#VirtualInfluencer: A Deep Dive into Virtual Influencers' Impact on Women's Self-Esteem, Body Dissatisfaction, and Purchase Intentions via Comparison Mechanisms

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Abstract

Virtual influencers are one of the newest marketing phenomena that have taken the world by storm, prompted by a rise in artificial intelligence and virtual reality. They can offer brands unique and creative opportunities to engage with a wide range of audiences and decrease the risks and limitations associated with human influencers, such as sickness or reputation damage. However, they have been associated with unrealistic expectations about what constitutes beauty and body type standards. Abundant research revealed how women exposed to models with unrealistic bodies tend to engage in comparison, develop negative feelings toward their bodies and engage in purchase behaviour to attenuate those feelings. This study hypothesised that highly anthropomorphised virtual influencers would lead to a similar negative impact on women's well-being and increased purchase intentions via appearance-based social comparison and body image-self discrepancy mechanisms. An online experiment tested the effects of highly anthropomorphised influencers and how disclaiming their non-human nature affects the outcomes. The results found clear evidence that highly anthropomorphised virtual influencers could impact women's well-being through decreased appearance self-esteem and increased body image dissatisfaction. They also led to increased purchase intentions. These effects were (partially) mediated by appearance-based social comparison, contributing to the existing knowledge on how this mechanism works and showing that irrelevant, non-human agents can activate it. Disclaiming the non-human nature of the virtual influencer did not attenuate the effects. Therefore, more research is needed in that area. These results call for more transparency and cautiousness when using virtual influencers in media and advertising.

Keywords: appearance-based social comparison, body image self-discrepancy, virtual influencers, anthropomorphism, disclaimers

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#VirtualInfluencer: A Deep Dive into Virtual Influencers' Impact on Women's Self-Esteem, Body Dissatisfaction, and Purchase Intentions via Comparison Mechanisms

Miquela Sousa is a 19-year-old model and influencer living in LA who booked advertising campaigns with Prada, Calvin Klein and Burgundy and has 3 million followers on Instagram. However, Miquela is not a real person. To be more precise, she is a computer-generated image (CGI) whose resemblance to a human could be easily described as unsettling. And she is not the only one. Influencers such as Miquela are characters created by computer software to have a human-like appearance. A creative team manages them to have a fully-fledged social media presence, talking to their followers and sharing their daily lives (Nast, 2018). Better known as virtual influencers, they are actively involved in advertising campaigns and brand sponsorships (Conti et al., 2022). Renowned brands use them for promotional purposes in different social media advertising campaigns for clothes (Balmain, Nike, Calvin Klein, Puma, HM), perfume (Prada), cosmetics (Fenty Beauty), technology (Samsung) and lifestyle-focused products (Ikea) (Samosa, 2022; Webster, 2020).

A survey conducted by Conti et al. (2022) revealed that virtual influencers are still a novelty, with only 38.6% of participants knowing of their existence. While there are different types of virtual influencers, some more realistic than others, this paper addresses the highly anthropomorphised ones that make it difficult to distinguish them from real people (Cresci, 2018; Dodgson, 2019). These virtual influencers have been created to portray overly idealised bodies, thin, with hourglass figures, which might impact women's perception of the self and lead to adverse effects on their well-being (Jalan, 2022). The choice to create them with such unattainable appearances might not be coincidental.

Since the mid-1920s, the standard of bodily attractiveness has been represented by thin models with hourglass figures (small waist-to-hip ratio) and has been widely used in magazines and advertising (Howard, 2018; Singh, 1994). This trend survived through the

decades because it led to a favourable evaluation of the advertised products and persuaded consumers to purchase (Janssen & Paas, 2014; Joseph, 1982). While virtual influencers might have been created as an outlet for creativity and technological advancement, their visual appearance reflects society's tendency to prioritise certain body types. Brands could easily perpetuate the idea that certain physical features are better than others by using them in advertising, commercials, and sponsorships without disclaiming that they are not human. Extensive research has found evidence that women's body satisfaction and self-esteem are negatively impacted by exposure to this kind of idealised bodies (Argo & Dahl, 2018; Grabe et al., 2008; Scully et al., 2020a).

Social comparison was shown to explain these adverse effects. According to Festinger (1954), people have an intrinsic need to evaluate themselves, most often by comparing themselves to others. Prior research found evidence that exposure to idealised body images used in advertising, social media and even for inanimate objects such as mannequins generates a social comparison (Argo & Dahl, 2018; Fioravanti et al., 2022; Richins, 1991). These are further linked to negative feelings toward oneself (Fioravanti et al., 2022; Pedalino & Camerini, 2022; Scully et al., 2020a; Weber et al., 2022). When women compare themselves with models portrayed in media, they are at risk of being faced with the harsh reality that their appearance does not match that ideal, unattainable body, which decreases their self-esteem (Heron & Smyth, 2013). The degree of body image self-discrepancy has also been found to influence these adverse effects. For instance, Bessenoff (2006) found that a higher level of self-discrepancy leads to an increased likelihood of comparison with idealised bodies and lower levels of appearance self-esteem.

Most research surrounding virtual influencers looked into their social media presence, trying to understand what opportunities and challenges they bring for brands (Conti et al., 2022; Sands et al., 2022), similarities to human influencers and how social media users

interact with them (Arsenyan & Mirowska, 2021), and differences between types of virtual influencers (Batista da Silva Oliveira & Chimenti, 2021). To the author's best knowledge, no research so far considered how virtual influencers' body attractiveness could impact women's well-being and purchase behaviours due to their novelty. As both mechanisms (social comparison and self-discrepancy) are usually bound to human-to-human comparison, it is yet to be determined if and to what extent the mechanisms remain for virtual agents. Prior research has found that social comparison is an automatic process that happens when a person sees someone else and can even occur when the comparison agent is later deemed irrelevant (Gilbert et al., 1995). Therefore, it could be that virtual agents that are highly humanised (anthropomorphised) activate similar comparisons as humans; it could also be that they are not considered comparison agents, and very different processes apply.

Specialists in media, research and market research voiced concerns about the effect of virtual influencers' appearance on women's well-being, seeing them at risk of comparing themselves with idealised non-humans (Batista da Silva Oliveira & Chimenti, 2021). Therefore, this research will test if the high anthropomorphism level of the virtual influencers activates the two mechanisms; further, it will test if a decreased level of anthropomorphism could potentially deactivate them. Moreover, it will investigate how the different levels of anthropomorphism impact women's well-being and purchase intentions via the two comparison mechanisms.

In addition to whether non-human agents are a source of comparison, Batista da Silva Oliveira and Chimenti (2021) have raised the critical point that women might be unaware that virtual influencers are not human. As such, in a quest to protect women and their well-being, a call for transparency is imperative. While some virtual influencers allude to the fact that they are not human through comments or hashtags on their profile and have been confirmed by their creators not to be human, for others, one would have to speculate. When they appear

alongside real known models in photoshoots, or next to their “makeup artist” or “hairstylist”, the line between what is real and what is not becomes much more elusive. Gilbert et al. (1995) suggested that if people are made aware that the comparison is irrelevant, they should be able to correct their thinking. Consequently, this research will evaluate if disclaiming the non-human nature of the influencer, thus making women aware the comparison agent is irrelevant, could deactivate the ideal self and self-comparison mechanisms and attenuate the impact on women’s well-being and purchase intentions.

As can be seen, there is a lack of understanding of how virtual influencers' use in marketing activities impacts women’s well-being and purchase behaviours and how the effects could be alleviated. Therefore, this research seeks to answer the following question:

To what extent do virtual influencers’ anthropomorphism levels and the use of disclaimers activate/deactivate the comparison mechanisms, and how do they impact the relationship with women’s well-being and purchase intentions?

To investigate the effects of virtual influencers on women’s well-being and purchase intentions, this study employed a 2 (Virtual Influencer's Anthropomorphism Level: Low, High) x 2 (Disclaimer of Virtual Influencer Use: Used, Not used) between-subjects experimental design. The research was conducted using a large sample of 299 Caucasian women living in the United Kingdom, aged between 26 and 41 years old.

The academic contributions of this research are threefold. Firstly, it will contribute to the growing literature on virtual influencers by adding new insights into their effects on women’s well-being and purchase behaviour. Secondly, it will expand the knowledge on social comparison and self-discrepancy by examining whether a virtual, non-human agent activates similar comparisons as humans in traditional advertising and social media. Lastly, it will add to the evolving literature on disclaimer use in media by testing whether addressing

the non-human nature of the influencers has any attenuating effect on women's well-being and purchase intention, using a novel disclaimer designed explicitly for this research.

While virtual influencers are still a novelty, their impact on marketing is slowly growing. Therefore, it is essential to address whether virtual influencer marketing has the potential to grow into a fully-fledged marketing tool and what impact it will have on women. The results of this research will provide managers with data-based recommendations on the use of virtual influencers in branded campaigns and sponsorships.

The rest of this paper is organised as follows: the second chapter discusses relevant literature and introduces the research hypothesis; chapter three describes the methodology and data collection plan; and chapter four presents the research results. Finally, chapter five discusses the findings, provides recommendations to managers and policymakers, and explains the limitations. Lastly, it proposes avenues for future research that can help better understand the effects of virtual influencers on women.

2. Literature Review and Theoretical Framework

2.1 Problem Statement and Research Question

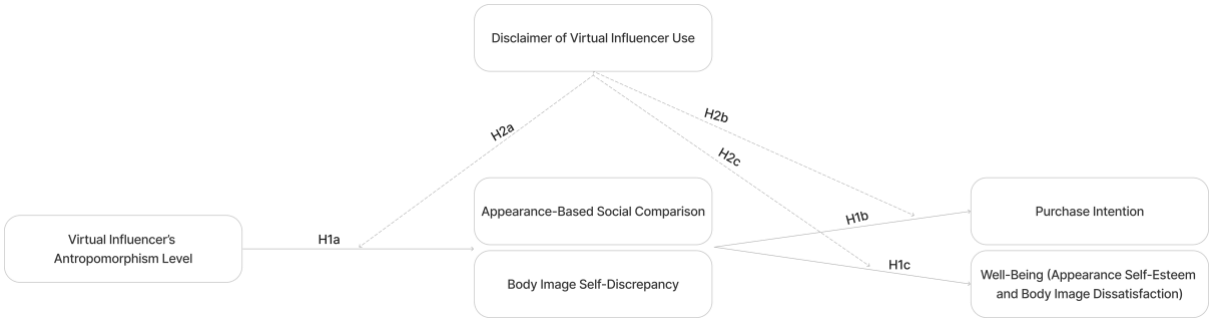
Virtual influencers are a relatively new marketing phenomenon that emerged in recent years, prompted by a rise in artificial intelligence and virtual reality technology (Jalan, 2022; Samosa, 2022; Webster, 2020). Virtual influencers can be used in more creative and complex ways to engage with a wide range of audiences and decrease the risks and limitations associated with human influencers, such as sickness or damaged reputation (P2P, 2021; Rasmussen, 2021). However, they have been associated with unrealistic expectations about what constitutes beauty and body type standards (Moustakas et al., 2020). Due to their novelty, there is a lack of research investigating whether non-human agents activate comparison mechanisms and how this impacts women's well-being and purchase behaviours. Moreover, when this research was conducted, no rules or regulations were enforced worldwide for those creating or using virtual influencers to disclose their non-human nature. Therefore, the present study aims to determine (1) the effects of virtual influencers on women's well-being and purchase intentions via comparison mechanisms and (2) the impact of disclaimers on that effect. The final goal is to provide a data-based answer to the question:

To what extent do virtual influencers' anthropomorphism levels and the use of disclaimers activate/deactivate the comparison mechanisms, and how do they impact the relationship with women's well-being and purchase intentions?

Figure 1 presents the proposed conceptual framework, including the different variables of interest and the hypothesised relationships between them. These will be discussed in detail in the following pages.

Figure 1

Moderated Mediation Conceptual Model, with Appearance-Based Social Comparison and Body Image Self-Discrepancy as Mediators and Disclaimer of Virtual Influencer Use as Moderator



2.2 Theoretical Framework

2.2.1 Virtual Influencers and Anthropomorphism

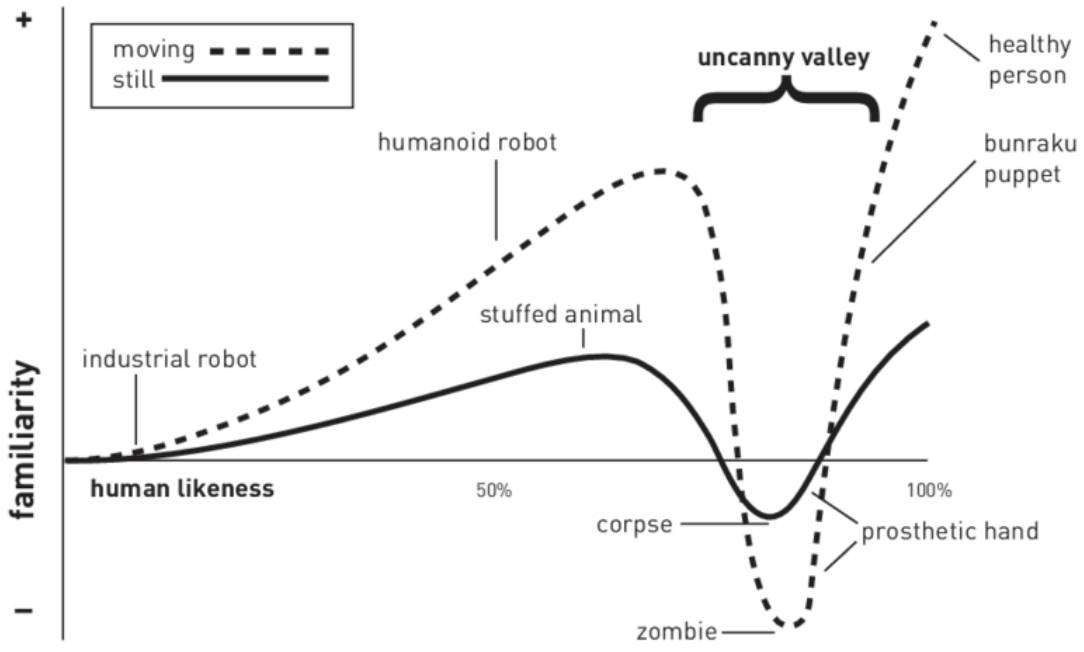
Virtual influencers are digital characters defined as "software entities that look and act like real or imaginary creatures in a computer-generated environment" (Vosinakis, 2020). While they do not exist in a physical form, virtual influencers are active on social media and are portrayed as having a specific personality, authentic experiences and friends, facing heartbreaks, happiness or other human-like feelings, and engaging in human-like behaviour, such as trying on makeup, clothes or food (Moustakas et al., 2020).

Virtual influencers are anthropomorphised to a higher or lower degree, ranging from cartoon characters such as Alvin and the Chipmunks to highly human-looking characters such as Miquela Sousa, one of the most well know virtual influencers in 2022 (Rasmussen, 2022). Anthropomorphism refers to attributing a human form, characteristics and features to non-human creatures, such as robots or digital characters (Aggarwal & McGill, 2012). Mori (1970, translated into English in 2012 by MacDorman) proposed that the anthropomorphism level of a non-human agent influences the positive or negative feelings (likability or familiarity) towards that agent, and this relationship is not linear.

Likeability increases positively with the anthropomorphism level until a point of high realism where people can still distinguish the object from an actual human (first peak), such is the case for a stuffed animal or a humanoid robot (Mori et al., 2012). After this point, people have trouble making this distinction (between 80-85% human likeness), reflected as a drop in likeability and the creation of an eerie feeling, resulting in what Mori described as the uncanny valley, where he included zombies and corpses. This feeling is evident by a "sense of strangeness, eeriness, and disquiet that can extend to feelings of disgust and revulsion" (Cheetham, 2011, p. 1). Lastly, once the realism increases to a point where the agent is perceived like a human (over 85% human likeness), the likeability increases to a second peak (Mori et al., 2012). Figure 2 illustrates the relationship between the two variables.

Figure 2

Mori's Graph of the Uncanny Valley, Translated and Simplified by MacDorman (2005)



Based on their anthropomorphism level, virtual influencers can be split into two groups: anime-like and human-like. Anime-like virtual influencers can be easily distinguished from humans as they present human-adjacent characteristics, such as extremely big eyes, thus falling within the first anthropomorphism vs likeability peak (Arsenyan & Mirowska, 2021; Yang et al., 2020). On the other hand, human-like virtual influencers have strong resemblances to humans in terms of their physical appearance, personality, and behaviours (Arsenyan & Mirowska, 2021; Moustakas et al., 2020). There is a growing number of human-like virtual influencers created with unrealistic expectations about what constitutes beauty and body type standards (Moustakas et al., 2020). Therefore, the rest of this paper will focus only on the human-like virtual influencers group, henceforth called "virtual influencers".

Based on the anthropomorphism level and human resemblance, virtual influencers can easily fall into the uncanny valley or the second anthropomorphism vs likeability peak. Nearly human virtual influencers can fall into the uncanny valley when they have distorted facial proportions (e.g. 50% enlargement of the eyes) or when the facial proportions are far from those of a human (MacDorman et al., 2009; Schwind et al., 2018). On the other hand, MacDorman et al. (2009) found that photorealistic textures of the skin and facial proportions that stay within human norms make them be perceived as real people, thus escaping the eerie feeling and reaching the second peak. These two anthropomorphism levels should have different effects on women's self-image based on the feelings they will generate. More specifically, virtual influencers on the border between non-human and human should evoke a strong eerie feeling due to an increased difficulty to categorise characters that look neither human nor robot or animal-like (de Borst & de Gelder, 2015). On the other hand, virtual influencers that people do not recognise as non-human should generate similar feelings to real influencers.

2.2.2 Comparison Mechanisms

2.2.2.1 Comparison with Highly Anthropomorphised Virtual Influencers. First introduced by Festinger in 1954, social comparison theory suggests that people have an intrinsic need to evaluate themselves, most often by comparing to others when non-social means are unavailable (Festinger, 1954). Therefore, social comparison includes all instances in which a person compares and contrasts their qualities or attributes to another's (Buunk & Gibbons, 2005).

While Festinger's theory was initially developed concerning evaluating abilities and opinions, Wood (1989) proposed that social comparison also applies to other evaluations, such as one's body image. Wang et al. (2019) defined the action of comparing with another person's body as an appearance-based social comparison. For example, Tiggemann and Polivy (2010) found that women engage in appearance-based social comparison when seeing other women with thinner and conventionally idealised bodies. Similarly, Brown and Tiggemann (2016) showed that Instagram users engage in comparison when shown images of thin celebrities and unknown peers.

Wood (1989) classified social comparison as upward, related to the comparison with others more superior to oneself, and downward, which is a comparison with others inferior to oneself. Seeing how virtual influencers are created to resemble conventionally idealised body types that are unrealistic and unattainable for most women, this research will focus on upward social comparison. This comparison was described by Gilbert et al. (1995) as an automatic process that can happen instantly when seeing someone else, even if the comparison is unwanted or the comparison agent is (later) deemed irrelevant. Consistent with this, Argo and Dahl (2018) showed how women engage in appearance-based social comparison with mannequins because, while non-human and irrelevant, they are linked to normative standards of thinness and beauty.

Moreover, when comparing themselves with idealised models portrayed in media, women are at risk of being faced with the harsh reality that their appearance does not match that ideal, unattainable body, also known as body-image discrepancies (Fioravanti et al., 2022). Higgins (1987) proposed two types of self-discrepancies, actual vs ought and actual vs ideal, leading to increased feelings of disappointment, dissatisfaction, and sadness. The former referred to discrepancies between the person's actual attributes and what they believe they ought to do, be or look like; the latter referred to the gap between the person's actual attributes and their ideal state of self (Higgins, 1987). As previously mentioned, traditional and current media outlets, such as social media platforms, promote idealised and unattainable images of female bodies, affecting women's view of their ideal selves (Stice & Shaw, 1994). Kirkpatrick and Lee (2021) showed that comparison between the actual self (one's own body) and the ideal self (ideal body portrayed online) causes body image self-discrepancies. Moreover, similarly to social comparison, Strauman and Higgins (1987) found that both types of self-discrepancies are automatically activated and induce negative emotional symptoms.

Prior research found evidence that these two mechanisms, body image self-discrepancy and appearance-based social comparison, might be related. For instance, Bessenoff (2006) found that the degree of self-discrepancy moderates the effects of social comparison on the different outcomes. However, considering the scope of this research was not to demonstrate that possible effect, the two mechanisms were run in parallel as separate mediators.

The current CGI technology is advanced to a level that allows virtual influencers to achieve very high human resemblance, thus making them almost indistinguishable from real humans. Since both comparison mechanisms automatically activate during exposure to idealised images, this research proposes that women will engage in comparisons with highly anthropomorphised virtual influencers.

Hypothesis 1a: A highly realistic virtual influencer will activate appearance-based social comparison and body image self-discrepancy in women.

2.2.2.2 Effect on Women's Purchase Intention. Higgins (1987) proposed that people are motivated to reduce the discrepancies between the actual and ideal self. The negative feelings associated with this gap can motivate consumers to engage in specific consumer behaviour that reduces self-discrepancy, such as purchasing items that can help them achieve their ideal self (Li et al., 2019; Luna-Arocas, 2008). Furthermore, Dinh and Lee (2022) found that when women are faced with influencers, they try to imitate them, an action explained through upwards social comparison. In a pursuit to close the gap between them and the influencer, they buy the promoted products (Dinh & Lee, 2022).

Therefore, this research proposes that, when faced with a virtual influencer who looks very much like a human, women will increase their purchase intentions due to the activation of the comparison mechanisms.

Hypothesis 1b: A highly realistic virtual influencer will lead to higher purchase intentions via higher levels of appearance-based social comparison and body image self-discrepancy.

2.2.2.3 Effect on Women's Well-Being. Davis (2019) describes a person's well-being as "the experience of health, happiness and prosperity" and includes concepts such as mental health and life satisfaction, which are affected by a person's body image and self-esteem (Lawler, 2022; Orth & Robins, 2014). When these two factors are low, well-being decreases.

Body image can be defined as a "person's perceptions, thoughts, and feelings about their body" (Grogan, 2006, p. 524). Most research in the body-image literature conceptualises this term in terms of body dissatisfaction, represented by negative feelings concerning one's own body (Grogan, 2006; Heider et al., 2018). Body dissatisfaction occurs when self-evaluation of one's body image is negative, and there is a perceived discrepancy between the

real and ideal body (Szymanski & Cash, 1995). This research will follow the same conceptualisation of this term with high body dissatisfaction decreasing overall well-being.

Furthermore, self-esteem can be defined through the valence, positive or negative, of the attitude one has towards the self (Rosenberg, 1965). Different factors influence self-esteem; however, prior research found that appearance is a significant predictor of global self-esteem for women (Connors & Casey, 2006; Harter & Leahy, 2001; Olchowska-Kotala, 2018). Therefore, this research uses appearance self-esteem as a predictor of global self-esteem for women, with low levels decreasing overall well-being.

A large number of experimental studies have shown that exposure to the thin ideal negatively impacts women's self-images, such as body satisfaction and appearance self-esteem (e.g. Argo & Dahl, 2018; Grabe et al., 2008; Scully et al., 2020). Tiggemann and Polivy (2010) and Brown and Tiggemann (2016) found that a critical path to body image dissatisfaction is the appearance-based social comparison with thinner and more conventionally idealised bodies. Moreover, Bessenoff (2006) found that women experiencing a higher level of self-discrepancy are more likely to engage in comparisons that lead to lower levels of appearance self-esteem.

In line with prior findings and the theorised relationship between virtual influencers and the comparison mechanisms, this research proposes that exposure to highly anthropomorphised virtual influencers will decrease women's well-being due to the activation of the comparison mechanisms.

Hypothesis 1c: A highly realistic virtual influencer will lead to decreased well-being (low appearance self-esteem and increased body dissatisfaction) via higher levels of appearance-based social comparison and body image self-discrepancy.

2.2.3 The Use of Disclaimers as a Possible Countermeasure

It was previously mentioned that only some virtual influencers allude to the fact that they are computer generated through comments or hashtags on their profile, while many others do not. Consumers would have to research this information themselves; however, what are the chances one would do this when faced with a highly anthropomorphised virtual influencer that looks exactly like a person? Robinson (2020) suggests that social media platforms where virtual influencers are active might have to implement specific tools to distinguish between real and virtual influencers. In 2022, Meta (former Facebook) acknowledged that using virtual influencers without disclaiming their non-human nature might negatively impact users (Meta, 2022). As a result, it announced that they were working on ethical guidelines defining how virtual influencers should be used, but nothing was available when this research was conducted (Meta, 2022). So far, only India has introduced regulations related to the use of virtual influencers in brand advertising, requiring that brands using virtual influencers in sponsored posts disclaim their non-humanness (Keegan, 2022).

More and more countries are discussing or have already introduced laws asking creators to add labels on top of the images, disclaiming to what extent the images posted online have been edited (e.g. Eggert, 2017; Lamba, 2019; Sieczkowski, 2012). Extensive research found that including a disclaimer calling out the fact that the image was digitally altered did not reduce the negative impacts on women's well-being (e.g. Bury et al., 2016; Fardouly & Holland, 2018; Tiggemann & Brown, 2018). Only Slater et al. (2012) found that warnings remind women that the thin ideal presented in the images was not relevant for them to compare with or aspire to, further reducing the adverse effects on body dissatisfaction. While most evidence suggests that disclaimers do not produce the desired effect, no research to date has focused on determining how the process works for disclaiming the virtual influencers' non-human nature. In the available research, the agent of comparison was always

human and therefore still seen as relevant even after exposure to the label. On the other hand, once the virtual influencer's non-human nature is disclosed, it should immediately be perceived as irrelevant. Moreover, Gilbert et al. (1995) suggested that if the person is made aware of the error of comparing with an irrelevant agent and can correct their thinking, they should be able to revert the comparison by consciously processing the information provided.

Consequently, this research proposes that disclaimers activate conscious processing, allowing women to realise that the comparison agent is irrelevant, thus deactivating the comparison mechanisms. It should further lead to a decrease in the hypothesised positive effects on purchase intention and adverse effects on well-being.

Hypothesis 2a: Disclaiming the non-human nature of the virtual influencer will reduce the impact of its high perceived human likeness on appearance-based social comparison and body image self-discrepancy in women.

Hypothesis 2b: Disclaiming the non-human nature of the virtual influencer will reduce the impact of its high perceived human likeness on women's purchase intentions via lower levels of appearance-based social comparison and body image self-discrepancy.

Hypothesis 2c: Disclaiming the non-human nature of the virtual influencer will reduce the impact of its high perceived human likeness on women's well-being (increased appearance-based self-esteem and decreased body dissatisfaction) via lower levels of social comparison and body self-discrepancy.

3. Data and Method

3.1 Study Setup

3.1.1 Participants

This study was conducted with a large sample of Caucasian millennial women living in the United Kingdom (UK) with British nationality, aged between 26 and 41 years old (M = 33.59, SD = 4.38). When this research was conducted, virtual influencers were mostly present on the social media platform Instagram. Therefore, only those participants who used Instagram regularly (at least once a month) were selected.

The choice of millennial females instead of other age groups was based on two reasons. Firstly, in September 2022, millennials represented almost 50% of the 32 million Instagram users in the UK, with 56% being women (Dixon, 2022a, 2022b). Secondly, millennials have been shown to follow and purchase products based on influencers' recommendations (Droesch, 2020; Iskiev, 2022). Therefore, millennial women could easily be exposed to and influenced by virtual influencers in their daily Instagram interactions. Further criteria they had to meet to be included in this study were: 1) their sex, gender, and gender identity was female/women (including Trans Female/Trans Women); 2) their first or fluent language was English; and 3) their Prolific Academic approval rate was 95% or higher. The sampling frame obtained from Prolific, the platform used to reach participants, contained 5,670 eligible participants.

Prolific uses convenience sampling, with the spots allocated on a first-come, first-served basis (Prolific, 2023b). While convenience sampling generally has low levels of external validity (Trochim et al., 2016), prior research found that results from Prolific are generally representative regarding user perceptions and experiences, which is what the current study focused on (Tang et al., 2022). Furthermore, additional measures have been taken to ensure participants provided qualitative responses: 1) participants were informed

upfront about the time needed to complete the study and their remuneration; 2) attention checks were included to ensure participants were actively reading the questions and paying attention to the study; and 3) the study excluded those who took part in the pre-test.

As the sample cannot be fully considered representative of the population, any effects of anthropomorphism level on purchase intention and well-being can be generalised based on the proximal similarity model (Trochim et al., 2016), such that similar effects could be expected for other Caucasian millennial females living in a Western country, aged between 26 and 41 years old, with high technological proficiency and who use Instagram.

An a priori power analysis for a two-way ANOVA that examined all main effects and interactions showed that 251 participants would provide 95% power ($\alpha = .05$) to detect a medium effect (Cohen's $f = .25$) in the dependent measures of interest. The online survey was sent to 300 participants, an extra 20%, to account for any incomplete data or dropouts. The final sample contained 299 participants, with one participant being removed because they did not pass the attention check.

3.1.2 Product Choice

A product was selected and used in the experiment to evaluate purchase intentions. Based on influencers' recommendations, the top five product types consumers purchased in 2020 were clothing/accessories, food/beverages, makeup, beauty products and tech (YPulse, 2020). Skincare is an expanding industry in the UK, with cosmetic facial care (facial creams and lotions) leading the category (Statista Research Department, 2022); therefore, a product from this category was used. To ensure brand unfamiliarity, the experiment showed a face moisturiser from a fictitious brand, Hydrop. The product packaging of an existing brand was used, and the product name was changed. The image can be seen in Appendix D.

3.1.3 Design

To investigate the effects of virtual influencers on women's well-being and purchase intentions, this research employed a 2 (Virtual Influencer's Anthropomorphism Level: Low, High) x 2 (Disclaimer of Virtual Influencer Use: Used, Not used) between-subjects experimental design. Participants were randomly assigned to different conditions, which ensured the only differences between groups were due to chance (Trochim et al., 2016). Generally, this type of study ensures a high level of internal validity, decreases bias and allows for concluding the causal relationship between the variables (Kothari, 2004, p.47). The current experiment involved manipulating the anthropomorphism level of the virtual influencer and the disclosure or non-disclosure of being computer generated. At the same time, it looked at the observed differences in the outcomes of the dependent variables (purchase intention and well-being).

3.1.4 Procedure

Data were collected using the online survey shown in Appendix E, created in Qualtrics. This data collection method is widely used in academic research because it is an automated, low cost and timely way of gathering responses; moreover, it is free from researcher bias, large samples can be targeted, and respondents can go through the questions at their pace (Siva Durga Prasad Nayak & Narayan, 2019; Trochim et al., 2016). Furthermore, it allows for anonymity during response collection, which decreases the social desirability bias (Trochim et al., 2016). Nonetheless, online surveys have the limitation of only allowing those with internet access and technological proficiency to participate in the research, increasing the sampling bias, as the excluded individuals could be different from those who chose to partake in the study (Palmer & Strickland, 2016).

Data collection was completed on the crowdworking research platform created and managed by Prolific Academic Ltd, which connects researchers and participants worldwide,

making it easy to target the right sample (Prolific, 2023a). The choice of this platform was based on several criteria. Firstly, Prolific has high levels of transparency for both participants and researchers, with strong regulations, rights, and obligations for both parties (Palan & Schitter, 2018). Secondly, it allows for screening participants and controlling for specific variables of interest, such as age and gender. The participants were paid an hourly rate of £6.00, and the survey completion took approximately 5 minutes, leading to a payment of £0.50 for completing the survey. Before starting the survey, information about the payment and a short study description were available to potential participants.

Participants were informed about confidentiality and the right to withdraw at any time, after which they had to provide their consent to start the survey. Next, the survey asked participants to pay attention to the Instagram profile of the fictitious lifestyle influencer Emily Green. As their attention to the image was necessary, they could only advance to the next question after spending a minimum of 20 seconds on that page. Following, it asked about their likelihood of purchasing the recommended product, their appearance self-esteem and body satisfaction current feelings, comparison tendency in the past 15 minutes, their current and ideal body image, several manipulations and attention checks, demographics, and control questions. All questions were mandatory, and participants could not advance without answering. Once participants reached the end of the survey, they were debriefed and thanked for their time. The payment was made within 24 hours of their submission.

The two levels of the independent variable were randomised, with each level being shown to an equal number of participants. Furthermore, the two mediators and the two measures of well-being (appearance self-esteem and body dissatisfaction) were presented randomly to account for one influencing the other and the final effects. Table 1 presents the sample plan as well as the order of the survey.

Table 1

Sample Plan and Survey Order

Power 95% (α = .05)			
Manipulation IV: High-Anthropomorphism (HA)		Manipulation IV: Low-Anthropomorphism (LA)	
Moderator: Disclaimer not used	Moderator: Disclaimer used	Moderator: Disclaimer not used	Moderator: Disclaimer used
Condition: Virtual Influencer HA and no disclaimer **DVs:** Purchase Intention + Well-being (randomised) **Mediators:** Appearance-Based Social Comparison and Body Image Self-Discrepancy (randomised) **Rest:** Manipulation checks, Attention, Demographics and Controls	**Condition:** Virtual Influencer HA and disclaimer **DVs:** Purchase Intention + Well-being (randomised) **Mediators:** Appearance-Based Social Comparison and Body Image Self-Discrepancy (randomised) **Rest:** Manipulation checks, Attention, Demographics and Controls	**Condition:** Virtual Influencer LA and no disclaimer **DVs:** Purchase Intention + Well-being (randomised) **Mediators:** Appearance-Based Social Comparison and Body Image Self-Discrepancy (randomised) **Rest:** Manipulation checks, Attention, Demographics and Controls	**Condition:** Virtual Influencer LA and disclaimer **DVs:** Purchase Intention + Well-being (randomised) **Mediators:** Appearance-Based Social Comparison and Body Image Self-Discrepancy (randomised) **Rest:** Manipulation checks, Attention, Demographics and Controls
n = 74 (one removed)	n = 75	n = 75	n = 75

3.1.5 Pre-Test Setup

To determine which influencer and disclaimer to use in the experiment, a between-subjects pre-test was conducted with two goals: 1) influencer selection and 2) disclaimer selection. The pre-test was run with 120 participants, having the same selection criteria as the main study and using Prolific Academic for data collection. The participants were randomly allocated to one of the eight conditions based on the influencer images created. A small sample of 15 participants per condition is generally deemed acceptable for running a pre-test. The questions used in the pre-test can be found in Appendix B, and the complete data analysis can be found in Appendix C. Only the main results of the pre-test will be presented in this chapter.

3.2 Stimuli and Manipulation

3.2.1 Anthropomorphism Level (Independent Variable)

On top of the main effects of highly anthropomorphised virtual influencers, this research aimed to assess how different anthropomorphism levels impacted the dependent variables of interest; therefore, new visual stimuli of a virtual influencer were manipulated and pre-tested. Firstly, several criteria were applied to find the right virtual influencer for the experiment: 1) the virtual influencer identified themselves as female; 2) the virtual influencer had a high anthropomorphism level, which the researcher herself determined; 3) the virtual influencer was mid-tire (maximum of 300K followers), to limit the possibility that participants know them; and 4) the virtual influencer has previously posted a front-facing image, so that differences between images would be kept to a minimum as much as possible. Based on these criteria, two influencers were pre-selected: Bermuda (Instagram handle: bermudaisbae) and Dagny (Instagram handle: dagny.gram).

Bermuda is a virtual influencer with 256K followers on Instagram, created in 2016 by the marketing agency Brud (Dodgson, 2019). She was featured in social media advertisements for brands such as Chanel, Balenciaga, Tesla, Adam Selman and Starbucks (CM Models, 2023). The second influencer, Dagny, made her appearance in 2019 and has around 10K followers on Instagram. She was created by Cameron-James Wilson, owner of the digital modelling agency The Diigitals. She worked with brands such as Mercedes, Paraiso MB and S Moda. Both virtual influencers are Caucasian, with blond hair and blue eyes. They have conventionally attractive features and a similar body to what is currently deemed the “ideal size” (Bozsik et al., 2018; Moustakas et al., 2020).

In the second step, the researcher selected one front-facing image per influencer that looked as similar as possible. Lastly, the images have been photoshopped, and different levels of anthropomorphism have been created. All new images can be seen in Appendix A.

According to Mori (1970), a non-human agent could reach three levels of anthropomorphism. However, since virtual influencers are already created with a high level of anthropomorphism to resemble humans, they could fall into two groups: the second anthropomorphism vs likeability peak or the uncanny valley (Mori et al., 2012).

For the first group, the virtual influencer should have a human-realistic appearance. To operationalise this level, the original image taken from the virtual influencer's Instagram has been used (high anthropomorphism level, HA).

For the second group, the virtual influencers should be at the border between non-human and human (medium anthropomorphism, MA). Since there is no singular best way to end up at this level, the pre-selected images have been manipulated in three ways. Firstly, the original image was photoshopped to portray disproportionate eyes on the face. This has been done using the app "FaceApp", one of the most popular editing apps in the App store in October 2022. The tool "reshape" has been used, and a separation between the eyes of 20pt has been applied to each photo. This version was coded MAv1. Secondly, on top of the disproportionate eyes, the influencer's skin was discoloured to look grey while keeping all the other elements the same. The tool used for this was Photoshop. A saturation of -60 has been applied to the virtual influencers' skin. This version was coded MAv2. Lastly, the third version, coded MAv3, used only the discoloured skin of the influencer.

To ensure the image manipulations were successful and the images presented showed different anthropomorphism levels, the Anthropomorphism sub-scale from the "Godspeed" scale by Bartneck et al. (2009) was used in both the pre-test and the main experiment and proved satisfactory internal consistency with Cronbach's $\alpha = .89$. This sub-scale is widely used in the research community to test the anthropomorphism of robots (see Weiss & Bartneck, 2015). Participants rated their attitude towards the virtual influencers on five

semantic differential scales from one to five (e.g. Fake to Natural, Moving rigidly to Moving naturally).

The pre-test results revealed that Dagny was seen as more realistic, with all images (real and photoshopped) having higher anthropomorphism scores than Bermuda's (see Appendix C for full details). Regarding anthropomorphism levels, statistically significant differences were found only between groups HA and MAv2. Likeability and attractiveness were used as control variables and showed no comparable differences between these two groups. Therefore, the main experiment used the images corresponding to Dagny, levels HA and MAv2 (renamed LA), as seen in Figures 3 and 4.

Figure 3

Dagny, HA level

Figure 4

Dagny, LA level

3.2.2 Disclaimer of Virtual Influencer Use (Moderator)

The moderator variable proposed for this study was the Disclaimer of Virtual Influencer Use. Following the current rules for sponsorship disclosure, which state that disclosures should be visible (prominent) for consumers to see (Federal Trade Commission, 2013), two new labels were designed. To enhance attention, the colour red was used in both labels, as this colour was found to have a high level of compliance (Braun & Silver, 1995) and is widely used for warnings. Slater et al. (2012) found that labels containing the word "warning" reminded women that the model presented was not relevant for them to compare with or aspire to; therefore, Disclaimer 1 (Figure 5) was designed to draw attention to the influencers' computer-generated nature and warn participants that the influencer is irrelevant for comparison. Disclaimer 2 (Figure 6) called out the influencers' computer-generated nature in a more subtle way, making it a prime candidate to be enforced as a mandatory label by policymakers, as it can easily be overlayed over the images.

The newly created disclaimer labels have been pre-tested to determine: 1) which of them participants noticed, 2) which best conveyed the message, and 3) which was most appealing. Based on the results, participants perceive both disclaimers as relatively equal (see Appendix C for full details). However, the researcher's goal was to highlight that the virtual influencer was computer generated and to deactivate women's body comparison tendencies. Therefore, Disclaimer 1 was used in the main experiment.

Figure 5

Disclaimer 1

Figure 6

Disclaimer 2

3.3 Measures and Reliability

3.3.1 Purchase Intention (Dependent Variable 1)

Purchase intention measurements are widely used in academic research to relate consumers' purchase behaviour (e.g. Jiménez-Castillo & Sánchez-Fernández, 2019). While different papers employ different wordings and scales to operationalise this construct, Morwitz et al. (2007) found that purchase intention can be a strong predictor of future behaviour, especially in situations when the purchase decision is straightforward and refers to a durable product (e.g. the consumer is familiar with the product or the product type). Subsequently, the purchase intention of the fictitious brand of face cream has been tested using a one-item scale developed based on the best practices indicated by Morwitz et al. (2007): "If you were on the market to try a face cream, and it was in your price range, would you buy the one recommended?" (1 = strongly disagree, 7 = strongly agree).

3.3.2 Appearance Self-Esteem (Dependent Variable 2)

The scale "State Appearance Self-Esteem" by Heatherton & Polivy (1991) was used to assess the appearance self-esteem of participants using six items (e.g. "I am pleased with my appearance"). Participants rated their degree of agreement with each item on a 5-point Likert scale ranging from 1 (not at all) to 5 (extremely). The scale exhibited strong internal consistency, with Cronbach's $\alpha = .88$. The design of the current experiment was meant to temporarily alter participant's self-esteem by looking at images of a highly attractive model, and Heatherton and Polivy's (1991) scale is sensitive to such temporary changes.

3.3.3 Body Image Dissatisfaction (Dependent Variable 3)

Following previous studies in idealised body image exposure (e.g. Bury et al., 2016; Fardouly & Holland, 2018; Heinberg & Thompson, 1995), the Visual Analogue Scales (VAS) developed by Fardouly and Holland (2018) were used to assess body dissatisfaction based on participant's current feelings on four items (e.g. "physical attractiveness",

"satisfaction with your facial appearance"). The scale showed satisfactory internal consistency, Cronbach's α = .78. Participants had to move a vertical marker to the appropriate place on a horizontal line with the endpoints "not at all" (0) and "very much" (100).

3.3.4 Appearance-Based Social Comparison (Mediator 1)

The State Appearance Comparison Scale developed and tested by Tiggemann and McGill (2004) was used to assess appearance-based social comparison. This scale enabled assessment of the amount of actual appearance processing and comparison in which participants engage during the image processing. Participants rated their degree of agreement with each item on a 7-point Likert-type scale that ranges from 1 (Strongly disagree) to 7 (Strongly agree). The scale showed satisfactory internal consistency with Cronbach's α = .81.

3.3.5 Body Image Self-Discrepancy (Mediator 2)

The visual body scale is a standard method of measuring the degree of self-discrepancy that has proven to be a robust measure of distorted perceptions and attitudes towards body image (Ralph-Nearman & Filik, 2020). To that extent, the Female Body Scale (FBS) by Ralph-Nearman and Filik (2020) has been chosen because it is the most recent scale developed that accurately represents nine female body versions. The scale has been developed from actual female body figures, having a 10% increase in width between each body figure; several test-retest proved it was reliable (Ralph-Nearman & Filik, 2020). Respondents had to select one of the nine body figures corresponding to their current and ideal body image. The Body Image Self-Discrepancy score was calculated based on the Ideal figure score - Current figure score.

3.4 Control Variables

The study included six control variables: age, physical attractiveness, likeability and familiarity with the virtual influencer, following the virtual influencer, and prior purchase based on an influencer recommendation.

Prior studies showed that age impacts the perception of one's body image, which could lead to inaccurate assumptions of the effects of anthropomorphic level on purchase intention and well-being variables (Ålgars et al., 2009).

According to Mori (1970), the different levels of anthropomorphism of the non-human agent, in this case, the virtual influencer, could lead to differences in its likeability. Furthermore, as the images were edited to portray disproportionate facial features and discoloured skin, the influencer's attractiveness could also suffer, influencing the results. The semantic differential scale by Burgoon et al. (2009) was included to control for the potential effects of attractiveness, which proved satisfactory internal consistency, with Cronbach's α = .92. Participants rated their attitude towards the virtual influencers on three items from one to five (e.g. Attractive to Unattractive). Furthermore, to control for the influencers' likeability, the sub-scale from the "Godspeed" scale created by Bartneck et al. (2009) was used, which reflected satisfactory internal consistency ($\alpha = 0.95$). Participants rated their attitude towards the virtual influencers on five semantic differential items from one to five likeability (e.g. Unfriendly to Friendly; Awful to Nice).

Lastly, to control for the potential effect of participants' familiarity and liking of the virtual influencer, as well as their general tendency to purchase items based on influencer recommendations, three items with three possible responses (No, Yes, I do not remember) have been included: "I am familiar with the influencer in the post."; "I follow the influencer on Instagram." and "Have you ever bought something promoted by an influencer?".

3.5 Attention Checks

Two attention checks were included to ensure high data quality and catch any unmotivated respondents who might have sped through the survey or answered randomly. First, the survey asked respondents, "What product did the influencer talk about/recommend in her post?" to detect if participants paid attention to the image. A second attention check

related to the disclaimer has been included, “Do you recall seeing a disclaimer on the first image of the post?” testing if the participants paid enough attention to the image and recognised the newly created label as a disclaimer.

3.6 Analysis Method

The first step of the data analysis was to calculate the descriptive statistics, determine the reliability of the different scales, run the manipulation and attentions checks and calculate the intercorrelations between all variables. Three independent samples *t*-tests were performed to assess if there were any significant differences between the two images of the influencer in terms of anthropomorphism, likeability, and attractiveness. To assess the relationship between the anthropomorphism level, disclaimers, and mediators, two 2 x 2 Univariate Analyses of Variance (ANOVA) were performed. A two-way ANOVA is an excellent way to test if there is a statistically significant interaction between two independent variables on a dependent variable (Trochim et al., 2016). Furthermore, if an interaction effect is not found, the analysis allows for the interpretation of the main effects of the two independent variables on the dependent variable (Kothari, 2004; Trochim et al., 2016).

To assess the mediation effect of appearance-based social comparison and body image self-discrepancy between anthropomorphism level and the dependent variables, three mediation-based regression analyses (model 4) were conducted. This analysis was performed using PROCESS Procedure for SPSS by Andrew F. Hayes. This method was selected instead of more traditional ones, such as the causal steps approach (Baron and Kenny method, 1986), because it uses bootstrapping, allowing for data analysis without assuming a sample distribution (Frost, 2018). Moreover, it tests the potential mediation effects without being affected by non-significant total effects, which could lead to the erroneous conclusion that the mediator has no effects whatsoever (Hayes, 2009).

4. Results

This chapter presents the results of the data analysis conducted in SPSS. Firstly, the data obtained from the survey were reviewed and prepared for analysis, and the scales used to measure the different constructs were checked for reliability. Secondly, the variables were summarised, and the initial descriptive statistics were presented. Finally, the hypotheses were tested, and the results were described in detail.

4.1 Data Preparation and Statistical Procedure

4.1.1 Attention Checks

The first step was to remove participants who had failed the attention test. Of the 300 respondents who took part in the survey, one participant failed the attention test "What product did the influencer talk about/recommend in her post?" so their data were excluded from the follow-up analysis. This participant belonged to the High Anthropomorphism X No Disclaimer condition.

In addition, 74 participants did not pass the disclaimer check. Of those in the no disclaimer condition, 70% (104) correctly recalled the absence of the disclaimer, 12% (18) incorrectly recalled the presence of the disclaimer, and 18% (27) could not recall it. Of the participants in the disclaimer condition, 81% (121) correctly recalled the presence of the disclaimer, 13% (20) incorrectly recalled the absence of the disclaimer, and 6% (9) could not recall it. To determine whether retaining these participants would affect the results, analysis was conducted with the entire dataset (299 participants) and a separate dataset from which 74 participants were removed (225 participants). The results were compared and showed that they were essentially identical except for a lower statistical significance power. Therefore, regardless of whether they answered correctly, no participants were removed from the study. Since participants might have been confused by the presence of both a disclaimer label and hashtags, this is further addressed in the discussions section.

4.1.2 Reverse-Scoring

The scales used contained reverse-scored items to reduce response bias (Field, 2017). Before calculating the reliability tests, these items were recoded into new variables: two items from the appearance self-esteem scale ("I am dissatisfied with my weight" and "I feel unattractive") and three items from the body image dissatisfaction scale ("Physically attractive"; "Satisfaction with your facial appearance" and "Satisfaction with your body size and shape").

4.1.3 Reliability Analysis and New Variable Creation

All scales used in this study were adopted from previous studies, and reliability analysis was conducted to ensure participants understood them correctly. Cronbach's alpha (α) is a commonly used and widely accepted measure for internal reliability, with an α-value of 0.70 or higher indicating acceptable consistency of the scale items (Taber, 2018). All scales showed high reliability, as seen from the results presented in the previous chapter. The next step was to create the new variables.

The variable appearance self-esteem (ASE) was calculated using the six items of the original Heatherton & Polivy (1991) scale. A high (low) mean score in this new variable represents a high (low) level of appearance self-esteem.

The variable body image dissatisfaction (BID) was calculated using the four items from the original Fardouly and Holland (2018) scale. This new variable measured participants' average dissatisfaction with their bodies, with a high (low) mean representing high (low) body image dissatisfaction.

The appearance-based social comparison (ASC) variable was calculated using the three items of the original scale by Tiggemann and McGill (2004). This new variable measured the average appearance-based social comparison, with a low (high) mean indicating a weak (strong) tendency of appearance-based social comparison.

The variable body image self-discrepancy (BISD) was calculated to measure the average discrepancy between participants' ideal and actual body images. A negative value meant dissatisfaction with the current body and a desire for a more petite body. A positive value indicated dissatisfaction with the current body and a desire for a larger body. A value of zero meant satisfaction with the current body.

Finally, the anthropomorphism, likeability, and attractiveness variables were created to measure the average scores given to the virtual influencer portrayed in the image instead of the scales used during data collection.

4.2 Descriptive and Frequencies Statistics

The 299 participants were randomly assigned to one of the four conditions, with 74 participants selected for the high anthropomorphism and no disclaimer condition and 75 for each of the other three conditions. According to the Central Limit Theorem, the normality of the data can be assumed regardless of the shape of the sample data if the sample is larger than 30 and the data selection is random (Kwak & Kim, 2017; Turney, 2022).

Respondents were between 26 and 41 years old, with a mean age of 33.6 years (SD = 4.38), and according to sample limitations, all identified themselves as female. Almost all participants did not know the virtual influencer in the post (99%) and did not follow them on Instagram (100%), which should prevent familiarity effects. In addition, 50.8% (152) of participants had never purchased anything promoted by a virtual influencer, 43.8% (131) had, and 5.4% (16) could not recall.

4.2.1 Independent Variable and Moderator

The images participants saw at the beginning of the study either contained a disclaimer (the moderator) informing them of the non-human nature of the virtual influencer or did not. In total, 149 participants saw the image of the virtual influencer without a disclaimer (No Disclaimer). Of these, 74 participants were assigned to the high

anthropomorphism condition (HA) and 75 to the low anthropomorphism condition (LA). The remaining 150 participants who saw the image of the virtual influencer with a disclaimer (Disclaimer) were evenly distributed between the two perceived anthropomorphism levels. Therefore, 299 participants were assigned to either a high or low anthropomorphism level, resulting in a HA group with 149 participants and a LA group with 150 participants (Anthropomorphism Level). The independent variable anthropomorphism level has been coded as a dummy variable with 0 = HA and 1 = LA. In addition, the moderator variable Disclaimer was coded as a dummy variable with 0 = No Disclaimer and 1 = Disclaimer.

4.2.1.1 Anthropomorphism Level Manipulation Check. An independent samples t-test was conducted to assess whether the image manipulation of the virtual influencer's anthropomorphism level was successful. The results showed that the HA-manipulated image was rated higher than the LA-manipulated image in terms of anthropomorphism, $M_{HA} = 3.28$, $SD_{HA} = 1.07$, $M_{LA} = 2.42$, $SD_{LA} = 0.95$, $t(293) = 7.29$, $p < .001$. Levene's test revealed unequal variance ($F = 5.90$, $p = .016$). Therefore, the degrees of freedom were adjusted from 297 to 293.

4.2.1.2 Likeability and Attractiveness. Two independent samples t-tests were conducted to determine whether participants rated the two anthropomorphism levels of the virtual influencer differently in terms of likeability and attractiveness to understand whether the results could be attributed to the anthropomorphism level alone or whether these two variables could influence the effects. The results showed that the HA-manipulated image was rated higher than the LA-manipulated image on both likeability ($M_{HA} = 3.90$, $SD_{HA} = 0.78$, $M_{LA} = 3.60$, $SD_{LA} = 0.84$, $t(297) = 3.21$, $p < .001$) and attractiveness ($M_{HA} = 4.23$, $SD_{HA} = 0.72$, $M_{LA} = 3.07$, $SD_{LA} = 1.02$, $t(268) = 11.3$, $p < .001$). Levene's test revealed unequal variance for the attractiveness test ($F = 12.1$, $p < .001$); therefore, the degrees of freedom

were adjusted from 297 to 268. The implications of this and the results of the correlation analysis are discussed later in this chapter.

4.2.2 Dependent Variables

The experiment tested the effects of virtual influencers on three dependent variables: purchase intent (PI), appearance self-esteem (ASE), and body image dissatisfaction (BID). The mean of the first dependent variable, PI, equalled 3.54 (*SD* = 1.50), following a normal distribution, with skewness of -0.057 (*SE* = 0.14) and kurtosis of -0.85 (*SE* = 0.28). The mean of the second dependent variable, ASE, equalled 2.51 (*SD* = 0.88), following a normal distribution with skewness of 0.14 (*SE* = 0.14) and kurtosis of -0.82 (*SE* = 0.28). The mean of the third dependent variable, BID, equalled 57.6 (*SD* = 20.3), following a normal distribution with skewness of 0.079 (*SE* = 0.14) and kurtosis of -0.64 (*SE* = 0.28).

4.2.3 Mediator Variables

The mean of the first mediator variable, appearance-based social comparison (ASE), was 2.14 (SD = 0.99), following a normal distribution with a skewness of 0.89 (SE = 0.14) and kurtosis of 0.008 (SE = 0.28). The mean of the second mediator variable, body image self-discrepancy (BISD), was -1.88 (SE = 1.36), suggesting participants were unhappy with their bodies and wanted to be skinnier.

On top of the global descriptives presented above, Table 2 summarises the means and standard deviation of all variables by the anthropomorphism level group.

Table 2

Means and Standard Deviations of all Measured Variables by Anthropomorphism Level

	High Anthropomorphism *(n = 149)*		Low Anthropomorphism *(n = 150)*	
Variable	*M*	*SD*	*M*	*SD*
Purchase Intent	3.88	1.40	3.21	1.51
Appearance Self Esteem	2.45	0.86	2.56	0.89
Body Image Dissatisfaction	60	20.5	55.3	19.9
Appearance-Based Social Comparison	2.29	1.08	1.99	0.89
Body Image Self-Discrepancy	-1.97	1.39	-1.80	1.34

4.2.4 Correlation Matrix

To measure the strength and direction of the associations between the dichotomous variable anthropomorphism level and the other continuous variables, a biserial correlation has been conducted, presented in Table 3 (Field, 2017). The anthropomorphism level was significantly related to the likelihood of a person purchasing the recommended product (r_b = -.23 [-0.33, -0.12], p < .001), body image dissatisfaction levels (r_b = -.12 [-0.23, -0.004], p = .043), appearance-based social comparison (r_b = -.15 [-0.26, -0.033], p = .012), likeability (r_b = -.18 [-0.29, -0.071], p = .001) and attractiveness (r_b = -.55 [-0.62, -0.46], p < .001). There was no significant relationship between the anthropomorphism level and appearance self-esteem r_b = .064, p = .27 or body image-self discrepancy r_b = .061, p = .29.

The previously theorised control variable age did not correlate with any of the dependent variables; therefore, it was not included when reporting the analysis. On the other hand, the control variable prior purchase was correlated with the dependent variable purchase intention and was therefore included in all future analyses for this DV (r_b = .14 [0.025, 0.25], p = .017). In addition, both attractiveness and likeability correlated strongly with the dependent variable purchase intention (r_b = .44 [0.34, 0.52], p < .001; r_b = .49 [0.41, 0.58], p

< .001) and the mediator appearance-based social comparison (r_b = .29 [0.18, 0.39], p < .001; r_b = .19 [0.083, 0.30], p < .001), as well as with each other (r_b = .62 [0.55, 0.69], p < .001) and with the independent variable anthropomorphism level (r_b = -.55 [-0.62, -0.46], p < .001; r_b = -.18 [-0.29, -0.071], p = .001). Attractiveness was also strongly correlated to the dependent variable, body image dissatisfaction (r_b = .12 [0.011, 0.23], p = .032).

Since attractiveness and likeability correlate with the anthropomorphism level and with each other, this means that the image manipulation of the anthropomorphism level resulted in significant differences between the two groups that were not captured in the pre-test. While these two variables correlate with two of the dependent variables and should therefore be included as control variables in the analyses, the downstream effect of these two confounding variables could influence the outcome of the experiment by reducing the magnitude of the underlying effect and leading to false negative findings (VanLunen, 2020). To avoid this potential Type II error, they were not included as control variables in any of the future analyses. The strong correlation could also mean that these two variables act as mediators in the relationship between anthropomorphism level, appearance-based social comparison and the three dependent variables. While the possibility of a sequential mediation with attractiveness/likeability and appearance-based social comparison was not previously hypothesised, the analysis has been conducted, and the results can be seen in Appendix F. They are further discussed in the discussions section.

Furthermore, dependent variables appearance self-esteem and body image dissatisfaction were highly correlated (r_b = -.87 [-0.89, -0.84], p < .001), with the two scales possibly measuring the same thing. However, since the two have been used to create an overall measure of well-being, the two variables have been treated as independent DVs. This significant correlation is further addressed in the discussion chapter.

Table 3

Means, Standard Deviations, and Correlations of all Measured Variables

	M	SD	1	2	3	4	5	6	7	8	9	10
1. Anthropomorphism Level	-	-										
2. Disclaimer Use	-	-	-.003									
3. Prior Purchase	-	-	.036	.059								
4. Purchase Intent	3.54	1.49	-.23**	-.14*	.14*							
5. Appearance Self-Esteem	2.51	0.88	.064	.034	.003	.056						
6. Body Image Dissatisfaction	57.6	20.3	-.12*	.002	-.012	-.064	-.87**					
7. Appearance-Based Social Comparison	2.14	0.99	-.15*	-.074	.085	.24**	-.26**	.27**				
8. Body Image Self-Discrepancy	-1.88	1.36	.061	.017	-.083	.010	.55**	-.57**	-.17**			
9. Age	33.6	4.38	-.010	.008	-.058	.090	-.073	.056	-.054	-.087		
10. Likeability	3.75	0.82	-.18**	-.006	.13*	.49**	-.003	.015	.19**	.007	.041	
11. Attractiveness	3.65	1.06	-.55**	-.052	.027	.44**	-.095	.12*	.29**	-.093	.14*	.62**

Note. ** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

4.3 Hypothesis Testing

4.3.1 Effects of Anthropomorphism Level and Disclaimer Use on Mediators

Hypothesis 1a: A highly realistic virtual influencer will activate appearance-based social comparison and body image self-discrepancy in women.

Hypothesis 2a. Disclaiming the non-human nature of the virtual influencer will reduce the impact of its high perceived human likeness on appearance-based social comparison and body image self-discrepancy in women.

Two 2 x 2 between-subjects factorial Analysis of Variance (ANOVA) tests were run to determine if differences in the anthropomorphism level and disclaimer use led to differences in appearance-based social comparison and body image self-discrepancy activation. Residual analysis was performed to test the assumptions of the two-way ANOVA. Only the violated assumptions and the measures taken to remedy them are discussed in detail. All dependent variables were measured at the continuous level, and the two independent variables were dichotomous. Moreover, the observations were independent, as each condition had different participants. The normality assumption was violated in both analyses, as assessed by Shapiro-Wilk's test (p <.001). However, the sample was relatively large, and ANOVAs are robust to deviations from normality, so the analysis was carried out (Caldwell et al., 2022). In cases where outliers were detected, as determined by cases with standardised residuals of more than ±3 *SD*s, the analysis was performed once with and once without outliers. None of the differences was significant, so the outliers were retained in all cases.

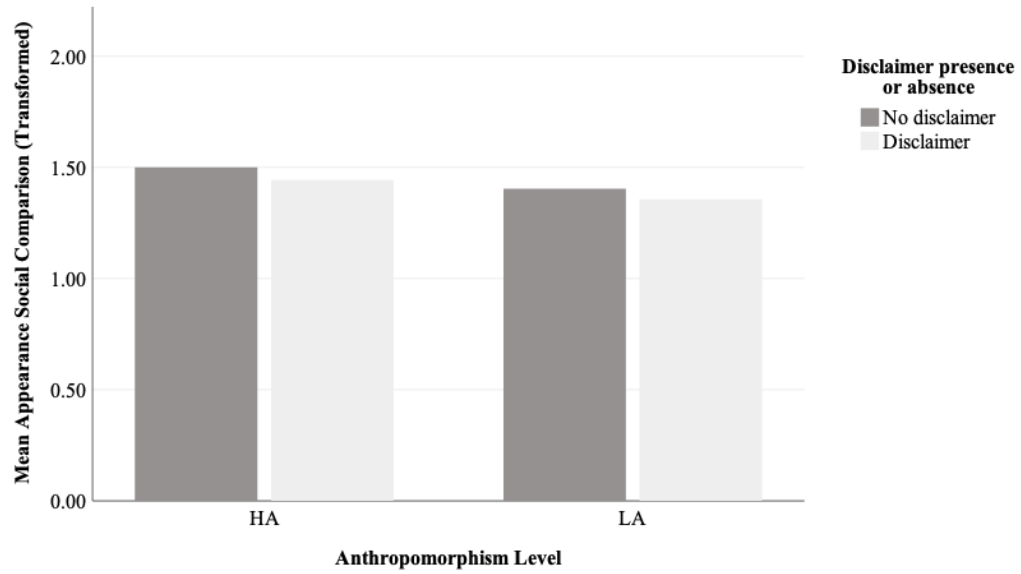
4.3.1.1 Results Appearance-Based Social Comparison. A two-way ANOVA was conducted to determine the effects of anthropomorphism level on the participant's appearance-based social comparison. Five outliers were found in the data. The assumption of homogeneity of variances was violated, as revealed by Levene's test for equality of variances (p = .039). A square root transformation was applied to transform this variable with a

moderately positive skewness (between 0.5 and 1; Biostats, 2017; Oracle, 2022). The analysis has been re-run, revealing homogeneity of variances, as assessed by Levene's test of homogeneity of variance (p = .14). There was no statistically significant interaction effect between anthropomorphism level and disclaimer use for the appearance-based social comparison score, $F(1, 295) = 0.019$, p = .89, partial η^2 = .000. Therefore, a main effect analysis for anthropomorphism level was performed, revealing a statistically significant effect, $F(1, 295) = 5.84$, p = .016, partial η^2 = .019. The high anthropomorphism level was associated with a mean appearance-based social comparison score of 0.091 higher than the low anthropomorphism level. There was no significant main effect of disclaimer use, $F(1, 295) = 1.933$ p = .17, partial η^2 = .007.

Figure 7 shows the mean values of the variable appearance-based social comparison for Anthropomorphism Level X Disclaimer Use conditions. As predicted, participants assigned to the high anthropomorphism condition had higher appearance-based social comparison tendencies than participants assigned to the low anthropomorphism condition.

Figure 7

Clustered Bar Showing the Mean of Appearance-Based Social Comparison for Anthropomorphism Level X Disclaimer Use Conditions

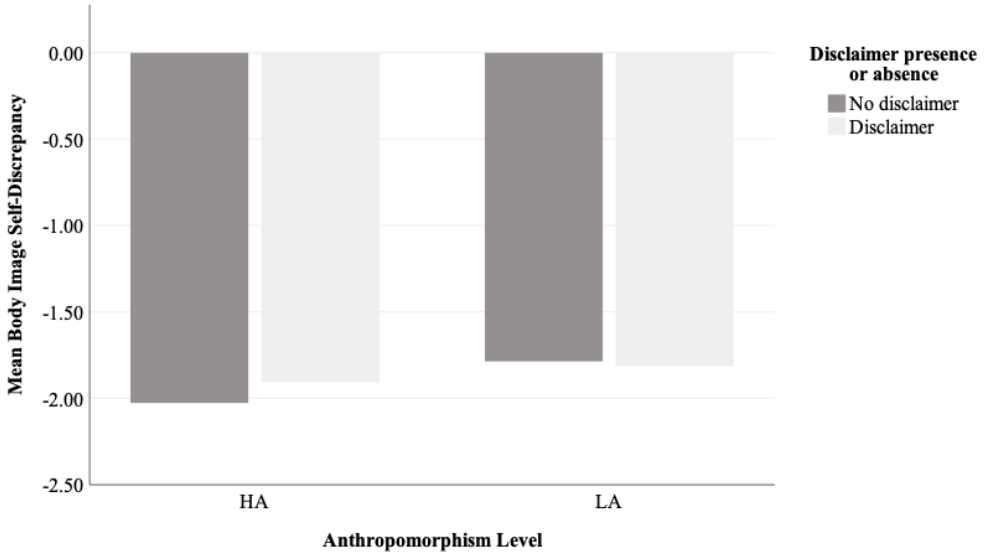


4.3.1.2 Results Body Image Self-Discrepancy. A two-way ANOVA was conducted to determine the effect of anthropomorphism level on the participant's body image self-discrepancy. Nine outliers were found in the data. There was no statistically significant interaction effect between anthropomorphism level and disclaimer use for the body image self-discrepancy score, $F(1, 295) = .22$, $p = .64$, partial $\eta^2 = .001$. Furthermore, there was no statistically significant main effect on body image self-discrepancy for disclaimer use, $F(1, 295) = .088$, $p = .77$, partial $\eta^2 = .000$, or anthropomorphism level, $F(1, 295) = 1.12$, $p = .29$, partial $\eta^2 = .004$.

Figure 8 shows the mean values of the variable body image self-discrepancy for anthropomorphism level and disclaimer use conditions. Even though the findings were not statistically significant, participants assigned to the high anthropomorphism condition had higher discrepancy levels between their current and ideal bodies than participants assigned to the low anthropomorphism condition, as predicted.

Figure 8

Clustered Bar Showing the Mean of Body Image Self-Discrepancy for Anthropomorphism Level X Disclaimer Use Conditions



These results support one part of H1a, as the results were only significant for the variable appearance-based social comparison. Furthermore, since no interaction effects were found, H2a could not be accepted. Disclaiming the non-human nature of the virtual influencer did not seem to influence the impact of the highly realistic virtual influencer on appearance-based social comparison or body image self-discrepancy.

4.3.2 Interaction Effects of Mediators and Disclaimer Use on the Dependent Variables

To further test whether the disclaimer had any effect on the relationship between the mediators and the dependent variables and thus determine whether the data could be used in full for the remainder of the analysis or had to be split into the conditions of disclaimer use, multiple moderation-based regression analyses were performed using the PROCESS Procedure for SPSS by Andrew F. Hayes (Model 1). A bootstrap sample of 5000 was combined with a 95% confidence level for the confidence intervals. The analyses showed that none of the moderations was significant, with $p > .05$ in all cases; therefore, the entire sample was used in the remaining analysis. The various interaction effects are presented in Table 4.

Table 4

Multiple Moderation-Based Regression Analyses

	b	*SE* (HC0)	*t*	*p*
Med1 x Moderator on DV1	.055 [-0.28, 0.39]	0.17	0.33	.74
Med1 x Moderator on DV2	.13 [-0.072, 0.34]	0.10	1.28	.20
Med1 x Moderator on DV3	-4.59 [-9.39, 0.19]	2.44	-1.89	.060
Med2 x Moderator on DV1	.11 [-0.13, 0.35]	0.12	0.88	.38
Med2 x Moderator on DV2	.085 [-0.050, 0.22]	0.069	1.24	.22
Med2 x Moderator on DV3	-1.92 [-5.38, 1.55]	1.76	-1.09	.28

Note. 95% CIs are reported in square brackets and standard error has been adjusted for heteroscedasticity (HC0) Med 1: Appearance-Based Social Comparison; Med 2: Body Image Self-Discrepancy; Moderator: Disclaimer use; DV1: Purchase Intention; DV2: Appearance Self Esteem; DV3: Body Image Dissatisfaction

Hypothesis 2b: Disclaiming the non-human nature of the virtual influencer will reduce the impact of its high perceived human likeness on women's purchase intentions via lower levels of appearance-based social comparison and body image self-discrepancy.

Hypothesis 2c: Disclaiming the non-human nature of the virtual influencer will reduce the impact of its high perceived human likeness on women's well-being (increased appearance-based self-esteem and decreased body dissatisfaction) via lower levels of social comparison and body self-discrepancy.

Since the interaction effects from the independent variable to the mediators and from the mediators to the dependent variables were insignificant, it was concluded that there is no possibility of moderated mediation as hypothesised in H2b and H2c. This was further confirmed by conducting three moderated mediations (Model 58) which produced the same results, as seen in Appendix G. Consequently, H2b and H2c could not be accepted.

4.3.2 Mediation Analyses

Hypothesis 1b: A highly realistic virtual influencer will lead to higher purchase intentions via higher levels of appearance-based social comparison and body image self-discrepancy.

Hypothesis 1c: A highly realistic virtual influencer will lead to decreased well-being (low appearance self-esteem and increased body dissatisfaction) via higher levels of appearance-based social comparison and body image self-discrepancy.

While a significant effect of the anthropomorphism level was only found on mediator appearance-based social comparison, Hayes (2009) argued that mediation analysis could be performed even on non-significant effects. Therefore, further analysis of the mediation effect as hypothesised in H1b and H1c was performed for both mediators. For this, multiple mediation-based regression analyses (Model 4) were performed using the PROCESS Procedure for SPSS. A bootstrap sample of 5000 was combined with a 95% confidence level

for the confidence intervals. For complete mediation, the relationship between the predictor variable (PV) and the dependent variable (DV) must be fully explained by the mediator (M), also known as the indirect effect. For the indirect effects of PV on DV through M to be significant, the 95% confidence intervals should not include zero (Hayes, 2009). If the relationship is only partially explained by M, then the direct effect between PV and DV is significant. Furthermore, there is a consensus among statisticians that even in the absence of a significant total effect (direct + indirect effect) between PV and DV, it is legitimate to infer a mediated relationship if the indirect effect is significant, especially if the effect size is expected to be small or suppression is possible (Hayes, 2009; Shrout & Bolger, 2002). This effect is most commonly referred to as a PV's indirect effect on DV through M (Mathieu & Taylor, 2006).

The study assessed the separate mediating role of appearance-based social comparison and body image self-discrepancy on the relationship between anthropomorphism level and the different dependent variables. The results are presented in Tables 5 and 6. Appearance-based social comparison partially mediated the relationship between anthropomorphism level and purchase intention. The negative indirect effect explains that, as predicted, purchase intention decreases as we move from high to low levels of anthropomorphism. Furthermore, appearance-based social comparison fully mediated the relationship between anthropomorphism level and body image dissatisfaction. The negative indirect effect explains that body image dissatisfaction decreases as we move from high to low levels of anthropomorphism, as predicted. Finally, an indirect effect has been found between anthropomorphism level and appearance self-esteem, showing that moving to a lower level of anthropomorphism leads to increased appearance self-esteem. On the other hand, no mediation effects were found for body image self-discrepancy. Therefore, H1a and H1b can be partially supported.

Table 5

Mediation-Based Regression Analysis for Mediator 1 (Appearance-Based Social Comparison)

Relationship	Total Effect	Direct Effect	Indirect Effect	Confidence Interval		*t*-statistics	Conclusion
				Lower Bound	Upper Bound		
Anthropomorphism Level -> Appearance-Based Social Comparison -> Purchase Intention	-.69 (.000)	-.59 (.000)	-.089	-.18	-.020	-2.14	Partial mediation
Anthropomorphism Level -> Appearance-Based Social Comparison -> Appearance Self Esteem	.11 (.27)	.047 (.64)	.066	.013	.14	2.06	Indirect effect
Anthropomorphism Level -> Appearance-Based Social Comparison -> Body Image Dissatisfaction	-4.73 (.043)	-3.22 (.16)	-1.51	-3.21	-.26	-2.02	Full mediation

Table 6

Mediation-Based Regression Analysis for Mediator 2 (Body Image Self-Discrepancy)

Relationship	Total Effect	Direct Effect	Indirect Effect	Confidence Interval		*t*-statistics	Conclusion
				Lower Bound	Upper Bound		
Anthropomorphism Level -> Body Image Self-Discrepancy -> Purchase Intention	-.68 (.000)	-.69 (.000)	.007	-.021	.045	.44	No mediation
Anthropomorphism Level -> Body Image Self-Discrepancy -> Appearance Self Esteem	.11 (.27)	.054 (.52)	.058	-.054	.18	1.02	No mediation
Anthropomorphism Level -> Body Image Self-Discrepancy -> Body Image Dissatisfaction	-4.73 (.043)	-3.32 (.085)	-1.41	-4.24	1.10	-1.03	No mediation

5. Discussion and Conclusions

5.1 General Discussion

This research aimed to determine if exposure to different anthropomorphism levels of a virtual influencer could affect if and to what degree women compare to non-human agents. Furthermore, it assessed if this comparison could impact their well-being and purchase intentions of a product recommended by the virtual influencer. Based on prior research, it was hypothesised that women's well-being would suffer due to this exposure; therefore, a novel disclaimer calling out the virtual influencer's non-human nature was tested to understand if it could have any counteracting effect.

The results of this study showed that the highly anthropomorphised virtual influencer, which participants recognised as looking more human, attractive, and likeable, led to significantly increased levels of appearance-based social comparison. The highly anthropomorphised influencer was not seen as fully human, with only a 3.28 out of 5 on the anthropomorphism scale; however, it was seen as highly attractive, with a 4.23 out of 5 on the attractiveness scale. While women participating in this study seemed to be aware, at least to a certain extent, that the image presented was not that of a real human, this did not stop them from comparing their appearance to that of the virtual influencer, showing further evidence that social comparison might occur automatically even when the comparison agent was deemed irrelevant (Goethals, 1986; Morse & Gergen, 1970; Tiggemann & Polivy, 2010). Furthermore, as shown in the additional follow-up analysis on attractiveness as a mediator presented in Appendix G, these findings echo Argo and Dahl (2018). Their results show that even non-human agents can activate appearance-based social comparison for women based on the normative attractiveness standards they portray (Argo & Dahl, 2018).

This awareness of the non-human nature of the virtual influencer could also explain the average low appearance-based social comparison scores. Wood (1989) proposed that

when the comparison target is perceived as dissimilar to oneself, the comparison is less likely to emerge. However, these findings show this is more nuanced since comparison occurs but is experienced less strongly. For the low anthropomorphism virtual influencer, the effects could be further explained through Mori's (1970) theory. With the overall low scores on anthropomorphism and likeability, this virtual influencer image could have fallen into the uncanny valley, thus triggering an eerie feeling in women, acting as an internal warning to detract them from comparison. For the highly anthropomorphised one, the results could also be explained by the one-time exposure to the influencer or the exposure's experimental nature, as they did not see the image organically on their Instagram. Studies with a similar setup and using the same state appearance social comparison scale also found relatively low scores for the participants' social comparison (e.g. Brown & Tiggemann, 2016).

For the second proposed mediator, the levels of body image self-discrepancy were measured after exposure to the influencer image. The analysis showed that the scores for the participants exposed to the first condition (high anthropomorphism) were lower than for those exposed to the second condition (low anthropomorphism). Moreover, on average, women were unhappy with their current body image, their ideal body being one or two levels below their current appearance. However, the differences found were not statistically significant. The current sample size was determined by an a-priori power analysis based on a medium effect size. However, a larger sample size may be needed to detect a small effect size.

Furthermore, while this study proposed self-discrepancy as a mediator, it could also be that body image self-discrepancy instead moderates a person's likelihood of comparing with an idealised image. For instance, Bessenoff (2006) showed that the degree of body image self-discrepancy could moderate the effects of social comparison on the different outcomes, such that women with high levels of body image self-discrepancy engaged more in

social comparison and experienced more negative consequences. While this research did not specifically test this effect, this possibility should be further assessed in follow-up studies.

In terms of the mediation effects, this study found the appearance-based social comparison to mediate the relationship between anthropomorphism level and dependent variables, leading to increased purchase intentions and decreased levels of well-being. This is in line with prior research that found these effects in the social media and advertising contexts (e.g. Brown & Tiggemann, 2016; Dinh & Lee, 2022; Fioravanti et al., 2022; Janssen & Paas, 2014; Pedalino & Camerini, 2022; Scully et al., 2020; Tiggemann & Polivy, 2010; Weber et al., 2022) and thus extend the knowledge to include virtual influencers. Combined with the relatively low scores of appearance self-esteem and high scores of body image dissatisfaction, these findings show that even short exposure and small degrees of appearance-based social comparison can lead to negative perceptions towards one's body image, even when compared with a non-human, non-relevant agent.

A newly developed disclaimer calling out the non-human nature of the influencer was introduced to test whether these adverse effects on women's well-being could be alleviated and determine if it would impact purchase intentions. Even though the disclaimer was evident (using the words "Warning" and "not real" and the colour red) and most participants correctly recalled the disclaimer shown on the image, the effect of the highly anthropomorphised virtual influencer did not change. Gilbert et al. (1995) proposed that when people are made aware that the comparison agent is irrelevant, they should be able to correct their thinking and not engage in comparison. However, in line with prior research that used different types of interventions (e.g. hashtags, comments, labels on the image) to deter women from comparing with idealised images portrayed (e.g. Bury et al., 2016; Fardouly & Holland, 2018; Tiggemann & Brown, 2018), this study found that including a disclaimer does not stop women from engaging in comparison and does not reduce the negative impacts on well-

being. It is worth mentioning that, while not statistically significant at the 95% confidence level, the presence of the disclaimer reduced the two comparisons even so slightly, especially in the case of the high anthropomorphism level. Perhaps a more explicit disclaimer could increase these differences. Future research should also investigate additional measures that can be taken to make users aware that they are not looking at a real person. It should be explicit that the features presented have been achieved through computer programming, making it impossible for a real person to achieve the same perfect standards. However, these findings show that, at the moment, only a low level of anthropomorphism could further decrease the effects of virtual influencers on women's well-being and purchase intentions.

5.2 Academical Contributions

To conclude, the contributions of this research are threefold. Firstly, this research contributes to the growing literature on virtual influencers trying to understand where they can be placed as a marketing tool and how they differ from human influencers (e.g. Arsenyan & Mirowska, 2021; Batista da Silva Oliveira & Chimenti, 2021; Conti et al., 2022; Moustakas et al., 2020; Sands et al., 2022) by showing that exposure to highly anthropomorphised agents negatively impacts women's well-being and can lead to increased purchase levels via appearance social comparison.

Secondly, it expands the knowledge on the upward social comparison (Brown & Tiggemann, 2016; Tiggemann & Polivy, 2010) by showing that a virtual, non-human agent activates similar comparisons as humans do in traditional contexts such as advertising and social media. Moreover, while not the scope of this research, it found evidence that the attractiveness of the comparison agent might take priority and activate the mechanism even in cases where the agent is deemed irrelevant. Since virtual influencers are already modelled to portray extremely idealised bodies and conventionally attractive features, the anthropomorphism level directly correlates with how attractive they are perceived.

Lastly, this study adds to the evolving literature on disclaimer use in social media and advertising by testing whether addressing the non-human nature of virtual influencers has any effect on well-being and purchase intention. Somewhat unsurprisingly, in line with prior research (e.g. Bury et al., 2016; Fardouly & Holland, 2018; Tiggemann & Brown, 2018), this study found that disclaimers do not seem to work on social media channels.

5.3 Practical Implications

For companies looking to use virtual influencers in their marketing campaigns, this research showed that highly anthropomorphised influencers, perceived from the start to be highly attractive, lead to high levels of purchase intention. Using them in advertising should produce similar results to attractive human influencers or models (Janssen & Paas, 2014; Joseph, 1982). While this might seem appealing because of the undeniable advantages of using this new type of influencer (Rasmussen, 2021), this research urges companies against using virtual influencers that portray unrealistic expectations of beauty and body type standards in their campaigns. Their appearance negatively influences women's well-being, leading to lower self-esteem and increased body dissatisfaction. Instead, companies could work with different virtual influencers representing various body types and physical characteristics, emphasising the beauty in diversity. Prior research showed that exposure to content that shows appreciation and acceptance for all body types and sizes makes women feel better about how their bodies look (Cohen et al., 2019).

5.4 Limitations and Future Research

The results of this research, while revealing a clear impact of virtual influencers on comparison tendencies and well-being, should be understood considering certain limitations. As previously mentioned in the results section, the two anthropomorphism levels differed in attractiveness, which highly influenced the results. The sequential mediation analysis showed that, together, they impact women's well-being and purchase intentions in the expected

direction, with low anthropomorphism seemingly being better for women's appreciation of their bodies. A higher anthropomorphism level seems to automatically lead to increased virtual influencer attractiveness. However, this finding cannot be easily generalised to other influencers, nor can it be concluded that the manipulations used in this research (a 50% increase in the distance between the eyes and grey skin) could be applied to other influencers with the same level of success. As follow-up studies could not be conducted as part of this research, future research should test the conceptual model with other influencers and more anthropomorphism levels to better understand and generalise the effects. Furthermore, to fully understand the effects of anthropomorphism levels alone, future research should ensure that attractiveness stays constant across different virtual influencers.

The two dependent variables used as operationalisation for assessing well-being showed a high negative correlation. As expected, dissatisfaction with body image decreased when appearance self-esteem increased and vice versa. However, since it is possible that the two scales measure the same thing and both scales refer to a person's appearance, it could be that the appearance self-esteem scale is not a good measure of global self-esteem. In that case, both results refer to women's satisfaction with their bodies instead of overall well-being. Future research should use a different operationalisation for self-esteem and test the effects. Despite this possible limitation, the results showed that exposure to idealised virtual influencers negatively impacts women's perception of their appearance.

This research focused explicitly on millennial women. However, each generation has specific characteristics; therefore, it is hard to assess whether the same results should be expected for different age groups. Furthermore, the participants were recruited from the UK, so these results are difficult to generalise to other non-Western cultures, where different standards of beauty or even non-human agents' acceptance might apply. Therefore, future research should investigate whether the effects can be replicated for other generations and

countries. Moreover, this research focused on virtual influencers portraying a thin ideal body and found similar results to the existing literature on real humans. Therefore, an exciting avenue for future research would be to test if there are differences between the equally attractive thin vs plus-sized virtual influencers and how they compare to the effects of real influencers or models. This additional research could clarify if the effect found is specific to the attractiveness level influenced by the thin ideal body size or if attractiveness alone explains this effect.

Lastly, around 25% of participants either wrongly recalled or could not remember if a disclaimer was present in the images they saw. When the social media post was designed for the experiment, to keep it as realistic as possible, certain hashtags were included in the post caption, such as “Recommended”. Participants might have confused the hashtag for a disclaimer, which either prompted them to say they saw a disclaimer when they did not or say they could not remember. Moreover, it could be that participants did not recognise the label on the image as a disclaimer because current requirements are to include any disclaimers in the post caption as hashtags. Future research should be cautious about including both hashtags and disclaimers in the same post, as it might confuse participants.

While virtual influencers are still a novelty, their presence and use in marketing and advertising are becoming more common. This research found evidence that virtual influencers have the potential to impact women’s well-being negatively. Therefore, their use and growth should be done cautiously and closely monitored. Moreover, while the present research could not find any effect of disclaimer use, future research should investigate other options that present virtual influencers for what they are: masterfully coded computer-generated images irrelevant to women’s comparison processes.

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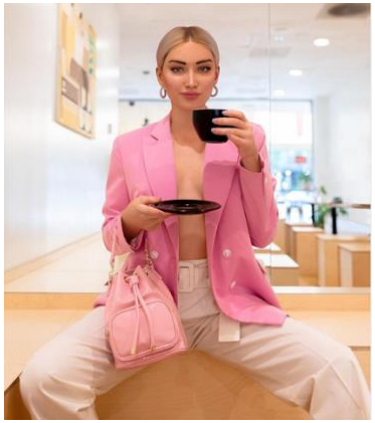
Appendix A

Manipulated Images Used in Pre-Test

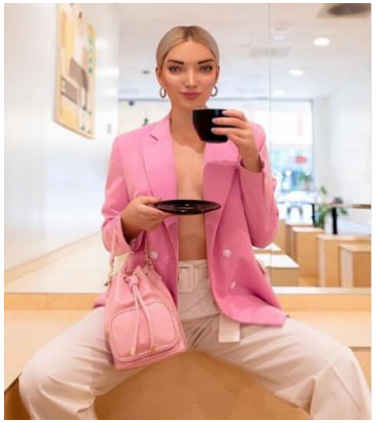
Figure A1

Influencer 1

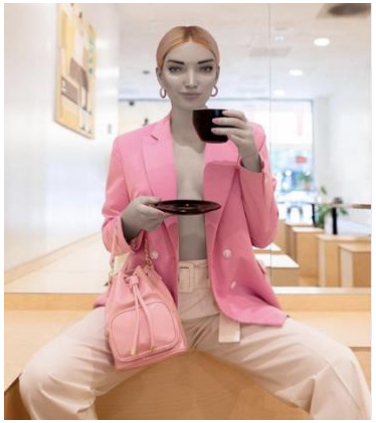
Bermuda



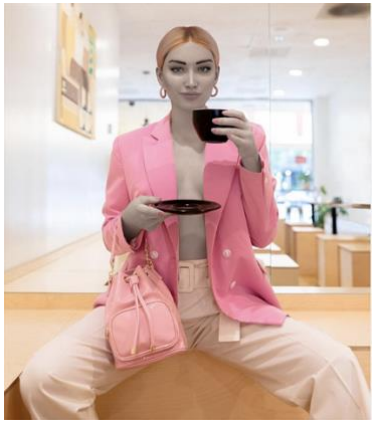
High Anthropomorphism (HA)



Medium Anthropomorphism (MAv1)



Medium Anthropomorphism (MAv2)



Medium Anthropomorphism (MAv3)

Figure A2

Influencer 2

Dagny

High Anthropomorphism (HA)

Medium Anthropomorphism (MAv1)

Medium Anthropomorphism (MAv2)

Medium Anthropomorphism (MAv3)

Appendix B

Pre-Test Survey Questions

Block 1: Consent form

STUDY TITLE: Virtual Influencers Selection

Protocol Director: Stefania Popa

DESCRIPTION: This research aims to pre-test a series of images used in a subsequent study. It should take about 2 minutes.

PARTICIPANTS: The study is addressed to participants who are residents of the UK.

RISKS AND BENEFITS: There is no risk associated with this study. The benefits that are reasonably expected to result from this study are the opportunity to contribute to greater knowledge regarding the understanding of virtual influencers' impact on consumer attitudes. We cannot and do not guarantee or promise that you will receive any benefits from this study. Your decision on whether or not to participate in this study will not affect your ability to participate in future research related to the University of Amsterdam.

TIME INVOLVEMENT: Your participation in this experiment will take approximately 2 minutes.

Payments: The reasonable and sufficient time limit of 2 minutes to fill in the survey will be used to calculate monetary incentives - an hourly wage of £6.00 per hour x 2 minutes = £0.20.

SUBJECT'S RIGHTS: If you have read this form and have decided to participate in this study, please understand your participation is voluntary, and you have the right to discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled. You have the right to refuse to answer particular questions. Your individual privacy will be maintained in all published and written data resulting from the study.

CONTACT INFORMATION: Questions, Concerns, or Complaints: If you have any

questions, concerns or complaints about this research study, its procedures, risks and benefits, you should ask the Protocol Director, stefania.popa@student.uva.nl

If you have read the information above and would like to participate in the study, please click "I agree." Alternatively, if you do not want to complete the study, please click "I do not agree", and you will be redirected to the end of the study.

[Mandatory choice: I agree or I do not agree]

Block 2: Prolific academic

What is your Prolific ID? *Please note that this response should auto-fill with the correct ID.*

Block 3-10: Influencer image– the eight blocks have been randomly assigned

Please have a look at the person portrayed in this image, then rate your impressions on the below three scales.

[Image – see Appendix A for all images]

Anthropomorphism - The person appears to be:

- Fake – Natural (from 1 to 5)
- Moving rigidly - Moving elegantly (from 1 to 5)
- Unconscious – Conscious (from 1 to 5)
- Machinelike – Humanlike (from 1 to 5)
- Artificial – Lifelike (from 1 to 5)

Likeability - The person appears to be:

- Unfriendly – Friendly (from 1 to 5)
- Unpleasant – Pleasant (from 1 to 5)
- Awful – Nice (from 1 to 5)
- Unkind – Kind (from 1 to 5)
- Dislike – Like (from 1 to 5)

Attractiveness - The person appears to be:

- Attractive – Unattractive (from 1 to 5)
- Beautiful – Ugly (from 1 to 5)
- Appealing – Unappealing (from 1 to 5)

Block 11: Disclaimer recognition introduction

The image you've seen is a representation of a fictional computer-generated 'person' who has the realistic characteristics, features and personalities of a human. While not very well known, these entities have a social media presence and a backstory interacting with their followers similarly to real influencers. Please look at the images below, and answer the last three questions.

Block 12: Disclaimer recognition questions

Please select all that apply or select "none" if none of the options applies.

- Which of these disclaimers have you noticed?
- Which of these disclaimers best conveys that the virtual influencer is computer-generated and not human?
- Which of these disclaimers is most appealing to see on a social media post showing a virtual influencer?

[Multiple choice options: Disclaimer 1, Disclaimer 2, None]

End of survey message

Thank you very much for your time and participation! If you are interested in a detailed description of the purpose of this study, please feel free to contact the protocol editor.

Please click the button below to be redirected back to Prolific and register your submission.

Appendix C

Pre-Test Results

To determine which influencer and disclaimer to use in the main experiment, a between-subjects pre-test was conducted with two goals: 1) influencer selection and 2) disclaimer selection. The pre-test was run with 119 participants, randomly selected from a wide sample of UK participants and randomly allocated to one of the eight conditions. The respondents' ranged between 26 and 41 years, with an average age of 32.9 years (*SD* = 4.58).

Data Preparation and Statistical Procedure

Reverse-Scoring

The items used in the attractiveness scale were reverse scored because the original scale from Burgoon and Stacks (2009) ranked items from most positive to most negative (e.g. Attractive to Unattractive), while the other two scales ranked them from most negative to most positive. The change was needed to ensure means comparison can be performed.

Reliability Analysis and New Variable Creation

While all scales have been adopted from previous studies, reliability analysis has been conducted to ensure participants understood them correctly: anthropomorphism, likeability, and attractiveness. Cronbach's Alpha (α) is a commonly used and widely accepted measure to check for internal reliability, with an α value equal to or higher than 0.70 indicating acceptable consistency of the scale items (Taber, 2018).

The anthropomorphism scale consisted of five items (α = .86), the likeability scale consisted of five items (α = .94), and the attractiveness scale consisted of three items (α = .92). Variables anthropomorphism, likeability, and attractiveness have been created to measure the average anthropomorphism, likeability and attractiveness scores given to the influencer presented in the image instead of the scales used in the data collection process.

Influencer Selection

Anthropomorphism Conditions and Influencers

Each of the 119 participants saw only one of the eight images, with 59 participants assigned to Influencer 1 and 60 assigned to Influencer 2. Four images have been tested for each influencer, representing the following anthropomorphism levels: high anthropomorphism (HA) and medium anthropomorphism (MAv1, MAv2 and MAv3). Only Influencer 1 (Bermuda) in condition MAv1 had 14 participants; the other seven conditions had 15 participants. Tables C1 and C2 summarise the means and standard deviation of the anthropomorphism, likeability, and attractiveness of each condition per influencer.

Table C1

Means and Standard Deviations for Influencer 1 (Bermuda)

	Anthropomorphism		Likeability		Attractiveness	
Condition	M	SD	M	SD	M	SD
HA	2.60	0.96	3.04	0.65	3.22	1.28
MAv1	1.97	0.73	3.09	0.62	2.93	0.91
MAv2	1.65	0.63	2.48	0.82	2.87	1.01
MAv3	1.93	0.53	3.00	0.49	3.07	0.70

Table C*2*

Means and Standard Deviations for Influencer 2 (Dagny)

	Anthropomorphism		Likeability		Attractiveness	
Condition	M	SD	M	SD	M	SD
HA	3.44	0.81	3.84	0.73	3.80	0.99
MAv1	2.68	0.95	3.92	0.78	3.20	1.17
MAv2	2.37	1.07	3.39	0.86	3.09	1.22
MAv3	3.11	1.05	4.01	0.79	3.96	0.73

Two one-way ANOVAs were conducted to determine which influencer to select for the main experiment and if all levels created should be used.

Results Influencer 1 (Bermuda)

A one-way ANOVA was conducted to determine if the anthropomorphism score differed for the four images created for this virtual influencer. Participants were classified into four groups: HA (N = 15), MAv1 (N = 14), MAv2 (N = 15) and MAv3 (N = 15). There were two outliers in the data, as assessed by a boxplot; it was decided to keep them after assessing that their removal does not change the results by rerunning the analysis without the outliers. Data were normally distributed for each of the anthropomorphism levels, as assessed by Shapiro-Wilk's test ($p > .05$), and there was homogeneity of variances, as assessed by Levene's test of homogeneity of variances ($p = .104$). The anthropomorphism score was statistically significantly different for the four groups, $F(3, 55) = 4.47$, $p = .007$. The anthropomorphism score decreased from HA (M = 2.60, SD = 0.96), to MAv1 (M = 1.97, SD = 0.73), to MAv3 (M = 1.93, SD = 0.53) to MAv2 (M = 1.65, SD = 0.63) in that order. Tukey post hoc analysis revealed that only the mean decrease from HA to MAv2 (0.95, 95% CI [0.24, 1.65]) was statistically significant ($p = .004$).

Results Influencer 2 (Dagney)

A one-way ANOVA was conducted to determine if the anthropomorphism score differed for the four images created for this virtual influencer. Participants were classified into four groups: HA (N = 15), MAv1 (N = 15), MAv2 (N = 15) and MAv3 (N = 15). There were no outliers in the data, as assessed by a boxplot. Data were normally distributed for each of the anthropomorphism levels, as assessed by Shapiro-Wilk's test ($p > .05$), and there was homogeneity of variances, as assessed by Levene's test of homogeneity of variances ($p = .57$). The anthropomorphism score was statistically significantly different for the four groups, $F(3, 56) = 3.46$, $p = .022$. The anthropomorphism score decreased from HA (M = 3.44, SD =

0.81), to MAv3 (*M* = 3.11, *SD* = 1.05), to MAv1 (*M* = 2.68, *SD* = 0.95) to MAv2 (*M* = 2.37, *SD* = 1.07) in that order. Tukey post hoc analysis revealed that only the mean decrease from HA to MAv2 (1.07, 95% CI [0.12, 2.01]) was statistically significant (*p* = .021).

Disclaimer Selection

Each of the 119 participants was shown the two newly created disclaimers and asked to assess: 1) which of them they noticed, 2) which best conveyed the message, and 3) which was most appealing. For each of the questions, participants could give multiple answers. For the question "Which of these disclaimers have you noticed?", 71 (38.8%) participants selected disclaimer 1, 70 (38.25%) participants selected disclaimer 2 and 42 (22.95%) said that they did not notice any of them. For the question, "Which of these disclaimers best conveys that the virtual influencer is computer-generated and not human?" 59 (44.36%) participants selected disclaimer 1, 67 (50.38%) participants selected disclaimer 2 and 7 (5.26%) said that neither works. Finally, for the question "Which of these disclaimers is most appealing to see on a social media post showing a virtual influencer?", 48 (38.10%) participants selected disclaimer 1, 55 (43.65%) participants selected disclaimer 2 and 23 (18.25%) said that neither disclaimer is appealing.

Appendix D

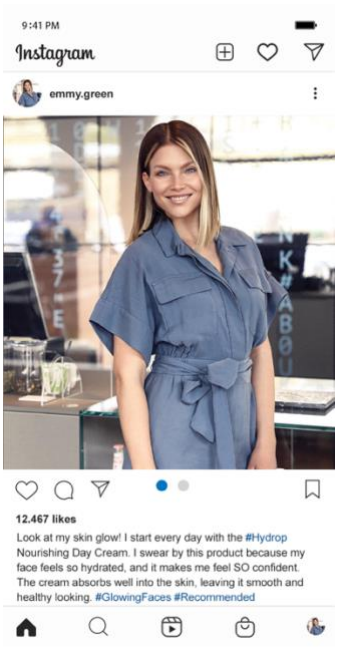
Images Used in the Main Experiment

Figure D1

Condition 1 HA x nD

Profile Image

Social Media Post Image 1



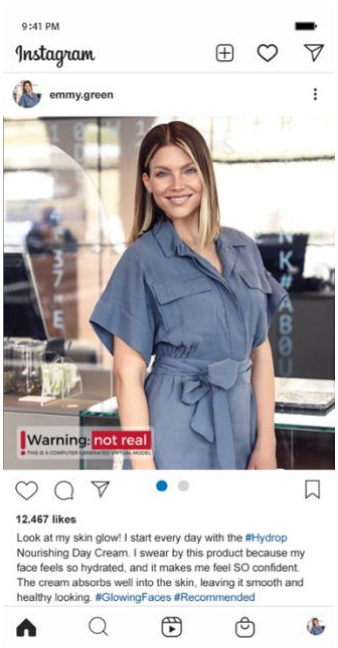
Social Media Post Image 2

Figure D2

Condition 2 HA x yD

Profile Image

Social Media Post Image 1



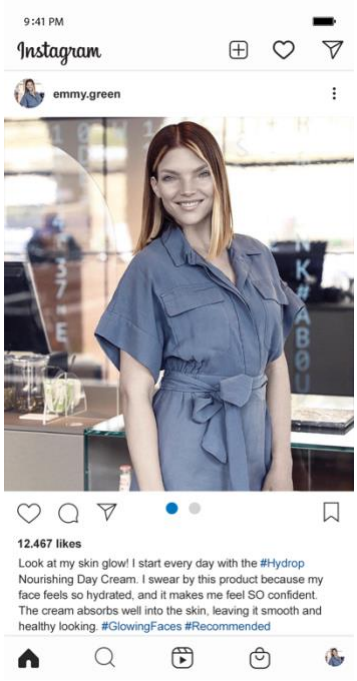
Social Media Post Image 2

Figure D3

Condition 3 LA x nD

Profile Image

Social Media Post Image 1



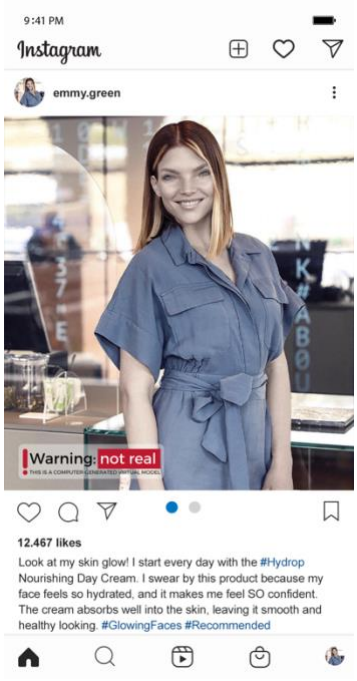
Social Media Post Image 2

Figure D4

Condition 4 LA x yD

Profile Image

Social Media Post Image 1



Social Media Post Image 2

Appendix E

Main Experiment Survey Questions

Block 1: Consent form

STUDY TITLE: Influencers and Impact on Consumer Attitudes

Protocol Director: Stefania Popa

DESCRIPTION: This study attempts to understand the impact of influencers on consumer attitudes. You will be asked to answer a series of short questions. This survey is only available to participants identifying as FEMALE between 26-41 years. Please only continue if you belong to this group. We included attention-check questions in the survey. With a normal amount of attention, they are easy to pass. But we will reserve the right not to pay participants if they do not pay sufficient attention to the survey. Please only consent if you are okay with that.

RISKS AND BENEFITS: There is no risk associated with this study. The benefits that are reasonably expected to result from this study are the opportunity to contribute to greater knowledge regarding the understanding of virtual influencers' impact on consumer attitudes. We cannot and do not guarantee or promise that you will receive any benefits from this study. Your decision on whether or not to participate in this study will not affect your ability to participate in future research related to the University of Amsterdam.

TIME INVOLVEMENT: Your participation in this experiment will take approximately 5 minutes.

Payments: The reasonable and sufficient time limit of 5 minutes to fill in the survey will be used to calculate monetary incentives - an hourly wage of £6.00 per hour x 5 minutes = £0.50.

SUBJECT'S RIGHTS: If you have read this form and have decided to participate in this study, please understand that your participation is voluntary, and you have the right to

discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled. You have the right to refuse to answer particular questions. Your individual privacy will be maintained in all published and written data resulting from the study.

CONTACT INFORMATION: *Questions, Concerns, or Complaints:* If you have any questions, concerns or complaints about this research study, its procedures, risks and benefits, you should ask the Protocol Director, stefania.popa@student.uva.nl

If you have read the information above and would like to participate in the study, please click "I consent." Alternatively, if you do not want to complete the study, please click "I do not consent", and you will be redirected to the end of the study.

[Mandatory choice: I consent or I do not consent]

Block 2: Prolific academic

What is your Prolific ID? *Please note that this response should auto-fill with the correct ID.*

Block 3: Social media post

On the next page, you will be shown the Instagram profile picture of Emily Green, a UK-based lifestyle influencer with 250,000 followers. You will also be shown one of her latests posts, which contains two carousel images.

We will ask you a sequence of questions about the influencer and the post. There will be attention-check questions about this study part!

Block 4-7: Social media post - manipulation | HA x nD, HA x yD, LA x nD, LA x yD

First, please look at the influencer's profile picture.

[Image – see Appendix D]

**As your attention to this image is important, we will only let you advance after spending at least 20 seconds on this page.*

Now, look at the following post from this influencer, containing a carousel with two images. Please imagine you are swiping between the two images in the post.

[Image – see Appendix D]

Block 8: Dependent variable 1

Q1 Purchase Intent: If you were on the market to try a face cream, and it was in your price range, would you buy the one recommended?

[Choices: Definitely not – Definitely yes (from 1 to 7)]

Block 9: Dependent variable 2 and 3

This next part of the study is designed to measure what you are thinking and feeling at this moment. There is, of course, no right answer for any statement. The best answer is what you feel is true of yourself at the moment.

Q2 Self-Esteem: Please answer these questions related to your thoughts as they are true for you right now.

- I feel satisfied with the way my body looks right now.
- I feel that others respect and admire me.
- I am dissatisfied with my weight.
- I feel good about myself.
- I am pleased with my appearance right now.
- I feel unattractive.

[Choices: Not at all, A little bit, Somewhat, Very Much, Extremely]

Q3 Body Satisfaction: Please move the marker to the appropriate place on the horizontal line that matches your current level of feeling for the following emotions.

[Minimum 0 (left) and Maximum 100 (right)]

Physically attractive	
Fat	
Satisfaction with your facial appearance	
Satisfaction with your body size and shape	

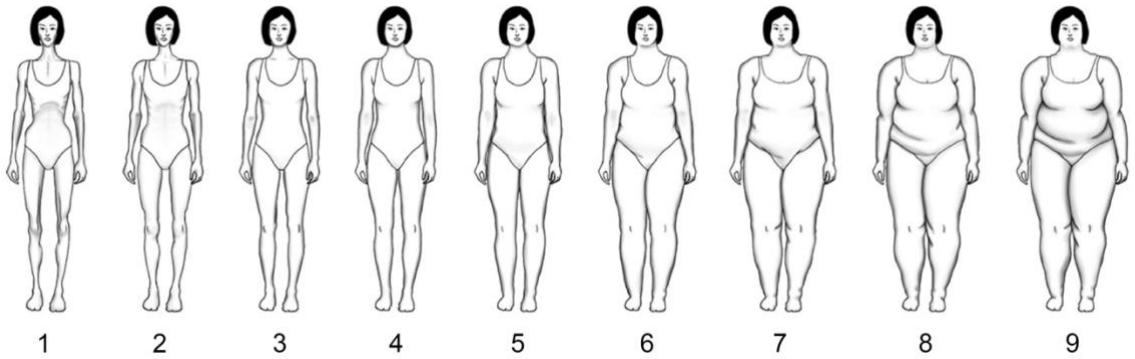
Block 10: Mediators

Q4 M1 Social Comparison: In the past fifteen minutes, to what extent did you:

- Think about your own appearance?
- Compare your overall appearance to that of the influencer shown in the study?
- Compare your specific body parts to those of the influencer shown in the study?

[Choices: Not at all, A little bit, Somewhat, Very Much, Extremely]

Q5 M2 Self-Discrepancy: Considering your thoughts and feelings in the past fifteen minutes, please indicate:



- Which of the nine silhouettes corresponds most closely to your own actual body.
- Which of the nine silhouettes corresponds most closely to your own ideal body.

Block 11: Manipulation and attention check

Please answer the following questions about the influencer whose post you saw.

Q6 Man1 Anthropomorphism: The person appeared to be:

- Fake – Natural (from 1 to 5)
- Moving rigidly - Moving elegantly (from 1 to 5)
- Unconscious – Conscious (from 1 to 5)
- Machinelike – Humanlike (from 1 to 5)
- Artificial – Lifelike (from 1 to 5)

Q7 Man2 Likeability: The person appeared to be:

- Unfriendly – Friendly (from 1 to 5)
- Unpleasant – Pleasant (from 1 to 5)
- Awful – Nice (from 1 to 5)
- Unkind – Kind (from 1 to 5)
- Dislike – Like (from 1 to 5)

Q8 Man3 Attractiveness: The person appears to be:

- Attractive – Unattractive (from 1 to 5)
- Beautiful – Ugly (from 1 to 5)
- Appealing – Unappealing (from 1 to 5)

The following questions serve to assess if you paid attention to the social media post.

Q9 Attention Disclaimer: Do you recall seeing a disclaimer on the first image of the post?

[Choices: No, Yes, I don't remember]

Q10 AttentionBrand What product did the influencer talk about/recommend in her post?

[Choices: Face Cream, Sheet Mask, Lip Scrub]

Block 12: Demographics and end survey questions

Q11 Demographics Age: What is your age?

Q12 Control Familiarity: I am familiar with the influencer in the post.

[Choices: No, Yes, Maybe]

Q13 Control Liking: I follow the influencer on Instagram.

[Choices: No, Yes, Maybe]

Q14 Control Prior Purchase: Have you ever bought something promoted by an influencer?

[Choices: No, Yes, I don't remember]

Q15 Use Data: In your honest opinion, should we use your data in our analysis of this study? Please be honest. You will be paid no matter what the answer is.

[Choices: No, Yes]

Q16 Unclear Confusing: Was anything unclear or confusing about this study? Do you have any comments?

End of survey message

Thank you very much for your time and participation! If you are interested in a detailed description of the purpose of this study, please feel free to contact the protocol editor.

The image you've seen is a representation of a fictional computer-generated 'person' who has the realistic characteristics, features and personalities of a human. While not very well known, these entities have a social media presence and a backstory, interacting with their followers similarly to real influencers. Furthermore, the brand used in the survey is fictional. Any resemblance of the brand or the influencer to real brands and people is purely coincidental.

Please click the button below to be redirected back to Prolific and register your submission.

Appendix F

Sequential Mediation on Purchase Intentions and Women's Well-Being

The possible sequential mediation of attractiveness/likeability and appearance social comparison on the relationship between anthropomorphism level and the three dependent variables has been tested using multiple sequential mediation-based regression analyses (Model 6) with the help of PROCESS Procedure for SPSS by Andrew F. Hayes. A bootstrap sample of 5000 was combined with a 95% confidence level for confidence intervals. Each of the two variables has been tested separately with each of the hypothesised mediators, and the analysis has been run for each dependent variable independently.

Tables F1 and F2 present the results, including the total effect, direct effect, indirect effect, t-statistics (calculated as indirect effect/SE) and the conclusion. The results showed there are individual serial mediations of attractiveness and likeability with appearance social comparison (ASC) on the relationship between anthropomorphism level (AI), purchase intention (PI), appearance self-esteem (ASE) and body image dissatisfaction (BID). These findings are addressed in the discussion section as a possible topic for future research.

Table F1

Sequential Mediation Analysis with Attractiveness and Appearance Social Comparison as Mediators

Analysis	Total Effect	Direct Effect	Relationship	Indirect Effect	Confidence Interval		t-statistics	Conclusion
					Lower Bound	Upper Bound		
AL -> PI	-.688 (.000)	.021 (.91)	AL -> Attractiveness -> ASC -> PI	-.055	-.12	-.004	-1.79	Full sequential mediation
AL -> ASE	.113 (.27)	.037 (.75)	AL -> Attractiveness -> ASC -> ASE	.072	.032	.12	3.06	Indirect effect
AL -> BID	-4.733 (.043)	-2.998 (.27)	AL -> Attractiveness -> ASC -> BID	-1.66	-2.88	-.68	-2.94	Full sequential mediation

Table F2

Sequential Mediation Analysis with Likeability and Appearance Social Comparison as Mediators

Analysis	Total Effect	Direct Effect	Relationship	Indirect Effect	Confidence Interval		t-statistics	Conclusion
					Lower Bound	Upper Bound		
AL -> PI	-.688 (.000)	-.386 (.011)	AL -> Likeability -> ASC -> PI	-.012	-.034	-.001	-1.43	Partial sequential mediation
AL -> ASE	.113 (.27)	.062 (.54)	AL -> Likeability -> ASC -> ASE	.015	.003	.033	1.86	Indirect effect
AL -> BID	-4.733 (.043)	-3.554 (.13)	AL -> Likeability -> ASC -> BID	-.34	-.79	-.062	-1.79	Full sequential mediation

Appendix G

Moderated Mediation on Purchase Intentions and Women's Well-Being

Hypothesis 2b: Disclaiming the non-human nature of the virtual influencer will reduce the impact of its high perceived human likeness on women's purchase intentions via lower levels of appearance-based social comparison and body image self-discrepancy.

Hypothesis 2c: Disclaiming the non-human nature of the virtual influencer will reduce the impact of its high perceived human likeness on women's well-being (increased appearance-based self-esteem and decreased body dissatisfaction) via lower levels of social comparison and body self-discrepancy.

Six moderated mediations (Model 58 in PROCESS) have been performed to test hypotheses 2b and 2c further. This model explicitly tested the moderation effect on the predictor to mediator path and from the mediator to the dependent variable path. An index of moderated mediation was used to test the significance of the moderated mediation, with the absence of zero within the confidence intervals supporting a significant effect.

The results revealed no evidence for a moderated mediation for either of the tested relationships, as presented in Tables G1 to G6. Disclaiming the non-human nature of the virtual influencer did not impact the effect of the highly anthropomorphised virtual influencer on women's purchase intentions, appearance self-esteem and body image dissatisfaction via appearance social comparison or body image self-discrepancy; therefore, these hypotheses cannot be accepted.

Table G1

Moderated Mediation between Anthropomorphism Level (IV) and Purchase Intention (DV1), with Appearance Social Comparison (MED1) as Mediator and Disclaimer Use (MOD) as Moderator

Relationship	*b*	*p*	ΔR^2
IV x MOD -> MED1	-0.002	.99	.0000
MED1 x MOD -> DV1	0.054	.74	.0003
Index of moderated mediation	-0.017 [-0.19, 0.15]		

Note. The 95% percentile CI for the index of moderated mediation is presented in square brackets.

Control variable prior purchase has been included in the analysis.

Table G2

Moderated Mediation between Anthropomorphism Level (IV) and Appearance Self Esteem (DV2), with Appearance Social Comparison (MED1) as Mediator and Disclaimer Use (MOD) as Moderator

Relationship	*b*	*p*	ΔR^2
IV x MOD -> MED1	0.014	.95	.0000
MED1 x MOD -> DV2	0.13	.20	.006
Index of moderated mediation	-0.042 [-0.18, 0.085]		

Note. The 95% percentile CI for the index of moderated mediation is presented in square brackets.

Table G3

Moderated Mediation between Anthropomorphism Level (IV) and *Body Image Dissatisfaction (DV3), with Appearance Social Comparison (MED1) as Mediator and Disclaimer Use (MOD) as Moderator*

Relationship	*b*	*p*	ΔR^2
IV x MOD -> MED1	0.014	.95	.0000
MED1 x MOD -> DV3	-4.59	.057	.013
Index of moderated mediation	1.41 [-1.59, 4.88]		

Note. The 95% percentile CI for the index of moderated mediation is presented in square brackets.

Table G4

Moderated Mediation between Anthropomorphism Level (IV) and Purchase Intention (DV1), with Body Image Self-Discrepancy (MED2) as Mediator and Disclaimer Use (MOD) as Moderator

Relationship	*b*	*p*	ΔR^2
IV x MOD -> MED2	-0.13	.68	.0005
MED2 x MOD -> DV1	0.10	.39	.002
Index of moderated mediation	0.011 [-0.072, 0.095]		

Note. The 95% percentile CI for the index of moderated mediation is presented in square brackets.

Control variable prior purchase has been included in the analysis.

Table G5

Moderated Mediation between Anthropomorphism Level (IV) and Appearance Self Esteem (DV2), with Body Image Self-Discrepancy (MED2) as Mediator and Disclaimer Use (MOD) as Moderator

Relationship	*b*	*p*	ΔR^2
IV x MOD -> MED2	-0.15	.64	.0007
MED2 x MOD -> DV2	0.086	.21	.004
Index of moderated mediation	-0.038 [-0.28, 0.18]		

Note. The 95% percentile CI for the index of moderated mediation is presented in square brackets.

Table G6

Moderated Mediation between Anthropomorphism Level (IV) and *Body Image Dissatisfaction (DV3), with Body Image Self-Discrepancy (MED2) as Mediator and Disclaimer Use (MOD) as Moderator*

Relationship	*b*	*p*	ΔR^2
IV x MOD -> MED2	-0.15	.64	.0007
MED2 x MOD -> DV3	-1.96	.26	.004
Index of moderated mediation	0.95 [-4.29, 6.79]		

Note. The 95% percentile CI for the index of moderated mediation is presented in square brackets.