

Original Article

Analysis of seven animation characters in Pororo the Little Penguin with Sasang typologyYeo-Jin Yoon^a, Bo Kyung Hwang^a, Soo Jin Lee^b, Jin Oh Lee^c, Han Chae^{a,*}^a Division of Longevity and Biofunctional Medicine, School of Korean Medicine, Pusan National University, Busan, Korea^b Department of Psychotherapy, School of Nursing and Public Health, Kyungil University, Gyungsan, Korea^c Department of Art, Culture and Image, Pusan National University, Busan, Korea

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ABSTRACT

Background: Animation characters are created to embody distinctive personalities and body images; however, these features have not been analyzed with objective measures based on East Asian theory. The purpose of this study was to analyze the biopsychological features of seven animation characters in *Pororo the Little Penguin*, which scored unprecedented success in Korea, with clinically validated and standardized measures of Sasang typology.

Methods: Forty-one graduate students completed a survey examining body mass index (BMI) and Sasang Personality Questionnaire (SPQ) of seven characters in *Pororo the Little Penguin* after watching three selected episodes. The differences in physical appearance and psychological traits among animation characters were analyzed with analysis of variance.

Results: SPQ and BMI showed distinctive biopsychological features of seven animation characters. Pororo (28.29 ± 6.38 and 36.61 ± 3.09) was a typical So-Yang type boy, Petty (20.98 ± 4.07 and 31.66 ± 4.59) was a typical So-Yang type girl, and Loopy (28.05 ± 6.60 and 22.78 ± 4.78) was a typical So-Eum type girl in terms of BMI and SPQ, respectively. The BMI and SPQ of Poby (41.10 ± 4.26 and 22.32 ± 3.48) and Harry (19.63 ± 5.17 and 37.61 ± 2.40) showed the most obvious contrast.

Conclusion: This study showed that SPQ and BMI are useful objective measures for analyzing the biopsychosocial features of animation characters as well as patients. The interdisciplinary research methodology of Sasang typology suggested here would provide useful tools for educating healthcare professionals and the general public about Korean medicine, and also contribute to the development of animation characters.

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1. Introduction

Animation, also known as motion picture or cartoon film, is the art of making drawings of inanimated objects appear to move for presenting a story or drama, and the history of modern animation starts with *Fantasmagorie* (1908) by Emile Cohl.¹ The animation character is a man-made virtual actor leading the story, and also a cultural icon creating industrial values at the same time.²⁻⁴ Adults and children might learn about foreign cultures and languages,⁵ acquire new knowledge, improve their socialization skills using vicarious experiences,⁶ as well as derive enjoyment from just watching the show.

Pororo the Little Penguin, a Korean TV animation series that aired starting from 2003 and scored unprecedented success,^{2,7} scored a 57% viewer rating in France⁸ when it was broadcasted in 130 countries.⁹ As for the reason why it caught the eyes of Korean and foreign young viewers, *Pororo the Little Penguin* successfully embodied the realistic and well-organized personality and physical appearance of the main characters (Table 1) that can be generally accepted during the preproduction and production stages. However, even with the success that Korean animation achieved in this competitive market, Korean theories, strategies, and methodologies for developing and analyzing animation characters have not been sufficient.¹⁰ Many animated TV series produced in the United States have prospered with tight narrative structures and distinctive main characters from myths, legends, and fiction sources from other parts of the world. Japanese animation has incorporated their unique cultural perspectives and imaginative creativity to establish their own genre as Japanimation.

There have been Korean studies that analyzed animation characters with various viewpoints and theories, including gestures of the characters,^{11,12} use of adjectives,^{13,14} use of color,¹⁵ clothing or dress,¹⁶ phrenology,^{17,18} East Asian Five phase,^{17,19} Sasang typology of Korean medicine,^{20,21} system of gender symbols,²² *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*,²³ personality theories of Myers-Briggs Type Indicator and Enneagram,^{21,24-26} and legends.²⁷ However, these studies have limitations in terms of the lack of objective measures and comprehensive consideration of cultural and social backgrounds for analyzing animation characters.^{7,28}

As for *Pororo the Little Penguin*, realistic drawings and natural behavior of animation characters were suggested as crucial for bringing attention to⁸ and its educational use with children.²⁹ There have been studies from various fields of visual information design,³⁰ childhood education,^{6,29,31-33} communication,⁷ digital media,³⁴ animation,^{2,35,36} personality of Enneagram,³⁷ computer engineering,³⁸ and business administration⁹ as shown in Table 2; however, these studies also need quantitative and validated measures to achieve more objectives and generalizable conclusions.

For these reasons, we analyzed the animation characters of *Pororo the Little Penguin* with traditional Korean Sasang typology, which has East Asian cultural, social, and philosophical background, and well-validated psychobiological measures of body mass index (BMI) and Sasang Personality Questionnaire (SPQ).^{20,21,39-42} The perceived personality and body shape of seven animation characters of *Pororo the Little Penguin* were

examined and analyzed to provide generalizable discussions. It was reported that BMI quantifies the body shape of each Sasang type, and the SPQ measures the Yin-Yang temperament of Sasang typology in clinical situations.^{41,43,44} These measures were shown to be useful for clinical diagnosis of mental problems and physical features, such as problem behaviors of adolescents, anxiety and depression, obesity, and metabolic disease.

The aim of this study was to show the usefulness of Sasang typology in the multidisciplinary approach on media study,^{20,21,45,46} as traditional knowledge on humans might provide an innovative theoretical backbone to the animation industry. As for public health, familiar animation characters would be an efficient communication tool to promote general understanding on traditional Korean medicine including Sasang typology, and its adequate use for preventing diseases and establishing healthy lifestyles, especially for children, adolescents, and their parents.^{47,48} Moreover, by providing realistic and intuitive multimedia materials in medical education of Sasang typology, the efficiency of medical education in Korea can be further enhanced.⁴⁹

2. Methods

2.1. Participants

A total of 41 graduate school students completed two questionnaires of SPQ and BMI for seven animation characters after watching three selected episodes of *Pororo the Little Penguin* for 15 minutes. This study was approved by the Institutional Review Board of Pusan National University (PNU IRB/2016_17_HK), and written informed consent was provided by all participants.

2.2. *Pororo the Little Penguin*




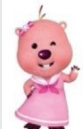



Pororo the Little Penguin (Pororo) is a computer animated cartoon series that has been broadcasted for six seasons with 208 episodes from 2003 to 2016 in Korea.⁵⁰ Each episode is 5 minutes long (in consideration of the short attention span of children), and two episodes are aired back to back in 1 day. Table 1 provides a description of each character of *Pororo the Little Penguin*.⁵¹

Three episodes [Season 2, Episode 1 (S2E1), S2E4, and S2E7] from the second season were selected because the interactions and typical features of the main characters were fully settled by the second season. Petty (S2E1) and Harry (S2E7) were presented for the first time in season 2, and all seven characters played relatively even roles in S2E4 unlike others, which focused on only one or two of the main characters. The seven characters to be analyzed were Pororo, Poby, Petty, Loopy, Crong, Harry, and Eddy.

2.3. BMI

BMI (kg/m²) is used for measuring conceived body shape, which is an objective index calculated as weight (kg) divided by height (m) squared. BMI is an objective measure for physical characteristics in Sasang typology, and the Tae-Eum Sasang

Table 1 – Descriptive features of seven main characters of Pororo the Little Penguin.

Name	Character	Personality
Pororo		A little penguin (8 y old) that wears blue dungarees and attracts the attention of friends. He is the leading figure in this show. He often gets into various types of mischief with his friends, such as attempting to fly and playing practical jokes with friends.
Poby		A polar bear (15 y old) that lives out by a glacier. He is the largest of all the characters and has a very gentle nature. He enjoys fishing and photography, and does most of the chores in the village.
Petty		A female little penguin (8 y old) who was introduced in Season 2. She is presented as a tomboyish character who is a terrible cook; she is excellent in sports, but is afraid of spiders. She lives in a cabin made by her friends.
Loopy		A beaver (7 y old) who provides the voice of reason. She is very shy, sensitive, and somewhat princess-like. She lives in a big hollowed log and often invites friends. She enjoys baking cakes and pies for her friends.
Crong		A little herrerasaurus (3 y old) that lives with Pororo. He is discovered as an egg and hatched to be adopted as a little brother of Pororo. He is the youngest character in the show. He is constantly getting into trouble. He can only say his own name of “crong,” but in later seasons he has learned to say a few basic words.
Harry		A wayward hummingbird (5 y old) who lost his way while sailing to Summer Island and get to Pororo and other friends' village. He is quite temperamental. He loves to sing, but his singing is not welcomed by his friends and others. He is warmhearted and likes to sing joyful and happy songs.
Eddy		A little fennec fox (10 y old) who is an intelligent genius and is good at inventing things. He likes to show off his own inventions, and these eventually go wrong and cause problems for someone caught by his tricks. Images reprinted with permission from ICONIX.

type was found to have the highest BMI and the So-Eum type with the lowest in previous studies.^{41,44,52}

As measurement of weight and height of virtual animation characters is not quite possible, we improvised the BMI virtualized human body shape of Perceiving Systems Department, Max Planck Institute for Intelligent System (Fig. 1) for measuring the conceived body shape of seven characters in *Pororo the Little Penguin*. Seven representative figures representing BMI scores from 15 to 45 with an interval of 5 were presented, and the participants were asked to select one body shape similar to each of the seven animation characters from *Pororo the Little Penguin*.

2.4. SPQ

The SPQ is an objective and clinically validated psychometric measures for analyzing Yin–Yang temperament in Sasang typology. Studies have showed that the SPQ total score is in increasing order for So-Eum, Tae-Eum, and So-Yang Sasang types.

Because the age of the seven characters of *Pororo the Little Penguin* were similar to that of lower grade elementary schoolchildren (Table 1), we used the SPQ score of

high (35.88 ± 1.84 and 34.84 ± 2.49 for males and females, respectively), middle (30.71 ± 1.78 and 28.51 ± 1.73), and low (24.07 ± 2.55 and 22.19 ± 2.31). SPQ score groups corresponding to So-Yang, Tae-Eum, and So-Eum Sasang types were used as references for analysis in this study.⁵³

SPQ is composed of 14 items with three subscales of behavior, cognition, and emotionality. Previous studies reported acceptable test–retest reliability,⁵⁴ clinical validity,⁵² and concurrent reliability with biopsychosocial measures.⁵⁵ The internal consistency of SPQ, SPQ-B, SPQ-C, and SPQ-E were 0.81, 0.74, 0.62, and 0.62, respectively.³⁹

2.5. Statistical analysis

The demographic features of 41 participants were examined with descriptive analysis. The differences in age and academic level between male and female participants were analyzed with independent t test and χ^2 test. As for the biopsychological features of seven characters, BMI and SPQ scores were used for the analysis. Analysis of variance was used to compare BMI and SPQ scores among the seven characters of *Pororo the Little Penguin*, and we used Bonferroni or Dunnett's T3 post hoc test depending on the results of Levene's test.

Table 2 – Previous studies on Pororo the Little Penguin.

Authors (y)	Field	Materials (episodes)	Objectives	Major points of the study
Song (2008) ³⁴	Digital media	n.a.	Semiotic structure of educational animation (focused on characters)	Actantial triangle model
Jung et al (2010) ⁶	Childhood education	Seasons 1, 2, and 3 (3 each, total of 15 episodes)	Factors and pathways of friendship formation	Frequency of components
Kim and Im (2011) ³¹	Childhood education	Seasons 1, 2, and 3 (156 episodes)	Meaning and limitations for infant education	Frequency of game types
Kim (2011) ⁷	Communication	n.a.	Factors for success of animation	Analysis on related factors
Jung and Bang (2012) ²⁹	Childhood education	Season 1 (52 episodes)	Trends of early childhood character development	Criterion for early childhood character development
Kim and Kim (2012) ³²	Childhood education	Seasons 1 (16 episodes) and 2 (14 episodes)	Gender roles of main characters	Interview with children and analysis on illustrated contents (language use, role, and visual contents)
Choi and Oh (2012) ³⁶	Animation	Season 4 (opening and ending)	Technique for 3D animation production	Technical analysis of stereoscopic video
Kong (2013) ³⁰	Visual information design	n.a.	Personality of main characters	Enneagram
Park and Shin (2013) ³³	Childhood education	Seasons 1 and 2 (3 episodes)	Application of visual material on contextual learning	Theoretical approach with contextual learning
Cho (2013) ³⁵	Animation	n.a.	Components for the storytelling of each characters	Personality (four humor theory), behaviors, and storytelling
Kim et al (2015) ³⁸	Computer engineering	183 episodes	Learning and inference using cartoon video based on concept structure	System handling using in-depth hypernetwork
Kim and Choi (2015) ⁴⁰	Business administration	Not specified	Strategies for exporting animation character	Analysis on characters, contents, and marketing strategy

n.a., not available; 3D, three dimensional.

IBM SPSS statistics 20.0 (IBM, Armonk, NY, USA) was used for the analysis. The results of statistical analysis were presented as mean \pm standard deviation, and statistical significance level was set as $p < 0.05$, $p < 0.01$, $p < 0.00$.

3. Results

3.1. Demographic features of participants

The demographic features of 41 participants (17 males and 24 females) included in this study are presented as Table 3. There were no significant differences ($t = 0.965$, $p = 0.3404$) in age between male (30.64 ± 9.08) and female (28.62 ± 4.08) groups. There were no significant differences in education level ($\chi^2 = 0.806$, $p = 0.369$) between male and female participants (Table 3).

3.2. BMI and SPQ total score of seven characters

The BMI and SPQ subscale scores of Pororo, Poby, Petty, Loopy, Crong, Harry, and Eddy are presented in Table 4. There were significant differences in BMI and SPQ and its subscales, and the Dunnett's T3 test was used for the *post hoc* analysis because the Levene's test results were significant.

In BMI, there were significant differences ($F = 65.756$, $p < 0.001$) among the seven characters (Table 4). Poby (41.10 ± 4.26) had a high BMI score, and Petty (20.98 ± 4.07), Harry (19.63 ± 5.17) and Eddy (18.9 ± 4.4) had low BMI scores. Pororo (28.29 ± 6.38), Crong (28.17 ± 5.78), and Loopy (28.05 ± 6.6) were in the middle range.

As for SPQ, there were significant differences ($F = 54.303$, $p < 0.001$) among the seven characters (Table 4). Harry (37.61 ± 2.41) and Pororo (36.61 ± 3.1) had high SPQ scores, and Loopy (22.78 ± 4.79) and Poby (22.32 ± 3.49) had low SPQ scores. When we focused on the female characters, we found that Petty (31.66 ± 4.59) elicited a higher score compared with Loopy (22.78 ± 4.79). In the subscales of SPQ, there were significant differences in SPQ-B ($F = 41.166$, $p < 0.001$), SPQ-C ($F = 74.801$, $p < 0.001$), and SPQ-E ($F = 85.95$, $p < 0.001$). Moreover, the *post hoc* analysis showed similar profiles as the SPQ total score.

4. Discussion

This study examined the perceived biopsychological features of seven animation characters from *Pororo the little Penguin* with clinically validated objective measures of BMI and SPQ. The

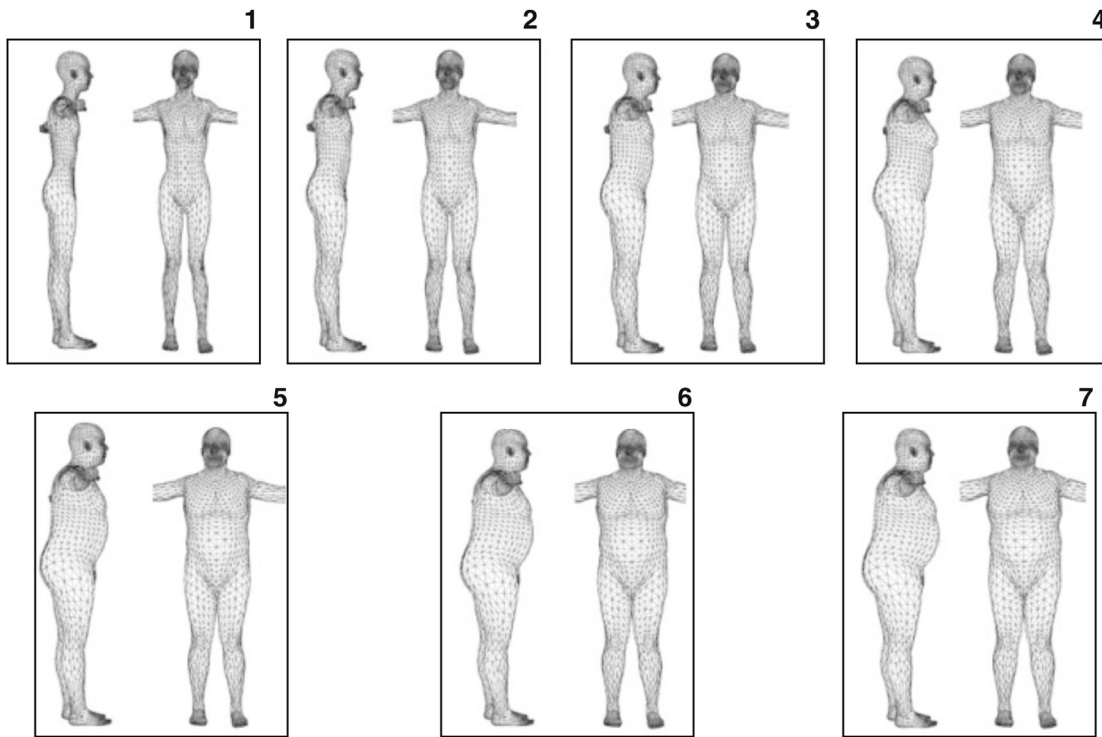


Fig. 1 – Body Mass Index virtualized human body shape from 15 to 45 with interval of 5 in this study.

Table 3 – Demographic features of participants.

	Male (n = 17)	Female (n = 24)	Total (n = 41)	Statistical analysis
Age (y)	30.64 ± 9.08	28.62 ± 4.08	29.46 ± 6.6	t = 0.965, p = 0.340
Education				χ ² = 0.806, p = 0.369
Bachelor	14	22	36	
Master	3	2	5	

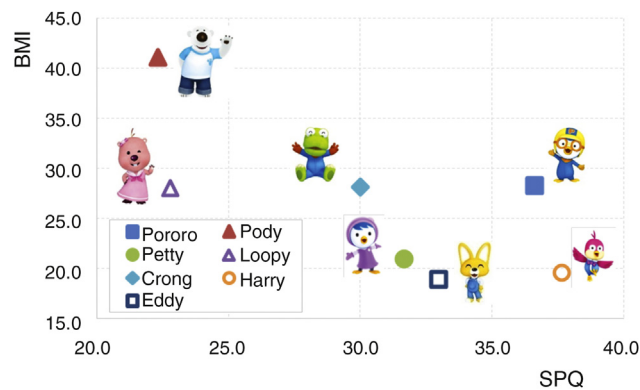


Fig. 2 – Perceived biopsychological features of seven characters measured with Body Mass Index and Sasang Personality Questionnaire. Images reprinted with permission from ICONIX.

results showed generalizable and quantifiable description of animation characters (Fig. 2).

Considering these sex- and age-matched SPQ scores of Sasang typology, four characters—Pororo, Petty, Harry, and Eddy—had high SPQ scores of So-Yang type; Crong had a middle SPQ score of Tae-Eum type, and Poby and Loopy have low SPQ scores of So-Eum type.^{53,56} The high prevalence of the high SPQ score group might come from the fact that the char-

acteristics of So-Yang type would be fit for leading dynamic activities and stories of highly energetic young kids.⁵⁷ As for the body shape with BMI, Poby has a high BMI of Tae-Eum type; four characters—Loopy, Crong, Pororo, and Petty—have middle BMI scores of So-Yang type, and two characters—Harry and Eddy—have low BMI scores of So-Eum type.

To sum up, these results showed that the seven animation characters have distinctive biopsychological features that

Table 4 – Body mass index and SPQ score of each character.

	Pororo	Poby	Petty	Loopy	Crong	Harry	Eddy	ANOVA
BMI*	28.29 ± 6.38	41.1 ± 4.26	20.98 ± 4.07	28.05 ± 6.6	28.17 ± 5.78	19.63 ± 5.17	18.9 ± 4.4	F = 65.756, p < 0.001
SPQ*	36.61 ± 3.1	22.32 ± 3.49	31.66 ± 4.59	22.78 ± 4.79	30 ± 6.17	37.61 ± 2.41	32.98 ± 5.7	F = 54.303, p < 0.001
SPQ-B*	14.27 ± 1.03	8.56 ± 1.83	13.51 ± 2.3	8.49 ± 2.57	9.95 ± 3.01	14.56 ± 0.67	12.59 ± 2.19	F = 41.166, p < 0.001
SPQ-C*	12.9 ± 1.43	8.44 ± 1.4	10.12 ± 2.2	7.22 ± 1.52	11.34 ± 2.35	12.54 ± 1.47	11.27 ± 2.09	F = 74.801, p < 0.001
SPQ-E*	9.44 ± 1.5	5.32 ± 1.51	8.02 ± 1.35	7.07 ± 1.84	8.71 ± 1.9	10.51 ± 1.38	9.12 ± 2.26	F = 85.95, p < 0.001

ANOVA, analysis of variance; SPQ, Sasang Personality Questionnaire.

* p < 0.001.

might be analyzed with BMI and SPQ. Pororo was found to be a typical So-Yang type boy (28.29 ± 6.38, 36.60 ± 3.09), Petty was a typical So-Yang type girl (20.98 ± 4.07, 31.65 ± 4.58), and Loopy was a typical So-Eum type girl (28.05 ± 6.60 and 22.78 ± 4.78) as measured with BMI and SPQ, respectively.

Previously, one study²¹ introduced Sasang typology for analyzing animation characters from films produced by Pixar Studio, such as *Toy Story 1* and *Toy Story 2*, *A Bug's Life*, *Monsters, Inc.*, *The Incredibles*, and *Cars*; however, they used Myers-Briggs Type Indicator to analyze the psychological characteristics, and simplified shapes such as triangle, oval, or rectangle for physical features, unlike the evidence-based SPQ and BMI used in this study. Another study²⁰ classified Sasang types with arbitrarily selected representative descriptions of each Sasang types to analyze the personality of animation characters, but it still needs objective and validated measures with theoretical background.

Although there have been animation character analysis with phrenology,^{17,18} Five phase of traditional medicine,^{17,19} personality theory of four humors,³⁵ Sasang typology,^{20,21} and Enneagram,³⁷ this study provided a novel quantitative methodology that can be generalized for the first time. In contrast to previous studies on character analysis with East Asian theories based on the impressions of a few researchers,^{17,19-21} this study analyzed perceived biopsychological features with objective and reliable measures considering the age and sex of the animated characters.^{52,54,55}

The results in this study showed that the seven animation characters of *Pororo the Little Penguin* have realistic and representative personality and body shape of Sasang types, and this might explain how they achieved international success. Realism is an important factor for making characters vivid and familiar, and the popularity of animation films heavily depends on them. It was known that, during the preproduction stage of the filmmaking, the producer and director of *Pororo the Little Penguin* wanted young viewers to share kinship with the show's animated characters,⁵⁸ by viewing them as classmates or neighbors of their own, not as a hero or a princess usually found in other films.⁸ The body shapes of the characters were designed to be similar to those of actual children, and amiable colors were selected to be easy with children.³¹

The results in this study are in accordance with previous descriptive and qualitative studies as shown in Tables 1 and 2. Pororo was found to have typical So-Yang type with moderate BMI (28.29 ± 6.38) and high SPQ (36.60 ± 3.09). He was described as a novelty-seeker and an impulsive mischievous boy with a high level of curiosity,³² who might be classified as Sanguine or Choleric and Achiever (Third of Enneagram).^{30,37} Along with him, Eddy is supposed to be So-Yang type from his high SPQ (32.97 ± 5.69). Eddy was described as an imaginative genius focusing on his current works,³⁵ arrogant with his knowledge and skills,³⁷ and competitive with self-pride³² that characterized him as Melancholic³⁵ and Investigator (Fifth; Enneagram).^{30,37}

Crong was described as a distracted character with selfish, reckless, narcissistic, and dependent traits, engaging in childish tricks³² and mischievous troubles (Table 1), corresponding to Sanguine³⁵ and Enthusiast (Seventh; Enneagram).^{30,37} He might be considered to have So-Yang type of personality; however, the psychological traits measured with SPQ score

(30.00 ± 6.16) were quite that of the Tae-Eum type. We suppose this discrepancy might come from the fact that viewers recognized him as a healthy 3-year-old boy communicating with “Crong, Crong” sounds only for verbal communication, although the researchers have only focused on his childish and immature behaviors, and then tried to consider it as problem behaviors of So-Yang Sasang type.^{47,56}

In contrast, Harry exhibits an impatient temperament and bothersome singing, which make his friends feel exhausted. He was analyzed as Sanguine or Choleric³⁵ and Enthusiast (Seventh of Enneagram) owing to his hot-tempered personality.^{30,37} Although Harry is a boy, his sexuality was a source of confusion among children because of his unstable psychological features.³² These might be a sign of psychopathological problems with short attention span and distracted behaviors of So-Yang Sasang type,⁴⁷ and these psychological characteristics were measured with SPQ (37.60 ± 2.40) and SPQ-E (10.51 ± 1.38).

The two female characters, Petty and Loopy, have contrasting psychological features,^{31,32} and these are distinguished as high (31.65 ± 4.58) and low (22.78 ± 4.78) SPQ total score (Table 4). Petty is a So-Yang type girl and described to have an active, sociable, and thoughtful personality (Table 1), which can be recognized as choleric³⁵ and romantic Individualist (Fourth; Enneagram),^{30,37} whereas Loopy is a So-Eum type girl with a shy, delicate, friendly, and warm-hearted personality⁶ that would be typical of Melancholic³⁵ and Peacemaker (Ninth; Enneagram).^{30,37}

Poby was expected to be Tae-Eum type for his high BMI (41.10 ± 4.26); however, he would rather be So-Eum type in personality based from his low SPQ score (22.31 ± 3.48) even considering his age.⁵⁶ He cautiously helps his friends with their problems, and his calm, gentle, thoughtful, and considerate personality made people think of him as Phlegmatic³⁵ and Helper (Second type, according to Enneagram).^{30,37} We suppose that Poby might have been designed to have a moderate SPQ score of Tae-Eum type in the preproduction stage; however, during the production stage Poby was slightly adjusted to have a more Yin temperament to emphasize his unique personality or to achieve an overall balance of Yin–Yang temperament among the seven main characters.

There might be several limitations for generalizing the findings in this study. First, only three episodes (and not all 208 episodes) were included in this study. Because these 5-minute-long episodes were made with one or two characters as the main figures and others as part of the surrounding background, distinctive body shape and personality of seven animation characters might not be recognized enough. However, because the distinctive perceived biopsychological differences were objectively measured and were previously unavailable, the analysis in this study might be acceptable.

Second, the results should be reexamined using viewers with different demographic features, because cultural and ethnic background, age, sex, temperament, body image, and Sasang type were shown to influence the pattern of media use and its recognition.⁵⁹ In addition, other animation films from Japan, China, United States, and Europe should also be examined to see if the cultural background of characters influenced viewers' perception.

Third, although we successfully implemented BMI as an objective measure of body shape for animation character analysis, its usefulness should be compared with generally accepted body shape classification of rectangle, oval, and triangle in animation studies.^{15,20,21} Although BMI and Ponderal Index (PI) were validated for medical perspectives, their usefulness as primary or complementary measures should be examined by professionals in the animation industry.

The results in this study might be useful for several multidisciplinary studies. First, because Sasang typology was previously shown to be useful for designing service robots,⁶⁰ appropriate outfits and personalities for housekeeping or companion robot might be developed with SPQ and BMI or PI. Second, Sasang typology was reported to be useful for presenting realistic figures in theatricals, TV dramas, and films,^{45,59,61–67} and SPQ, BMI, and PI would be a pivotal tool for developing and analyzing characters³¹ and educational materials for actors and actresses in the future.

Third, this study would be useful for pedagogy³³ considering the fact that realistic animation is a good vehicle for educating the general public.⁴⁷ Sasang typology is clinically useful for pediatrics^{14,47,68–72} and adults, and animated characters are valuable for delivering clinical knowledge and health management of traditional Korean medicine to children,⁴⁸ adolescents, and adults.

Fourth, the use of multimedia resources to inform the audience about traditional Korean medicine, which has been presented only in text for a long time, will enable a more efficient way to educate medical professionals. It would be possible to present easier, more realistic, and more intuitive explanations to Korean medical students lacking fundamental understanding, foreign medical practitioners who are unfamiliar with traditional medicine, and physicians who are interested in East–West integrative medicine.⁴⁹

Last, but not least, personality plays a pivotal role for the quality of life and efficient intervention for character development that should be applied on the basis of self-awareness of the individual's temperament. Based on the results of this study, traditional Eastern knowledge might be utilized considering one's Yin–Yang temperament in psychological counseling of adults and character development programs for adolescents.^{48,73}

This study examined perceived biopsychological features of animated cartoon characters using clinically validated BMI and SPQ with 41 participants. We found that the success of *Pororo the Little Penguin* might stem from the realistic presentation of the main animated characters, which are based on East Asian perspectives of human nature in Sasang typology. The interdisciplinary research methodology used in this study would provide foundations for multidisciplinary collaborations among arts, philosophy, sociology, mass media, pedagogy, medical education, public health, and medicine.

Conflicts of interest

The authors declare no conflict of interest.

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