the product. One of researchers for this study conducted a preliminary market survey, and found that UV specialized shirts were not available at the local golf stores due to low interests of golfers. Hence, triability is focused on the availability of and try-out the innovation in the traditional stores. Triability is an important attribute for highly involved products, such as clothing, because those product categories are more associated with self image, economic risk, and performance risk than lower-involved products (Blackwell et al., 2001).

Observability is defined as the degree to which the results of an innovation are visible to others. The preventive innovation possesses relatively low

observability because it is difficult to identify a causal relationship between the adoption of the innovation and the probability of an unwanted event occurring. For instance, the person who adopts this innovation could develop skin cancer due to cumulative effects of UV radiation that occurred before adopting it. Observability for this study included two aspects: visibility refers to the degree to which potential adopters are able to observe the use of an innovation in their social context, and result demonstration refers to communicability of the results of the innovation (Agarwal & Prasad, 1997).

The relative importance of attributes of innovations is different based on the nature of an innovation. Relative advantage and result demonstrability were significant predictors of the intention to continue to use the World Wide Web (Agarwal & Prasad, 1997). Regarding India-inspired garments, consumers likelihood of purchasing was positively and significantly influenced by familiarity with overall garment features and compatibility (matching) with existing garments (Littrell & Miller, 2001); Complexity of garment features did not have a significant impact on likelihood of purchasing.

When clothing innovation attributes were identified by four factors—compatibility (with existing clothing lifestyles), functional relative advantage (price, comfort, ease of care, etc), social relative advantage (good looking, quality, fashion), and perceived risk (acceptable to others)—three of them except for social relative advantage were significant predictors of use innovative behavior, while none of them were significant for purchase innovative behavior (Park, 2000). The results of innovation attribute studies may not be generalized to the preventive innovation due to the different characteristics of the innovation. Identifying attributes of UV specialized clothing would provide a baseline for the adoptability of the preventive innovation in its prediffusion stage.

3. Sun Protection Behavior (SPB) and Intention to Adopt

Potential adopters intention to adopt an innovation

would be influenced by the previous experiences or beliefs about a certain situation. According to the innovation-decision process, attitudes toward an innovation are formed after knowledge of the innovation is obtained or received (Rogers, 2003). Knowledge is shaped and influenced by consumers' previous practices, felt needs, and influences of significant others, because people have received information that is relevant to their interests or beliefs. In terms of adopting UV specialized clothing, if an individual has a strong felt need to prevent skin cancer, s/he would practice sun protection and be interested in UV specialized clothing. This individual would have more positive perception of compatibility or relative advantage toward UV specialized clothing than a person who does not have a need for sun protection. Then the individual's positive attitudes toward the UV specialized clothing would enhance the intention to adopt it. Finding the effect of sun protection behaviors on intention to adopt the preventive innovation would be beneficial, since researchers have done little work to explain attributes of the preventive innovation associated with perceivers' actual health-related practices.

4. Research Purposes

The purposes of this study are to assess golfers' current behaviors regarding sun protection and to examine whether perceived attributes of UV specialized clothing are related to golfers' intention to adopt it. Specific research questions are 1) to what extent do golfers' engage sun protection behaviors (SPB)? 2) How is each attribute variable associated with the intention to adopt UV specialized clothing? 3) To what extent is the SPB variable related to the intention to adopt UV specialized clothing? 4) What is the relative importance in predicting the intention to adopt it for the potential adopters?

III. Method

A self-administered questionnaire was developed. There were few standardized instruments of clothing

attributes, so it was required to extensively modify previous instruments. A total of 18 attribute items were adopted from the studies of Moore and Benbasat (1991) and Strutton et al. (1994). Each attribute except for relative advantage was measured with three items. Relative advantage included two items of economic advantage, two items of image, and two items of overall usefulness. Moore and Benbasat (1991) argued to put the variety of advantages of an innovation under the concept of relative advantage when developing the instrument. Three items of intention to adopt were modified from Jackson (1997). Subjects answered each item on five-point Likert-type scales (1=strongly disagree; 5=strongly agree) (Table 1). For this section, a color photograph of a UV specialized shirt was included in the questionnaire. The researcher indicated that the shirt was designed to offer better UV protection during playing golf, and asked to assume to purchase it in regular golf stores. The photograph which represented a golfer was selected by two professionals from commercial catalogs of four UV specialized clothing companies. The male model wore a long-sleeved polo shirt with dark long pants, putting on golf glove on his left hand with golf club. Shirts in different colors (yellow, green, white, and patterns) and price information ranged from \$ 60.00 to \$ 80.00 were also included in order to provide a variety.

Regarding sun protection behaviors, five items were modified from Jackson (1997), including use of sunscreen on the face; and body; use of long-sleeved shirts or pants to cover the body; use of a hat; and use of the shade to avoid exposure. Five items were measured on five-point Likert-type scales ranging from "never" (1) to "all the time" (5).

A pretest was conducted to golfers at a public golf course and each one item of economic advantage, complexity, and triability were deleted according to the results of internal consistency using Cronbachs alpha. The alpha for each attribute was ranged from .73 (compatibility) to .87 (intention), except complexity (.66). In addition, three professionals examined the modified questionnaire for content validity before the final survey was conducted.

During the last three months of 2002, the data were collected by a convenience sampling method. Golfers were recruited from public golf courses and golf-related programs at universities in a Midwestern area of the U.S. The response rates for the final 158 eligible participants were 68.1%; 21.6% refused to participate and 10.3% did not complete the questionnaire. Respondents age ranged from 16 to 80 years old (mean age=30 years), and 91% were male. Male golfers were dominant in the selected golf courses. About 74% were Caucasians and 65% were single.

IV. Results and Discussion

Regarding respondents current sun protection behaviors, descriptive statistics were used. About

31% of the respondents often to all the time wore sunscreen on the face and 20% used it on the body when outdoors, while more than 80% never or rarely wear a long-sleeved shirt to cover the body from the sun. About 47% of the respondents often to all the time wore a hat when they were in the sun and 26% tried to stay in the shade when outdoors. Findings showed that approximately a quarter of respondents practiced one of the recommended behaviors except for wearing long-sleeved shirts often to all the times when they were outdoors. This finding indicates necessity to educate outdoor recreational groups about the appropriate sun protection behaviors.

<Table 1> showed mean and standard deviation of each item of attribute variables. Cronbachs alphas of

Table 1. List of Items of Clothing Attributes and Intention to Adopt (IA)

Relative Advantage (<i>Alpha</i> = .67)	Mean	SD
This product would maximize the quality for the money that I spend.	2.82	0.89
Golfers who have this product would have more prestige than those who do not.	2.13	0.98
Wearing this product would improve my image among my golfing friends.	2.06	0.98
This product would be more fashionable or unique in style than other similar types of shirts.	2.38	0.97
This product would provide better UV protection than the other garments I have.	3.80	1.04
Compatibility (<i>Alpha</i> = .76)	Mean	SD
This product would coordinate well with the other garments I have.	2.78	1.06
This product would be compatible with my current needs for a new shirt.	2.54	0.98
This product would be appropriate for my golf games.	2.80	1.08
Complexity (<i>Alpha</i> = .64)	Mean	SD
It would be difficult to understand how this product works to prevent UV radiation.	2.88	1.08
I would have difficulty explaining why wearing this product is beneficial.	2.79	1.07
Triability	Mean	SD
It would be easy to try out this product without a big commitment. ^a	3.46	1.01
If this product, made especially for golfers, is available in stores where I buy my golf clothes, I would try it on.	3.05	1.12
Observability (<i>Alpha</i> = .67)	Mean	SD
I have seen people wearing this product when I am outdoors. ^a	1.65	0.93
I could communicate the advantages of wearing this product to others.	3.00	1.01
If I use this product, the advantages/disadvantages would be readily apparent to me.	3.02	0.99
Intention to Adopt (<i>Alpha</i> = .82)	Mean	SD
I plan to wear a UV specialized shirt for most outdoor activities.	2.09	0.92
I intend to wear a long-sleeve shirt while playing golf.	2.03	1.03
I intend to purchase a UV specialized shirt within the next few years.	2.12	1.01

^aDeleted item in the summated scale construction

variables were relatively lower than the alphas in the pretest, but all of the alphas were above 0.60, the minimal acceptable level (Devellis, 1991). About 70% agreed with the superiority of UV protective function of the UV specialized shirt compared to typical shirts, but they perceived a lower level of advantages for the style. Only 30% of respondents agreed that the innovation was compatible with their garments, and the benefits of UV protection were observable. About 40% of the respondents reported a low level of complexity in understanding the UV protective function. However, 70% reported that they did not intend to adopt the UV specialized shirt.

Correlation coefficients were examined in order to find out the specific association between five attribute variables and dependent variable (IA). All variables except for complexity were significantly and positively correlated with IA. The ranges of significant coefficients were from .30 (observability) to .57 (triability) at .01 level (Table 2). Sun protection behavior variable (SPB) is also significantly correlated with IA ($r=.40$), indicating that individuals who take sun protection behaviors are more likely to

adopt the UV protective shirts.

Based on the results of correlation, the contribution of five attribute variables and SPB to the intention to adopt UV specialized shirt (IA) was examined by multiple regression analysis with stepwise method. The summated scale of each variable was developed to use in the regression equations. The sum of sun protection behavior variable (SPB) was entered in the first block, and attribute variables were in the second. It was necessary to force the order of entry of variables according to innovation-decision model.

Four out of six variables were significant predictors of intention to adopt UV protective shirt (IA) and 46.5% of the variance was explained (Table 3). Triability was the most significant variable ($\beta=.279$) in predicting IA. UV protective clothing is relatively new to consumers, so if potential adopters wear it, they would be earlier adopter and triability is more important attribute to them than later adopter (Rogers, 2003). The SPB variable ($\beta=.247$) was the second most important predictor, which implied that encouraging individuals health-related behaviors would be

Table 2. Pearson Correlation Coefficients among Variables

	1	2	3	4	5	6	7
Relative advantage	1.00						
Compatibility	.66**	1.00					
Complexity	.07	.05	1.00				
Triability	.49**	.64**	-.16	1.00			
Observability	.38**	.36**	-.16	.37**	1.00		
SPB	.23**	.16	.04	.26**	.18*	1.00	
Intention to adopt (IA)	.52**	.55**	-.07	.57**	.30**	.40**	1.00

* $p<.05$, ** $p<.01$

Table 3. Regression for Intention to Adopt UV Specialized Clothing

Independent Variables	B	β	p	F	R ²
Constant	-1.69		.033		
SPB	.18	.247	.000***		
Relative Advantage	.15	.192	.020*	32.33***	.465
Compatibility	.20	.201	.029*		adj R ² = .450
Triability	.64	.279	.001**		

* $p<.05$, ** $p<.01$, *** $p<.001$

helpful to increase the rate of adoption of the preventive innovation. Compatibility ($\beta=.201$), and relative advantages ($\beta=.192$) were also significant predictors. In fact, aesthetic factors such as styling, color/pattern, fabric, appearance, and fit and price were the important criteria when buying specific garments (Eckman et al., 1990). With this reason, compatibility showed the high correlation with relative advantage empirically, although these two were distinct conceptually (Moore & Benbasat, 1991).

Complexity and observability did not contribute significantly to explaining the variance. Since the innovation is relatively new, the effectiveness of UV protection would not yet be apparent to respondents. Complexity may be an inadequate attribute to describe the clothing innovation that is consistent with the study of Littrell and Miller (2001).

V. Conclusion

Respondents personal characteristics of this study were comparable with outdoor enthusiasts who were more likely to be exposed to the sun for long periods of time (Robinson et al., 1997). With respect to protecting the face, about 50% of the respondents wore a hat, and 30% used sunscreen on the face at least frequently, while only 20% protected their bodies by using sunscreen. The US Department of Health and Human Services (2000) reports that 47% of U.S. people more than 18 years old in 1998 practiced at least one of these sun protection behaviors, and set the objective to reach 75% of adults by 2010. Findings in this study indicate that the additional sun precaution campaign is necessary to change golfers sun exposure behaviors.

Three attribute variables, triability, compatibility, and relative advantage, and current sun protection behavior (SPB) influenced the intention to adopt UV specialized clothing. Whether the innovation is triable and available in the close stores is the most important attribute for the potential earlier adopters. Although UV specialized clothing represented a preventive innovation and golfers were not familiar with it, respondents seemed to consider it as a reg-

ular long-sleeved shirt. Then, physical and functional features of clothing were directly and significantly associated with their intentions to adopt it. However, diverse evaluative criteria in purchasing clothing were examined as one relative advantage variable in the present study, which might lead to a low level of explanation of the variance. It will be worthwhile to attempt to use these criteria as an individual attribute of the clothing innovation.

There were limitations in this study. The respondents can not represent the general golf population, so caution is necessary in interpreting the findings. Low Cronbachs alpha coefficients might affect the significances in the regression model, reducing the explanatory power. The male models physical characteristics in the photograph of the questionnaire might influence respondents attitudes toward UV specialized clothing. Despite the limitations, this study provided the first step in understanding perceived attributes of the health-related preventive innovation. In order to enhance the adoptability, it is necessary to achieve changes in potential adopters knowledge, attitudes, and behaviors. Finally, investigating social influence on selecting clothing or communication channels as information source which affect the rate of adoption as Rogers indicated (2003) would be necessary for future study.

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요 약

골퍼들은 레저활동의 특성상 장시간 자외선에 노출이 되므로 피부 보호를 위한 햇빛 노출 예방에 대한 관심이 미국에서 고조되고 있다. 본 연구는 자외선 차단의복을 예방혁신제품으로 하여, 제품의 인지된 속성이 잠재적 소비자의 수용의도에 미치는 영향을 Rogers의 혁신확산이론에 비추어 연구하였다. 또한 혁신 제품이 건강관련 제품이므로, 수용의도에 미치는 골퍼들의 현재 자외선 차단행동의 영향을 고찰하였다. 임의 표집 방법을 이용, 미국내 골퍼들을 표본으로 하여 설문지 조사법으로 자료를 수집하였다. 최종 158명의 응답자 중 91%가 남성골퍼였으며, 평균나이는 30세였다. 응답자의 25%정도만이 피부노출 방지를 위한 차단행동을 하는 것으로 나타났으며, 대부분의 응답자들은(약 70%) 자외선 차단의복 특성에 대해 부정적인 태도를 보였다. 현재의 자외선 차단 행동 및 인지된 다섯개의 혁신속성을 회귀분석법으로 측정된 결과, 시용의 용이성, 자외선 차단 행동, 일치성, 상대적 우월성 순으로 자외선 차단 의복 수용의도를 예측하는데 중요한 변인으로 나타났다. 피부보호와 관련된 예방혁신제품의 수용정도는 현재의 자외선차단 행동이 영향을 주며, 또한 제품의 외관적, 성능적 속성들도 일반 의류제품과 마찬가지로 소비자의 제품 수용시 고려되는 중요한 변인임을 알수 있다.