# Virtual Influencers' Lifecycle: An Exploratory Study Utilizing a 4-Stage Framework of Planning, Production, Debut, and Retirement

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**Abstract.** In this paper, we explored a 4-stage framework(planning, production, debut, and retirement): the life cycle of a 'Virtual Influencer'. To address expected ethical limitations on how VIs are produced and how they communicate with the world, we developed a 4-stage framework for the VI's lifecycle. paper includes a literature review, case studies, and surveys to determine the perception of VIs. We summarized the concepts and characteristics and the market size of VIs. Moreover, we discussed how VIs are created and produced at each stage these days, which is different from human influencers and celebrities. In addition, we adjusted the concept of the retirement of the VIs by suggesting the possible utilities that can be done in the near future. Finally, we identified what social and ethical problems are expected during VI production and activities and proposed solutions such as awareness improvement and preparation of legislation.

**Keywords:** Virtual Influencer · Virtual Human · Virtual Influencer's Life Cycle · Metaverse · Digital Human

## 1 Introduction

**Planning and Production.** Virtual Influencer (VI) is a digital character created using artificial intelligence, computer graphics, or other digital technologies, designed to mimic the role of a real-life influencer. They engage with audiences across social media platforms, promoting products, sharing content, and sometimes even advocating for causes, just like human influencers. Most VIs have detailed backstories, friendly personalities, and attractive appearances to appeal to their followers. The production of VIs presents unique challenges. Recent surveys indicate a nuanced consumer perception towards virtual influencers. While a human resemblance can foster familiarity, making them indistinguishable from real humans may inversely impact their appeal, leading to a decline in favorability. It emphasizes the need for a well-considered approach in the design and presentation of virtual influencers, ensuring a clear distinction between the virtual and real while still harnessing the benefits of human-like relatability.

**Debut.** Currently, they are stepping out of the fashion&music market and making waves in the tech world, with companies now teaming up to create their virtual personalities. When the decision-makers in the market produce a VI, they need to select the target industry, and the nature of the activities to be pursued is crucial.

**Retirement.** Like existing graphic artworks, virtual influencers are not immune to unauthorized reproduction and secondary processing, which raises concerns about intellectual property rights and originality. As advancements are made, there is potential for virtual influencers to interact with users through artificial intelligence. It brings forth a critical discussion on the nature of data utilized for training these AI algorithms. It is crucial to ensure that the data is accessible from profanity, hate speech, or biases, especially against marginalized groups such as homosexuals, black individuals, and people with disabilities. The human-like interaction proposed for virtual influencers necessitates stringent measures to avoid biased learning data, ensuring ethical and unbiased engagements. Additionally, the ease of production of virtual influencers could lead to a surge in their numbers, making it imperative to exercise caution to prevent indiscriminate production and potential misuse.

In this paper, we took a closer look at the VI's journey, breaking it down into 4 main stages: planning, production, debut, and retirement. By looking at previous related works, real-world examples, and what people think through surveys, we will explore what the "lifecycle" looks like for virtual influencers (Fig. 1).
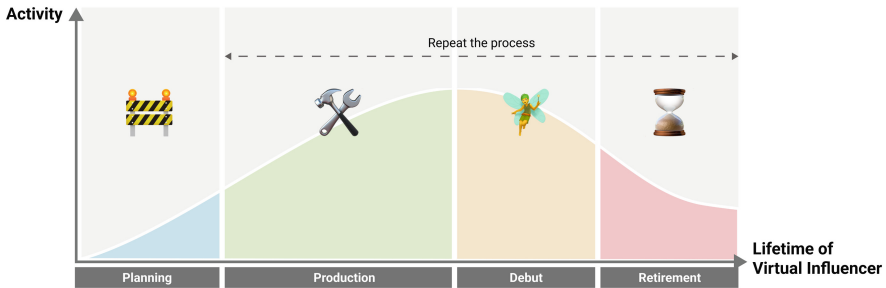


**Fig. 1.** The 4-stage framework of planning, production, debut, and retirement.

## 2   Related Works

### 2.1   Concept and Characteristics of the Virtual Influencer

An influencer is an influential person on a social network service (SNS) who significantly impacts consumers' purchasing decisions for a particular brand or

content created through social media. Influencers' activities are not limited to social media. By collaborating with companies and creating advertising content, the boundaries between online and offline activities are more blurred than ever. Recently, due to the COVID-19 pandemic and technological development, virtual influencers not affected by the constraints of reality have begun to appear. Virtual influencers are fictional characters created by combining artificial intelligence and computer graphics, and they are referred to as influencers with great social influence. The technologies utilized include artificial intelligence (AI), augmented reality (AR), and computer graphics (CG) [27].

The virtual influencer market is growing, and the influence is constantly expanding. In particular, the impact of VIs has become more evident with the advent of COVID-19. Influencers gain popularity by actively communicating with the public on social media and earning income through marketing activities such as brand advertising. The market size of many virtual influencers, both domestic and international, is constantly expanding. Therefore, it is expected to have a market size of about 220 million dollars in 2023, and it is expected to grow to a market size of more than 370 million dollars in 2027.

Businesses and consumers have recently embraced VIs for several reasons. First, they are not limited by time and space. Because they're virtual, they can be active anytime, anywhere, and they don't have to coordinate their schedules like celebrities or human influencers do. They can be active when and where they want and for as long as needed. Second, they are easier to control and manage. In the case of humans, when incidents and accidents occur, the advertising brand's image is heavily damaged, and the advertising model has to terminate the contract and pay penalties. However, VIs are less likely to cause incidents and are easier to control and manage, minimizing the damage. Third, VIs have no boundaries to their territory, allowing them to operate freely. While human influencers are limited by their physical characteristics, VIs can work across various content industries, such as singers, YouTubers, actors, models, DJs, etc. [39].

## 2.2   The Importance of Virtual Influencer Marketing

Virtual influencer marketing has emerged as a compelling strategy, utilizing computer-generated or AI-powered characters to promote products, services, or brands. In 2020, Moustakas et al. conducted an exploratory qualitative study, interviewing six experts to delve into the advantages and disadvantages of using fictional characters in marketing, particularly highlighting VIs' challenges and success factors compared to human ones [34].

Adding to this discourse, Jhawar et al. (2023) set out to explore the rise of virtual social media influencers, recognizing the dearth of research in this area [17]. To address this gap, they proposed a theoretical model to understand social media users' acceptance of VIs, emphasizing the role of parasocial interaction (PSI) in establishing source credibility and fostering acceptance.

Furthermore, Wibawa et al. (2022) conducted a literature review from 2018 to 2022, revealing a positive outlook among digital experts regarding the effec-

tiveness and reliability of using VIs in marketing strategies [44]. They suggest that incorporating virtual characters can bring innovation and depth to global marketing, potentially leading to widespread adoption across industries.

In a related study, Jang et al. (2020) examined the information sources, evaluation criteria, and favored attributes of 3D VIs, providing insights for integrating them into the fashion market and understanding the anticipated effects of their advertisements on brands [16].

Shifting the focus to credibility, Lim and Lee (2023) conducted experiments to investigate the impact of disclosing a VI's origin and employing positive versus negative emotional narratives on their credibility [29]. Their findings suggest that boosting credibility requires disclosing the VI's origin and using positive emotional narratives.

Finally, Franke et al. (2023) delved into the correlation between a virtual influencer's appeal and a consumer's inclination to make a purchase [13]. They found that attractiveness was not directly linked to purchase intention but mediated by mimetic desire and brand attachment.

In conclusion, VI marketing presents a forward-thinking and efficient approach to engaging with audiences in the digital age, offering brands unique opportunities to connect, communicate, and establish a strong online presence.

## 2.3   Exploring Ethical Terrain on Virtual Influencers

Human influencers naturally have flaws and unique traits, but VIs are artificial creations carefully designed and managed by companies or individual creators. These VIs can be precisely crafted to appeal perfectly to certain audiences without the unpredictability of human behavior.

Sands et al. (2022) examine brands' potential advantages and difficulties in utilizing VIs to connect with and sell to audiences. While VIs offer opportunities for engagement, the authors highlight five main challenges: consumer concerns, unrealistic beauty standards, lack of authenticity, regulatory and ethical issues, and consumer resistance. This substantial difference highlights the need for ethical reflection on using VIs. With their actions and stories tightly controlled, the ease with which VIs can be made into ideal figures raises important questions about truthfulness and manipulation in the digital space. In this research, we investigate how the level of human likeness in a VI's appearance influences consumers' adoption of a recommended stance. Additionally, the study explores whether disclosing the VI's non-real status, despite its humanlike appearance, impacts its persuasive effect. The findings suggest that a more humanlike appearance in VIs increases the sense of social presence, leading to improved perceptions of message quality and brand attitude [34].

As VIs mostly appear on social media platforms, which let users post numerous images(body images [12] and short videos), this content can potentially be repurposed to create deepfakes. Kugler et al.(2021) highlight the growing concern around deepfake technology, which enables the realistic insertion of individuals into videos, leading to a surge in political satire and fake pornography. The research reveals a strong public sentiment against nonconsensual pornographic

deepfakes, with a majority favoring criminal sanctions for creators. Though ethical debate around VIs has been focusing on the broader consequences of their use: the possibility of biased audiences [30], and understanding the responsibilities of those who create and control these digital figures [21], a careful and thorough discussion about the ethical aspects of VIs is needed.

In this paper, we highlight the inadequacy of current legal structures in addressing crimes involving VIs (VIs) while also posing critical inquiries: *(1)How should we perceive and handle VIs?*, (2)*Are they to be regarded as entities with human-like attributes or merely as data?* This question emphasizes the need for a carefully thought-out approach, both ethically and legally, to address the growing presence of VIs in the digital world.

## 3   4-Stage Framework

### 3.1   Planning

VI becomes a branding tool for companies and products by expressing themselves using their personalities and images. Its extroverted appearance and worldview are important to design a VI that is intimate and attractive to people. A VI is a virtual figure that exists only in the digital world. However, setting up a worldview and persona is essential because it communicates with people and socially affects consumer consumption patterns like a human influencer. First, as an influencer, it is essential to be envied by the public and to communicate in a friendly manner. Second, it should be connected to reality so there is no boundary between virtual and reality. The blurring of the line between virtual and reality, and the more detail, the more people become fans of VIs and go crazy [16].

**Background of Persona Formation.** Most VIs currently on sale target the MZ generation, which refers to the combination of Millennials and Generation Z (GenZ) as a branding core. Among them, 82.2% watched YouTube in their spare time, and more than half (59.6%) said that there are more than five creators who subscribe to channels such as YouTube, Instagram, and African TV to remember their names and visit them frequently [35]. Therefore, forming a VI image focusing on the MZ generation, which has much contact time with social media, is essential. To target the MZ generation, it is necessary to examine their values. Born in an economic environment with improved national income levels compared to previous generations, the MZ generation forms consumption patterns with leisure, environment, and personality as critical keywords. The VIs currently active have different forms of worldviews centered on the above keywords.

**Example of Persona Formation.** Lil Miquela is a Brazilian-American woman who is a VI from Los Angeles. About 83 percent of her 2019 Instagram followers are GenZ under 24. As a result, Lil Miquela's worldview has been set as an environmentally friendly, socially participative, and virtual human who speaks his mind like the tendency of the leading SNS follower group. A VI is designed from

the overall worldview to personal taste, personality, and daily life. Lil Miquela is forming a familiarity with GenZ followers by sharing her favorite K-pop meeting and parting process through Instagram. In addition, she was set up as a bisexual and added concreteity and reality to the setting of her worldview. She has taken an active stance on human rights issues for the socially disadvantaged, such as sexual minorities and blacks [4]. It is also funded to support the music industry suffering from COVID-19 [10]. Rozy is a VI for Koreans, and she has a world view, including the main interests of GenZ, such as yoga, travel, running, fashion, and eco-life. She has a free-spirited and sociable personality, and her appearance and her enviable appearance will help the MZ generation form a consensus. For example, they frequently post daily photos on Instagram, such as photos taken while traveling abroad or shopping, to form a sense of intimacy with SNS followers. In addition, she is interested in the environment and has a worldview that actively participates in social issues, such as participating in the Zero West Challenge [41]. According to Bibrand, who produced VI Rui, Rui was established as a singer-songwriter by referring to the real model and was produced by embodying the real model's bright and active personality and language. However, even with a high degree of consistency with real people, we must create a new personality that is not in the world. Therefore, when producing VIs, care should be taken to ensure that entertainment companies have detailed differences as if they were managing artists [37].

### 3.2 Production

VIs are mainly created using deep learning-based graphical and voice technologies. The synthesis of a VI's appearance can be divided into face, body, voice, and facial expression, and fashion is also an important element in completing the VI. When creating a VI face, the key factors are naturalness and freshness. All of the VIs on the market are synthesized faces that don't exist in the real world. A common technique used for face synthesis is the digital double, which is a deep-learning graphics technology that uses a specific actor or model as the primary actor and then applies another virtual face to the real model. Since the face is analyzed and synthesized in 3D, it has a natural advantage over deep fake techniques [43]. In addition, the detailed graphics work realizes the movement and connectivity of all muscles, including skin, bones, and neural networks. Digital doubles can be used to analyze and predict how different muscles around the jawline move when a VI makes various facial expressions or speaks.

Typical VIs who have used this technology are Rozy and Lucy, and in the case of Lucy, the pores and fuzz of her skin are realistic [2]. Rozy was created using 3D modeling technology that captured her face and gestures through a band model with over 800 facial expressions and shapes that Gen MZ preferred [22]. In the case of active VIs, there are no examples of 3D modeling of the entire body, and only the face of the VI is composited with a choreographer as a model [19]. In addition to appearance, voice is a factor that makes VIs realistic and approachable. Most of the VIs that have been released have communicated with users only through on-screen movements or photos without voices, but there

are VIs who have produced music with natural pitches and high-quality sound using deep learning-based voice synthesis technology [14]. The voice synthesis technology used to create VIs records authentic human voices over a while, and then the AI analyzes the timbre, tone, and inflection and synthesizes the voice when certain words and sentences are given as input [15]. Recent technological advances have made it possible to create intonation, micro-breathing, and natural-sounding voices to capture emotion and personality in a VI's voice [23]. With this technology, VIs Rozy and Kim Rae-ah released their first singles and debuted as singers. VI facial expression is a depth sensor-based face recognition technology that changes the VI's facial expression when the subject's or model's facial expression changes. The VI's fashion and styling are set to match the persona of each VI. For example, Rozy is styled using street fashion, comfortable and sporty hats and hoodies, and casual jumpers to match her persona of being free-spirited and sociable [25].

**User Experience of VI Appearance.** A quantitative research method using a structured questionnaire is adopted to grasp the degree of recognition of VIs. The sample group was set at 110 people born in 1987-2003, including Millennials between 1980 and 1994 and Generation Z (Gen Z) between 1995 and 2004. The characteristics of the sample were MZ generation men and women living nationwide, with a gender ratio of male: female = 40.0:59.1, and respondents born in 1995, which is the reference point for generations M and Z, were composed of the average year of birth. The average daily time of the sample group was 1.9 h, and Instagram and Facebook were the most frequently used SNSs. According to the analysis results, 16.4% said they "know well", 61.8% said they "have heard of it" and most respondents recognized VIs. As for whether to visit VI SNS, 27.3% of the respondents had visited (See **Appendix**).

**Questionnaire.** A quantitative research method using a structured questionnaire is adopted to grasp consumers' perception of the appearance of VI. Evaluation items were organized based on existing prior research to organize the survey items. Um(2023) designed to examine the effects of para-social interaction as relationships between VIs and audiences [42]. This study delves into the effects of perceived human likeness, perceived predictability, and perceived authenticity in evaluating VI advertising. Kim et al.(2023) measured virtuality, expertise, intimacy, and likability [40]. Park Ye-rang et al.(2022) measured attractiveness, reliability, intimacy, expertise, interactivity, and self-consistency in the specialty evaluation of VIs [36]. Hong and Kim (2023) evaluated similarity, attractiveness, reliability, expertise, and interactivity in a study on the preference for VI of the MZ generation [18].

Divide by a numerical scale from 1 to 5, where 1 is very different, 2 is not, 3 is normal, 4 is true, and 5 is very much so. Among the perceptions of VI extroverts, only 37.3% (4: yes, 5: very yes, added up) said they had experienced an unpleasant valley. In addition, 32.7% of respondents said they were "attractive" to VI extroverts (4: yes, 5: very yes). The most noticeable features of the VI's

appearance were individual, ideal, and friendly in order, while other responses included "trendy", "ooks popular on social media these da", and "virtual ones stand out". Virtuality is a characteristic that looks real but does not exist, and if it is virtual, it means that it does not look like a real person. Among the extroverted characteristics of VIs, 45.5% (4: Yes, 5: Yes, very yes) accounted for about half of the survey on virtuality awareness. According to the survey analysis results, the part to remember when manufacturing VIs results in problems with the degree of virtuality and the direction of outward formation. From the corporate perspective, after analyzing and discussing how effective it is to make VIs similar to people, VIs should be produced with enough virtuality that consumers can feel comfortable without feeling uncomfortable. From a social point of view, some concerns producing virtual humans could cause social confusion to the point where it is difficult to distinguish them from others.

It is said that people can feel a sense of affinity because they resemble each other, but if they are so similar that it is difficult to distinguish, their likability may decrease (Fig. 2). .
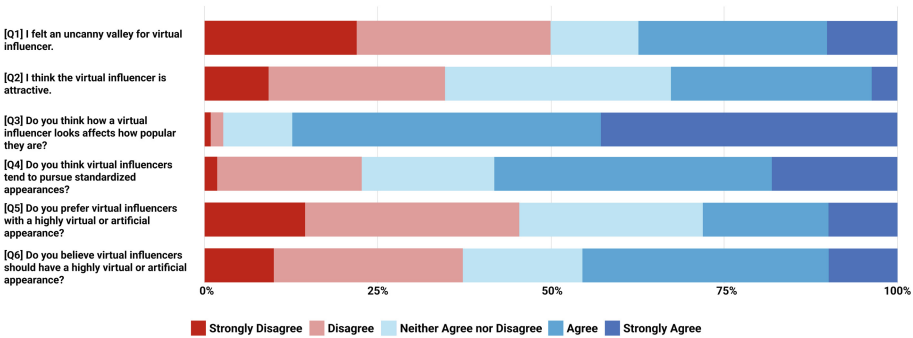


**Fig. 2.** Results from the survey.

### 3.3   Debut

VIs are not only in fashion and music but are expanded in the fields of artificial intelligence, with companies creating virtual humans, collaborating, and launching their own VIs. When a company creates a VI, deciding which industry they want to work in and what they want to do is essential. The scope of VIs is broad and unrestricted, so they can become singers, record albums, perform concerts, model products, and promote different brands. They can also become YouTubers, where they can constantly interact with their subscribers. There are two primary industries where VIs are active: the fashion and beauty industry and the game and music broadcasting industry. The media are Instagram, TikTok, YouTube, Twitter, and magazines.

**Fashion and Beauty Industry.** Many VIs now work as models in the fashion and beauty industry, stimulating consumers' desire to spend. Shudu[1] is a South African virtual model created by British photographer and computer graphics artist Cameron James Wilson based on his experience working in the fashion industry. As one of the first digital models, she rose to fame on social media and was signed by various fashion and beauty brands. She has collaborated with brands such as Calvin Klein and Dior, modeled for Fendi beauty lipsticks, and appeared in commercials for Balmain [11].

Rozy[2] is a VI created by Sydus Studio, a subsidiary of content company Lotus, and designed to represent the preferred beauty standards of Gen MZ. Rozy has an oriental mask and a height of 171cm. She has a free-spirited and sociable personality. Moreover, she modeled for the French luxury brand Celine and participated in a fashion photo shoot for WKOREA. The photoshoot was part of W Korea's 16th annual breast cancer awareness campaign, the "Love Your W" project. Rozy also modeled for W Concept, an online fashion platform, in a photo shoot titled "I am a concept," showcasing different brands' styles [26].

**Education Industry** Most VIs are active in the entertainment and content industries as influencers, but recently, they have also appeared in the education industry. DA: ON, produced by Minds Lab, a company specializing in AI virtual humans, was a scientific commentator at the online special exhibition'Artificial Intelligence and Art (AIART)' at the National Science Museum in Daejeon. DA: ON is equipped with Wav2Lip, an algorithm-based lip synchronization technology, and deep learning voice generation algorithm (Hi-Fi GAN) voice generation (TTS) technology, enabling free conversation with visitors [8].

Korean Air has recently unveiled a novel inflight safety video that showcases virtual humans. The video features a virtual character named Rina dressed in a Korean Air flight attendant uniform, providing safety instructions in a virtual setting called the "Korean Air Safety Lounge." This simulated space was designed to enhance the clarity of inflight safety rules. Rina, the virtual human, underwent safety training at Korean Air's Cabin Crew Training Center and was honored with the title of an honorary flight attendant. The safety video includes members of MAVE (Members of the Association of Virtual Experience) playing the role of passengers as they follow the safety instructions [1].

**Commercial Industry.** IMMA[3] is a model for IKEA in Tokyo, created by Japanese 3D imaging startup AWW, and earned 700 million won in 2019 from brand advertising revenue. A video of her spending three days at IKEA's Harajuku showroom and experiencing IKEA products was produced and shown on YouTube and in IKEA stores. In addition, IMMA shared photos from collaborations with Amazon and Porsche on social media [33].

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[1] https://www.instagram.com/shudu.gram/.
[2] https://www.instagram.com/rozy.gram/.
[3] https://www.instagram.com/imma.gram/.

**Music Industry.** In the music industry, we typically see VIs as singers, song-writers, DJs, etc. Aespa[4] is the virtual avatar of SM Entertainment's idol group, Aespa, created by Giant Step. Giant Step's U.S. subsidiary provided character design, VFX, real-time content solutions consulting, virtual studio, animation, and character rigging to construct the world of Aespa [38].

IITERNITI[5] is a virtual idol consisting of 11 members in their early 20 s realized with artificial intelligence technology. IITERNITI was developed by Pulse9, a company specializing in artificial intelligence graphics with "deep real" technology, and the 11 members were selected through a referendum. They have released music videos and albums and held fan meetings. The song "Im real" has about 900,000 views, and "No Filter" has about 2.2 million views, showing great public interest in virtual idols. Recently, K/DA organized the opening of the 'Chungcheongnam-do AI Week' online and offline events [32].

K/DA[6] is a fictional four-member girl group created to commemorate the League of Legends 2018 World Championship held in South Korea. K/DA was created by Riot Games, the company responsible for developing and distributing League of Legends (LoL), using the game's characters Akali, Ari, Evelyn, and Kaisa. The virtual girl group performed their new song "POP/STARS" at the 2018 League of Legends World Championship (LOLd Cup) Finals opening ceremony and later released a music video and soundtrack. The music video has received approximately 480,000 views on YouTube [46].

Lill Miquela[7] is a VI created by the American digital character creation company Brud in April 2016 and is a Brazilian-Spanish mixed-race music artist. As a musician, Lill Miquela works in the genres of RB, electronic, and pop, and she released her first single, "Not Mine," on Spotify in August 2017. She has also been featured as an interviewer at music festivals and appeared in music video [9].

Created by dob studio[8], Rui[9] is a virtual cover singer who sings along to famous songs and runs the YouTube channel Rui Coverage. In addition to covering songs, he introduces Korean travel destinations and vlogs about furniture brands from various corners of Korea. Rui is a virtual person who was created by using artificial intelligence technology to acquire the facial data of seven people and create a likeness of a real human being. She has about 40,000 subscribers on YouTube and communicates with the public through YouTube, Instagram, and TikTok [7].

**Virtual Influencer Collaboration Activities.** VIs work individually and with real people or other VIs to expand the scope of their activities, giving them a more realistic experience. First, examples of collaborative activities with

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human influencers are as follows. VI Rozy photographed for the May 2021 issue of WKorea, a high-end fashion magazine, with Irene, a model belonging to the model agency Esteem. Creative content company Esteem and Sidus Studio X, which produces and operates VIs, will jointly manage VI Logistics for the first time in Korea. As a result, Rozy's activity area, which was limited to SNS, has expanded to magazines and broadcasting activities [24]. Secondly, examples of collaborative activities between VIs are as follows. Sidus Studio X and Shudu, the world's first digital model, have launched a photo shoot for Vogue Korea magazine. At the time of the shooting, Rozy raised awareness by filming a fashion pictorial with the world-famous virtual model Shudu because she was a rookie VI. The pictorial was designed with the concept of "Over The Limit" to break down the boundaries in the world and create a world where they coexist. Shudu in Hanbok-style clothes and Rozy in African clothes were posted on Instagram. Within three months, each company created a scene of a VI to promote harmony between two VIs with different images. Taking advantage of VIs, they created a photo taken together in one space without meeting in person [45]. Third, in 2019, Calvin Klein launched the #MYTRUTH campaign featuring supermodel Bella Hadid and VI Lil Miquela with a video showcasing the two endorsers sharing a kiss [5]. Calvin Klein aimed to raise awareness about LGBTQ (lesbian, gay, bisexual, transgender, queer, and questioning or queer) rights through this initiative. On Twitter, the brand explained that the campaign was designed to challenge traditional norms and stereotypes in advertising. Specifically, the video sought to explore the boundary between reality and imagination [6] (Fig. 3).



**Fig. 3.** List of the VIs.

### 3.4 Retirement

In this section, we suggest the concept of the "Retirement" of VIs. In general, the word "Retirement" means that an individual gets away from social and economic activities and spends time leisurely. However, unlike humans, VIs do not have a short life span and have no restrictions on their activities. Nevertheless, "retirement" is inevitable even for VIs who are struggling with their fame.

Assuming existing human influencers have the same activity cycle as VIs, the considerable difference would be the concept of "retirement." In the case of VIs, there is no space or time constraint on activities because the concept of "life span" is not applied, but if it does not maintain its popularity like a human influencer, it will disappear [28]. VI is making profits and getting in contact with many consumers. However, if the contents are limited to one-sided interaction, such as text, photos, and videos, the chances of being forgotten by the public can increase. It is difficult to analyze the relationship between industrial changes and idol culture, including the fact that few industrial indicators have been disclosed or it is difficult to secure the reliability of the indicators. Previously, the retirement period was determined by relying on senses, but we would like to establish clear standards based on our understanding of the existing influencer market and utilize them as data for producing new VIs.

There are two types of retirement in the existing entertainment industry: voluntary retirement and involuntary retirement. Since most of the influencer's activities are operated by their agencies, the retirement timing is determined by the agency's decision. The retirement decision relies on the revenue from the market. Influencer activities will naturally decrease and be halted shortly when there is no meaningful profit compared to investment costs. As such, analyzing related data to expect the right timing is crucial. In the case of VIs, the agency can expect the moment to be retired or find the pattern based on the collected data from previous VIs' activities. Based on collected data, we expect that patterns can be set to determine the timing of retirement, such as (1) when no return on investment is expected to be made or (2) when a retirement decision is already made at the early planning/production stage of VI.

It is a new world with virtual humans around, and people might get mixed up if they cannot tell who is real and who is not, which we all need to discuss [34]. Like other digital art, VIs can be copied and messed with, which leads to ownership disputes. With the creation of VIs becoming increasingly fast, potential misuse emerges, such as deepfake pornography [20]. Thus, establishing specific guidelines is crucial.

**Data Utilization after Retirement.** The data obtained through the activities of VIs includes an understanding of the popularity cycle received by the public. It forms a "popularity scale model during the activity period" by understanding how specific images, personalities, work activities, and communication methods with the public affect popularity. Through the second stage of data collection and

utilization, retirement times determined by existing experience and reduction can be determined based on clear data-based standards and can be used to produce next-generation virtual humans.

- **Data utilization** Data values obtained through virtual human activities can be used for training existing entertainment companies. The reality of the influencer market is that it is difficult to make profits unless it gains popularity even after its debut. It is said that about 300 to 400 teams cannot be broadcast every year. To prevent the harmful effects of the current entertainment industry, accumulated know-how will be used to minimize the probability of failure and increase the return on investment the most. In addition, in the case of virtual humans, data is likely to be continuously used in the Intellectual property (IP) industry even after retirement. In some cases, the concepts of "digital human" and "VI" have already been imagined by many people for a long time. Due to the development of technology, the possibility and trust in "digital humans" have been expanded in that they can now work in the advertising and marketing fields like real people [31]. Cyber singer Adam[10] is also known to have worked as a fashion designer to live a second life after retirement. Webcomics containing this worldview were also scheduled to be released in 2016. In the case of VIs, data utilization between platforms is easier than that of human influencers to gain an advantage in the expanding IP industry.
- **Data extension** The life cycle of virtual humans identified in VI can be extended and applied to the virtual human area necessary for society other than the entertainment business. There is a possibility that VI management will try to manage, operate, and design virtual humans first, create databases accordingly, and produce virtual humans in other fields such as teaching and professional. For instance, through VI production, algorithms can identify how VI becomes a person with ethical values and how to produce them so that they do not deviate from the algorithm can be learned in advance. It is expected that VI will be applied to society as a whole as VI expands to other occupational groups. Since virtual humans in augmented reality complement rather than substitute for real things, attempts to fuse reality with metaverse are noteworthy [3]. The agency Gold medalist[11] and digital content developer EVR STUDIO[12] jointly implemented both the actual appearance and facial expression of Kim Soo-hyun[13]. New added value is expected to be created throughout the current VIs industry.

## 4   Discussion

As the main consumer of VIs is the MZ generation, and influencers' social influence grows, attention must be paid to forming VI personas. Due to the charac-

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[10] https://kpop.fandom.com/wiki/Adam.
[11] https://goldmedalist.com/en/company.
[12] https://evrstudio.com/.
[13] https://en.wikipedia.org/wiki/Kim_Soo\discretionary-hyun.

teristics of influencers, many followers imitate them, so it is important to design VIs as a personality with a sense of ethics and unique settings. When reflecting current major social issues in the personality of a VI, it should be able to be designed in a positive direction without controversy.

Like existing graphic artworks, VIs are not immune to unauthorized reproduction and secondary processing, which raises concerns about intellectual property rights and originality. As advancements are made, there's potential for VIs to interact with users through artificial intelligence. This brings forth a critical discussion on the nature of data utilized for training these AI algorithms. It is crucial to ensure that the data is free from profanity, hate speech, or biases, especially against marginalized groups such as homosexuals, black individuals, and the disabled. The human-like interaction proposed for VIs necessitates stringent measures to avoid the use of biased learning data, ensuring ethical and unbiased engagements. Additionally, the ease of production of VIs could lead to a surge in their numbers, making it imperative to exercise caution to prevent indiscriminate production and potential misuse. Establishing clear guidelines and ethical frameworks can help maintain a responsible approach toward creating and utilizing VIs, ensuring they serve as a positive extension in the digital realm rather than as a source of misinformation or bias.

We took a close look at the journey of VIs, breaking it down into four main steps: planning, making, introducing them to the world, and what happens when they retire. By looking at past studies, real-world examples, and what people think through surveys, we tried to get a handle on the whole VI scene, including what "retirement" might look like for them and what they could do afterward. It's a new world with virtual humans around, and people might get mixed up if they cannot tell who is real and who is not, which we all need to discuss. Like other digital art, VIs can be copied and messed with, which raises serious questions about who owns what. With the creation of VIs becoming increasingly effortless, a risk of oversaturation or potential misuse emerges; thus, establishing certain guidelines is crucial.

## Appendix

### A. Participant Demographics

Demographics of survey participants, including gender, birth year, primary SNS used, daily SNS usage time, awareness, and interaction with VIs (Table 1).

**Table 1.** Survey results.

| Question | Answer | Frequency (People) | Percentage (%) |
|---|---|---|---|
| Gender | Male | 44 | 40.0 |
| | Female | 65 | 59.1 |
| | Other | 1 | 0.9 |
| Birth Year | Millennial (1980-1994) | 47 | 42.7 |
| | Gen Z (1995-2004) | 63 | 57.3 |
| Preferred social media (Multiple selections) | Instagram | 96 | 65.3 |
| | Facebook | 25 | 17.0 |
| | Twitter | 12 | 8.2 |
| | Other (Snapchat, Tumblr, TikTok, etc.) | 14 | 9.5 |
| Average screen time on social media per day | 0 to <2 hours | 61 | 55.5 |
| | 2 to <4 hours | 33 | 30.0 |
| | >4 hours | 16 | 14.5 |
| Awareness of VIs | Very familiar | 18 | 16.4 |
| | Have heard of it | 68 | 61.8 |
| | Do not know | 24 | 21.8 |
| Visit VIs' social media | Have visited | 30 | 27.3 |
| | Have not visited | 80 | 72.7 |

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