

## An Analysis of Public Perception on Equestrian Clothing During the Covid-19 Outbreak

Rani Eom<sup>1</sup>

### Abstract

*This study aimed to investigate the public perception of equestrian clothing during the COVID-19 outbreak. Using a big data analysis platform (Somtrend), text mining analysis was used as the study methodology. The phrase subject to analysis was "equestrian clothing," and the analysis period spanned the years 2020 and 2021. Frequency, equestrian clothing, and emotion words were analyzed. The results of the study showed that except for the summer, which includes the Olympic period, there was a considerable rise in equestrian clothing from fall to winter. The referenced word most closely related to equestrian clothing was "pants." Positive words about equestrian clothing appeared more than negative words, such as "suitable," "good," and "pretty." In conclusion, during the COVID-19 pandemic, the public's interest in equestrian clothing peaked in the fall and winter, and interest in pants was high. The people also had favorable opinions of the riding clothing fashion. The public will need equestrian clothing with a variety of designs in the future, as well as riding pants appropriate for the fall and winter. This study can provide data for the development of equestrian clothing in the future.*

**Keywords:** *Big Data, Equestrian Clothing, Horseback Riding, Public Perception, Text mining.*

### 1. INTRODUCTION

People have begun to play new leisure sports activities, especially those that take place outdoors with only a few participants, since the onset of the COVID-19 (coronavirus infectious disease-19) epidemic [1]. From the outbreak of COVID-19, people would have likely formed a desire for outdoor activity with guaranteed safety [2]. Changes in lifestyle that promote a healthy leisure culture frequently focus on outdoor recreation, and the horseback riding sector is one that can provide this need [3]. Horseback riding is a representative leisure activity of healing and well-being that allows participants to engage with nature, communicate with animals in the outdoor environment, as well as acquire skills [4]. Recent research found that 15% of horseback riders increased their frequency of riding after the COVID-19 epidemic, changing the activity's original intent from a simple experience to one of fitness and pleasure [5]. In other words, based on previous studies claiming that interest and engagement in horseback riding, which is an outdoor activity, increased as exercise at sports facilities was restricted, it can be seen that COVID-19 has had a large impact on horseback riding.

Meanwhile, a previous study reported that it is necessary to develop a horseback riding product that maximizes the activity's differentiated advantages [6]. The representative

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<sup>1</sup> Department of Fashion & Textiles, Jeju National University, Jeju-si 63243, Jeju-do, Republic of Korea, rani@jejunu.ac.kr

horseback riding product available for enjoyment while participating in the activity is equestrian clothing. However, compared to studies investigating changes in horseback riding activity, which has increased due to COVID-19, studies on demand for and consumer perception of equestrian clothing are still difficult to find. That is, despite the fact that interest in equestrian clothing for outdoor horseback riding is inevitably increasing due to the prolonged COVID-19 pandemic, few studies on social perception of equestrian clothing have been conducted. Since horseback riding is now considered a leisure sport, it is necessary to expand the scope of the study subjects to the public without limiting to specific riders, examine the perception of the public towards equestrian clothing, and analyze the perception of equestrian clothing based on this. This process can contribute to the equestrian clothing market and horseback riding industry.

In line with this, the study was conducted to understand public perception of equestrian clothing using text mining. Accordingly, this study aims to measure how perceptions of equestrian clothing are qualitatively formed in the context of a global crisis such as the COVID-19 pandemic. Through text mining, it investigates and reviews public perception of equestrian clothing in the past two years since the outbreak of COVID-19. In addition, this study also seeks to provide the basic data as a timely countermeasure for the equestrian clothing market and horseback riding industry.

## **2. LITERATURE REVIEW**

### ***2.1 Horseback Riding Activity After COVID-19***

People's use of sports facilities was restricted during COVID-19 [7], and as an alternative, many chose sports that are played outdoors and involve a small number of people as such sports are perceived to have a relatively low risk of viral infection [8]. Consequently, the number of people spending time in equine establishments [9] and the frequency of horseback riding [5] increased during COVID-19 compared to the pre-pandemic period. In other words, the outbreak of COVID-19 has brought an increase in the number of people who enjoy horseback riding activities and the amount of time they spend doing so.

### ***2.2 Importance of Wearing Equestrian Clothing***

Horseback riding benefits include improved posture [10], reduced back pain for those with chronic back pain [11], and improved physical function [12, 13]. However, there are also risky issues such as fractures from riding [14]. Research on horseback riding-related injuries found that protective clothing has its benefits [15] and that wearing highly conspicuous clothes can lower injury rates by making riders more readily visible beside the horse [16]. Of course, riders themselves believe equestrian clothing is important in order to continuously engage in horseback riding [17]. Thus, in order to properly wear equestrian clothing before riding a horse, it is crucial to understand its significance.

Table 1 summarizes the reasons for wearing equestrian items, design features of each gear, and recommendations, based on the reference material [18]. Riders must wear gloves, pants, boots, helmets, and vests to prevent various injuries that may occur during horseback riding or from a fall. Helmets and safety vests are particularly important to protect body parts that are most susceptible to dangerous injuries in the event of a horse fall. In addition, riders should choose tight-fitting items and learn how to properly wear them to ensure a snug fit to the body.

Table 1: Description of Equestrian Gear

Item		Description
Equestrian gloves	Reason for wearing	- Holding the reins and whip with bare hands may cause abrasions and bruises on hands and wrists, or reins and whip may slip out of hand because they are slippery due to sweat and dirt.
	Design features and recommendations	- Must fit the hands perfectly. - The parts between thumb, index finger, ring finger, and little finger have been processed to be non-slip - Cowhide is more practical than soft lambskin.
Equestrian pants	Reason for wearing	- Wearing regular pants may cause abrasions because wrinkles can chafe the skin. - Wearing regular pants may result in bruises due to repeated horse kickbacks.
	Design features and recommendations	- The pants are designed to fit perfectly without wrinkles. - The inner parts of the hips, thighs, and calves have been treated to be non-slip and shock-absorbing. - Pants made of spandex are the most suitable choice.
Equestrian boots	Reason for wearing	- Not wearing boots may cause abrasions due to friction between the shins and calves. - Wearing boots allows for safe exercise due to increased adhesion between the rider and the saddle.
	Design features and recommendations	- Long boots are designed to protect the legs by fully covering the calves. - Ankle boots must be worn with calf sleeves (chaps).
Equestrian helmet	Reason for wearing	- Not wearing a helmet may cause critical head injuries in case of a fall.
	Design features and recommendations	- Adjustable jaw straps prevent the helmet from coming off or moving which may block the vision. - Helmets that comply with the safety standards of Conformité Européenne (CE) and the American Society for Testing and Materials (ASTM) are recommended.
Equestrian safety vest	Reason for wearing	- Not wearing a safety vest may cause impact to the skull and spine.
	Design features and recommendations	- Some items trigger airbags in case of a fall. - Items with proven shock absorption and spine protection are recommended (Items that have passed the highest level (Level 3) in EN13158, the shock absorption safety test in EU).

### 2.3 Cases of text mining utilization in the fashion industry

Text mining is a big data analysis technique that can be used to investigate public perception. Text mining is defined as a technique or process of extracting information, which satisfies purposes of a user, from an enormous amount of text data. This technology can be applied in various industries to lend insight into problems unsolved [19]. Researchers have also used text mining to examine public perception in the fashion industry. As for text mining research on analyzing social phenomena that occurred in the fashion industry, existing studies identified fashion trends and relevant phenomena [20], examined fashion shows [21, 22], and investigated the public perception of fashion brands [23]. Several researchers also conducted text mining research on analyzing perceptions towards certain clothes, fashion trends, and fashion markets. Existing studies analyzed swimsuits based on web, blog, news, and cafe data provided by Naver and Daum [24], combat uniforms using data collected from Naver, Daum, Google, and Twitter [25], and modern Hanbok based on online articles and comments on YouTube videos [26]. In each study, consumers' tastes and concepts were derived. That is, investigating public perception of a specific garment using text mining has the advantage of informing the choice of a marketing and design direction (form, material, and color) that would be the most appealing to consumers in the fashion industry.

### 3. METHOD

#### 3.1 Research Design

For the data of this study, text mining was performed using a big data analysis platform. Accordingly, Some trend(<https://some.co.kr/>) provided by Vibe Company was used. This was because data from the news media and social media could be obtained through Some trend [27]. Some trend, an Internet portal that collects and presents unstructured data, performs quantitative analysis.

#### 3.2 Data Collection

The search term was set as "equestrian clothing." The analysis period was set for the years 2020 (1 January 2020 – 31 December 2020) and 2021 (1 January 2021 – 31 December 2021), which cover the occurrence of COVID-19. The collection of data related to equestrian clothing that appeared in the media entailed gathering related press articles provided by Naver and other articles related to equestrian clothing for analysis. Data related to equestrian clothing that appeared on social media, Twitter, Naver blog, and Instagram, excluding retweet data, were analyzed. For related words, only words related to fashion were collected from products/items.

#### 3.3 Data Preprocessing

After undertaking an automatic refinement process following the basic NLP rules using Sometrend, secondary work was performed in a direction that did not bias the original data. Accordingly, during analysis of emotion words (positive/negative), if two words with the same meaning appeared, they were regarded as one word, and the number of cases was combined. Additionally, the excluded characters were excluded because Sometrend provides data that do not contain punctuation marks and emotion words.

#### 3.4 Data Analysis

Based on the collected data, frequency, related words, and emotion words (positive/negative words) were analyzed. Frequency analysis indicates that the higher the frequency, the more actively discussed a topic has been in the media including social media. Related word analysis refers to a word analyzed as having a high degree of relevance to the analyzed word. Regarding analysis of emotion words (positive/negative), the perception and reputation of equestrian clothing was identified using the technology developed by Sometrend. Specific data analysis was as follows. Nouns were extracted in the frequency and associative word analysis. In the emotion word (positive/negative) analysis, nouns, adjectives, and verbs were extracted. Up to 15 related words and emotional keywords (positive and negative) on equestrian clothing were analyzed, but words beyond that frequency were also analyzed if needed. In addition, the original text was also referred to during the process of understanding and analyzing the meaning.

## 4. RESULTS AND DISCUSSIONS

### 4.1 Mention Frequency

First, the number of mentions of equestrian clothing was shown as Figure 1, and there was a total of 5,514 mentions in 2020. Listing by month with the highest frequency of mentions above 400 mentions, it was November (800 mentions), December (693 mentions), September (571 mentions), October (472 mentions), July (428 mentions), and January (402 mentions). In 2021, there were a total of 4,279 mentions. Listing by month with the highest frequency of mentions, it was August (545 mentions), September (515 mentions), July (413 mentions), October (371 mentions), June (354 mentions), and December (322 mentions).

The most popular seasons for horseback riding, according to earlier studies before COVID-19, were determined to be spring and fall [28]. Through this study, it has been found that the mention of equestrian clothing continued until the winter season in the year 2020 when COVID-19 occurred. Additionally, it can be said that the COVID-19 outbreak has increased public interest in equestrian clothing. Moreover, mentions of equestrian clothing increased from April through August 2021 while declining in September. However, the overall number of mentions every month from July to September was higher than 400. Given that the 2020 Tokyo Olympics just ended and were held from 23 July to 8 August 2021, it appears that the Olympics had a significant influence on the mentions of equestrian clothing for 2021. In addition, as the mentions were relatively higher in October to December 2021 versus March to May, which is in spring, it can be seen that the interest in equestrian clothing has continued from fall to winter for 2021 as it did in 2020. However, when analyzing the mentions of equestrian clothing in 2021 along with the previous studies which state spring and fall as the preferred season for horseback riding [20]. When the COVID-19 issue fades away in the spring, it is possible that the mentions will increase once more.

The frequency of mentions was highest in the summer during the Olympic period for the year 2021, a year after the COVID-19 epidemic, and frequency tended to be consistently greater from fall to winter than in spring in the year of the COVID-19 outbreak.

It can be assumed that interest in horseback riding as a fall outdoor activity has risen in 2020, and as a result, such interest increased the frequency of mentions of equestrian clothing. In the past, "leisure" [29] and "camping" keywords occurred together with fall [30]. In addition, it can be implied that the frequency of mentions was higher in December, which is in the season not preferred for horseback riding, relative to spring because the interest in outdoor activities has continued throughout winter due to the outbreak of COVID-19.

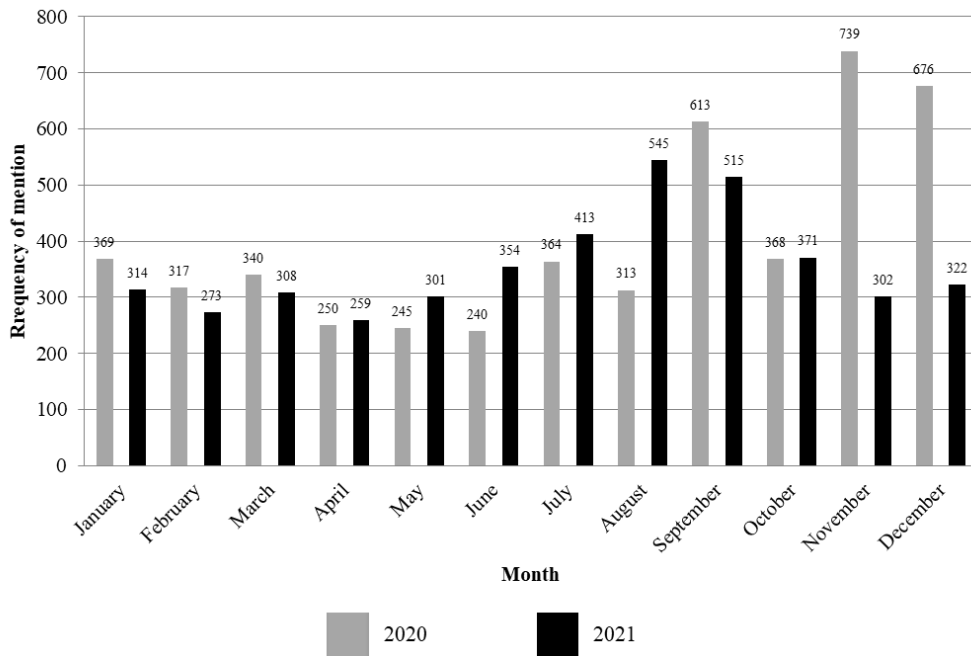


Figure. 1: Frequency of mention of "equestrian clothing"

#### 4.2 Relevant Keywords

Equestrian clothing words related to fashion products/items are presented in Table 2, and in 2020, there were "Pants (154 mentions)," "Clothes (149 mentions)," "Hat (55 mentions)," "Suit (53 mentions)," "Dress (45 mentions)," "Shirts (37 mentions)," "School Clothing (22 mentions)," "Boots (19 mentions)," "Military Clothing (17 mentions),"

"Equestrian Pants (17 mentions)," "Gloves (15 mentions)," "Jacket (15 mentions)," "Wig (12 mentions)," "Belt (11 mentions)," "Tailcoat (10 mentions)" and in 2021, there were "Pants (193 mentions)," "Clothes (164 mentions)," "Shirts (40 mentions)," "Dress (39 mentions)," "Suit (29 mentions)," "Jacket (24 mentions)," "Vest (22 mentions)," "Jewellery (19 mentions)," "Equestrian Pants (18 mentions)," "Boots (18 mentions)," "Bag (17 mentions)," "High heel (16 mentions)," "School Clothing (13 mentions)," "Shopping Bag (13 mentions)," "Hanbok (13 mentions)."

In the past two years, "Pants" appeared most frequently among equestrian clothing-related words, and the mentions increased 25.3% in 2021 versus in 2020. "Clothes" was the second most frequently appearing related word, and its mentions increased 10.1% in 2021 versus in 2020. Thus, it can be said that the public interest in equestrian clothing increased during the COVID-19 period. Especially, when including the mentions of "Equestrian Pants," it can be stated that the public interest in equestrian pants is high even among equestrian clothing. Equestrian pants have a patch on the calf and knee area which are exposed to abrasion during horseback riding [31], therefore its design is different from other sportswear (Table 3). It can be implied from the related word analysis that the public is aware of the importance of equestrian pants and perceives them as representative equestrian clothing.

Among the related words, the frequency of mentions for "Suit, Dress, Shirts, Boots, Equestrian pants, Jacket, School clothing" is different in 2020 and 2021, but they are also related words that are constantly mentioned. When looking at the original text for the related words "School clothing" and "Military clothing," they appeared in sentences implying these words as uniforms. Through this, it could be seen that equestrian clothing is perceived as a type of uniform. In addition, the third most frequently mentioned related word in 2020 "Hat," along with "Military clothing, Gloves, Wig, Belt, Tailcoat" did not appear in the related word list for 2021 and in 2021, "Vest, Jewellery, Bag, High heel, Shopping bag, Hanbok" newly appeared. Confirming with the original text, "Hat" in 2020 appeared in blogs, newspapers, and Twitter, and usually appeared in texts referring to celebrities wearing them. Also, "Gloves" appeared in sentences explaining equestrian styling on Instagram and "Wig" in sentences describing game items on Twitter. Other than that, "Belt, Tailcoat" appeared in a sentence promoting equestrian clothing products on Blogs and Twitter. In 2021, "Vest" appeared in a sentence explaining the full set of equestrian clothing on Twitter, and "Jewellery" also appeared on Twitter. This word could be seen in a sentence explaining a singer's equestrian styling. And "Jewellery," "High heel" have appeared in sentences describing equestrian clothing made for dolls in a doll costume shop on Twitter. Other than these, "Bag, Shopping bag" could be found in original texts on the news, where they appeared as words related to drama with horseback riding scenes. Lastly, "Hanbok" could be found in original texts from Twitter and in sentences describing the illustration that drew equestrian clothing like Hanbok.

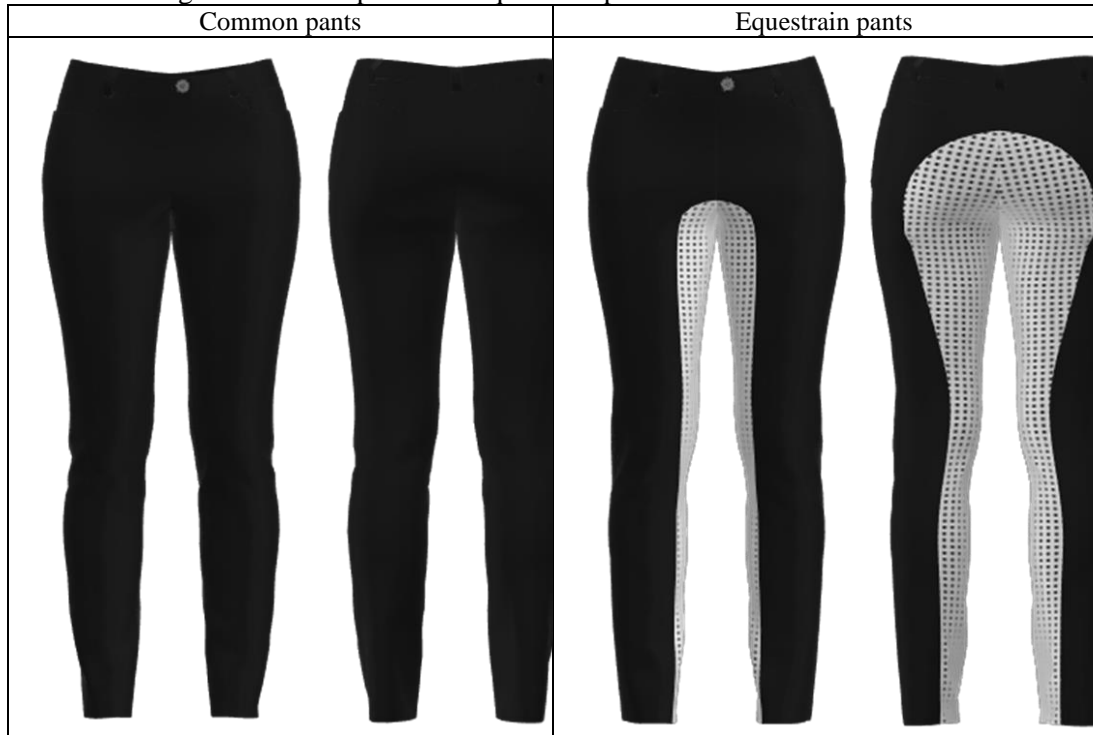
Table 2: Equestrian clothing-related words.

2020			2021		
Rank	Related word	Mention frequency	Rank	Related word	Mention frequency
1	Pants	154	1	Pants	193
2	Clothing	149	2	Clothing	164
3	Hat	55	3	Shirts	40
4	Suit	53	4	Dress	39
5	Dress	45	5	Suits	29
6	Shirts	37	6	Jacket	24
7	School clothing	22	7	Vest	22
8	Boots	19	8	Jewellery	19
9	Military clothing	17	9	Equestrian pants	18
	Equestrian pants	17		Boots	18
10	Gloves	15	10	Bag	17

11	Jacket	15	11	High heel	16
12	Wig	12	12	School clothing	13
13	Belt	11		Shopping bag	13
14	Tailcoat	10		Hanbok	13

In conclusion, the word "Pants" was the one that was used the most frequently when discussing equestrian clothing during the COVID-19 period. This not only shows that the public is aware of the significance of equestrian pants for horseback riding, but also that equestrian pants are the symbol of equestrian clothing. In addition, given uniform has appeared as a related word, equestrian clothing could be said to be perceived as a uniform. Related words with a low frequency of newly generated mentions appeared differently by year. Especially, related words appeared differently by a celebrity who was wearing the equestrian clothing, and related words also appeared in personal opinions regarding equestrian clothing promoting descriptions, game items, doll clothing, and illustrators. Thus, new areas of the horseback riding industry could be seen given that equestrian clothing-related words have also appeared in play culture, such as promotion by vendors, games, dolls, and cartoons.

Table 3: Design of common pants and equestrian pants.



#### 4.3 Emotion keywords (Positive words and negative words)

Equestrian clothing-related emotion keywords were presented in Table 4, and in 2020, positive words comprised 85.5%, negative words comprised 11.2%, and neutral keywords comprised 3.3% of total mentions. In positive keywords, there were "Suits very well (282 mentions)," "Good (260 mentions)," "Pretty (164 mentions)," "Want to have a look (140 mentions)," "Perfect (95 mentions)," "Brilliant (70 mentions)," "Standard (54 mentions)," "Like (50 mentions)," "Wonderful (49 mentions)," "Suits well (49 mentions)," etc. and in negative keywords, there was "Does not suit well (55 mentions)." In neutral keywords, there was "Possible (55 mentions)." And in 2021, positive words comprised 79.4%, negative words comprised 14.4% and neutral keywords comprised 6.2% of total mentions. In positive keywords, there were "Suits very well (256 mentions)," "Pretty (145 mentions)," "Good (141 mentions)," "Want to have a look (116 mentions)," "Like (55 mentions)," "Suits well (36 mentions)," "Cute (33 mentions)," "Wonderful (33 mentions)," "Happy (29 mentions)," "Stylish (28 mentions)," etc. and in negative

keywords, there was "Divorce (15 mentions)." In neutral keywords, there was "Possible (45 mentions)".

Over the past two years, there have been many positive keywords on equestrian clothing and relatively few negative keywords, and the portion of positive keywords have decreased by 7.1% in 2021 versus in 2020, while portion of negative keywords have increased by 28.6% in the same period. "Suits very well, Good, Pretty, Want to have a look, Like, Wonderful, Suits well" were the positive keywords that appeared the most over the past 2 years during COVID-19. In the original text, "Perfect, Brilliant, Standard," which appeared in 2020, was used to express celebrities who were wearing equestrian clothing in dramas, and "Happy," which appeared in 2021, was mentioned in an article discussing a drama starring an actor who was wearing equestrian clothing. Negative keywords appeared differently by year and in the original text, "Does not suit well," which appeared in 2020, was used ironically with positive meaning to imply that it suits well. In addition, "Divorce," which appeared in 2021, was related to the drama therefore this negative keyword on equestrian clothing was largely influenced by the drama. Thus, the many negative keywords in 2021 compared to 2020 did not have much meaning.

Table 4: Equestrian clothing-related emotion keywords.

2020				2021			
Rank	Related word	Emotion	Mention frequency	Rank	Related word	Emotion	Mention frequency
1	Suits very well	Positive	282	1	Suits very well	Positive	256
2	Good	Positive	260	2	Pretty	Positive	145
3	Pretty	Positive	164	3	Good	Positive	141
4	Want to have a look	Positive	140	4	Want to have a look	Positive	116
5	Perfect	Positive	95	5	Like	Positive	56
6	Brilliant	Positive	70	6	Possible	Neutral	55
7	Does not suit well	Negative	55	7	Suits well	Positive	45
8	Standard	Positive	54	8	Cute	Positive	36
9	Like	Positive	50	9	Wonderful	Positive	33
10	Wonderful	Positive	49	10	Happy	Positive	30
	Suits well	Positive	49	11	Stylish	Positive	29
11	Active	Positive	47	12	Love to buy	Positive	28
12	Fantastic	Positive	45	13	Love	Positive	23
13	Cute	Positive	35	14	Nice	Positive	20

In summary, there were many positive keywords during the period of the COVID-19 outbreak. Positive keywords could be found in feedback on the appearance of others wearing the equestrian clothing, and when connected with the results of the related word analysis. Hence, it could be implied that the public perceives equestrian clothing as a type of uniform and a style different from ordinary clothing. Until now, equestrian clothing has been presented as a type of clothing worn for safety during horseback riding activities [15, 16, 31, 32, 33, 34, 35, 36], but future studies should consider that the public perceives equestrian clothing as style.

Additionally, it appears that the media has a significant impact on the production of related terms and positive & negative keywords, which explains why connected words and positive and or negative keywords unrelated to equestrian clothing arose in descriptions of celebrities or in plays.

On the other hand, an emotion word expresses a normal direct emotion in society. Although emotion words directly express consumer perceptions [37], generalizing public perception and the reputation of equestrian clothing based on the frequency of emotion



words is difficult. Therefore, it is necessary to obtain more diverse emotion words associated with equestrian clothing through surveys in a follow-up study.

## **5. CONCLUSIONS**

The horseback riding industry has changed since the COVID-19 outbreak, in that more people enjoy horseback riding for longer durations. These changes have increased the demand for equestrian clothing to safely engage in riding activities. This study examined the public perception of equestrian clothing as seen in the news and social media after COVID-19 through text mining using unstructured data.

The results of the study were as follows. First, when analyzing the frequency of mentions of equestrian clothing, the frequency tended to be higher in fall and winter, excluding summer when the Olympics took place during the Covid-19 outbreak. Through this, it could be found that the interest in equestrian clothing was higher during fall and winter than in spring during the period of Covid-19. Second, when analyzing equestrian clothing words related to fashion product/items, "Pants" appeared frequently during the Covid-19 period, and other types of clothing worn as equestrian clothing tended to appear continuously. There was also the tendency to perceive equestrian clothing as a uniform. Through this, it was discovered that there is a high degree of interest in equestrian pants even within equestrian clothing, interest in the types of clothing that may be worn as equestrian clothing, and a notion that equestrian clothing is more like a uniform than a kind of sportswear. By looking at related words unrelated to equestrian clothing, it could be implied that the interest in equestrian clothing appears in the play culture. Third, when analyzing the emotion keywords (positive and negative), positive keywords appeared most frequently during the Covid-19 outbreak. Usually, they were opinions on the aesthetics of equestrian clothing. Through this, it could be seen that the public perceives equestrian clothing as a style rather than as sportswear, and is positively accepting them.

Until now, studies on equestrian clothing was conducted on horseback riding users. This study has significance in that it analyzed the perception of equestrian clothing expanding the study participant pool to the public. If the public's perception of equestrian clothing is sustainably analyzed and used as basic data for the equestrian clothing market, then the equestrian clothing market is expected to become larger than it is now. Also, as COVID-19 cases are on a downward trend, the result of text mining on equestrian clothing after 2022 will reveal different results. Thus, in order to analyze the equestrian clothing market, it seems as though text mining should be conducted sustainably each year. However, the big data analysis platform used in this study is a big data analysis service of a Korean company, therefore, it is difficult to generalize the results of this study. In a follow-up study, equestrian clothing text mining should be conducted by collecting data utilizing the big data platforms for each country.

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