

**FROM PIXELS TO FAME - AN EMPIRICAL STUDY OF
VIRTUAL INFLUENCERS AND GEN Z CUSTOMER
ENGAGEMENT**

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Master's Thesis

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ABSTRACT

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Title From pixels to fame - an empirical study of Virtual Influencers and Gen Z Customer Engagement	
Subject Digital Marketing and Corporate Communication	Type of work Master's thesis
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Abstract <p>Virtual Influencers (VIs) are artificially-generated characters that are designed to behave like real social media influencers. These digital natives are becoming increasingly popular as brands seek new ways to engage with younger audiences. Being a fresh subject of interest, extant literature has mainly explored VIs through key differences from their human counterpart. However, it is unclear how users may perceive these digital creations.</p> <p>This study examines the interaction between VIs and generation Z Instagram users in terms of Parasocial Interaction and perceived VIs' attributes, with Customer Engagement as the outcome. A measurement model was developed with credibility, authenticity, humanization, and novelty value being the key VIs' attributes. Primary data was collected through an online survey (N=221).</p> <p>The findings show significant positive impacts of Parasocial Interaction with VIs on Customer Engagement. However, this effect is partially mediated by the perception of VIs' credibility and novelty value. The measurement model explains 73% of Customer Engagement, with novelty value having the strongest effect on this outcome.</p> <p>The research provides theoretical contributions to the B2C endorsement literature while bridging the gap between VIs and younger audiences' outcomes. Managerial implications reveal how brands can harness the benefits of implementing these novel characters.</p>	
Keywords: Virtual Influencers (VIs), Parasocial Interaction, influencers' attributes, Customer Engagement, Gen Z	
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Helsinki, Finland, 10.04.2023
Hoang

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1 INTRODUCTION

This chapter presents the contextual foundation of the study, which leads to the identification of the research problem and research questions. The chapter also briefly introduces key concepts as well as the study's structure.

1.1 Research background

First documented in 2018, Virtual Influencers (VIs) were considered a new frontier in marketing for their ability to attract fans and the potential to replace human influencers (Kádeková & Holienčinová, 2018, p.96-97). Similar to their human counterpart, VIs are characterised by having a large follower base on social media platforms. They collaborate with brands for promotional campaigns. They often have a high degree of influence and they are key opinion leaders (Batist & Chimenti, 2021, p.6). However, VIs are not real in the sense that they were created by brands, programmers, or marketing agencies and they operate completely virtually (Kádeková & Holienčinová, 2018, p.96-97). VIs are also sometimes called CGI influencers, AI influencers, or non-human influencers (Batist & Chimenti, 2021, p.2), although studies since 2021 seem to have fixated on the term "Virtual Influencers". As influencers, VIs try to captivate and engage with other users through content that narrates their lifestyle, hobby or passion. These influencers usually have a sizable network of followers and are trusted in one or several niches (De Veirman, Cauberghe, and Hudders 2017, p.798, as cited in Thomas & Fowler, 2021, p.11).

The commercial value of influencers lies within their ability to deliver brand messages and keep customers engaged. At the same time, building and maintaining Customer Engagement has become a key issue, as it is an antecedent for value co-creation, loyalty and continuance intention (Wang et al., 2022). The emergence of VIs opens new doors for customer interactions that are receiving scholarly attention, as present studies have suggested how social media influencers (SMIs) are effective among younger generations (e.g Kádeková & Holienčinová, 2018,

p.99). This quantitative study will contribute to VIs research in several aspects. First, it seeks to quantify and generalize relationships between VIs and Generation Z users. Second, it follow-ups on current qualitative VIs studies that have identified key VIs categories (e.g. Batist & Chimenti, 2021, p.10-18) and speculates why VIs might benefit Customer Engagement (Robinson, 2020). Third, as the SMIs industry continues to grow year-on-year, this study offers managerial implications on how to tackle the younger users base on social media through this new type of endorser.

This cross-sectional study tested 8 hypotheses identified from the literature related to Parasocial Interaction with VIs, VI's attributes, and Customer Engagement. A quantitative design was adopted with an online survey (N=221) as the data collection method. Partial least squares structural equation modelling was used to evaluate the measurement model and to develop the structural model. (figure 1).

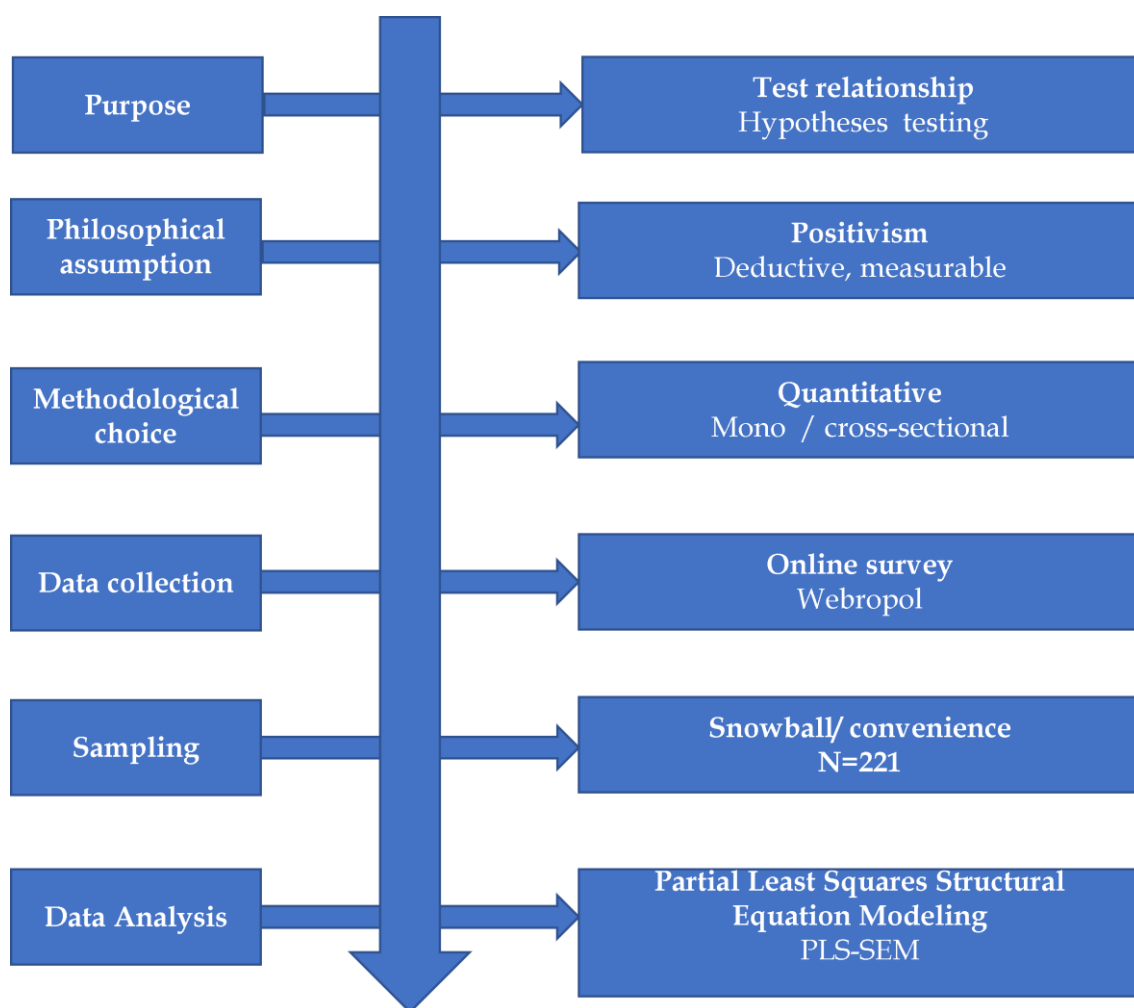


FIGURE 1 Research design (developed from Saunders et al., 2019)

1.2 Research problem & Research questions

Being a relatively new topic, studies regarding Virtual Influencers are scarce. From 2018 until 2020, most major studies regarding influencers focus solely on human influencers (HIs), with only a few of them briefly discussing VIs as a trend and only three of them (Kádeková & Holienčinová, 2018; Muostakas et al., 2020; Robinson, 2020) discuss VIs as the main theme. Using Science Direct and Google Scholar, the 23 most relevant Virtual Influencers studies from 2018 to 2022 were retrieved for the review process (table 2, page 18).

The prevailing theme identified from the literature is VIs 'authenticity', as most studies discuss the effect of 'non-human' towards user perception to some extent. Most studies can be considered early-stage, as they are explorative research that has touched upon the fundamental characteristics of VIs, such as in terms of how they can benefit brands (Powers, 2019; Thomas & Fowler, 2021; Zhang & Wei, 2021; Batist & Chimenti, 2021, Wibawa et al., 2022), how realism is perceived by

users (Andersson & Sobek, 2020; Mohanty, 2021; Cornelius et al., 2023; Zhang & Ren, 2022; Arsenyan & Mirowska, 2021), or ethical problems associated with Virtual Influencers (Robinson, 2020; Michaelsen et al., 2022, p.33-34). Some VI studies have also compared them to human ones (E.g Muostakas, 2020; Sands et al., 2022, Conti et al., 2022; Stein et al., 2022). One vital aspect that is underdeveloped is how all the aforementioned discussions can be connected to social media users. To truly apprehend the impact of VIs and how they may be considered a market disruptor, it is important to learn the magnitude of their impact on customers.

As customers and these computer-generated characters share the same media network, users are exposed to these VIs and their content. Like witnessing all social media characters, customers will go through a multi-staged process in which they first form their impression and disposition of the characters. Then, customers may develop certain feelings or attraction towards the persona and lastly, they may want to see more of the content from that character. This process is called Parasocial Interaction (PSI), which already can take place during the first spontaneous exposure to the media persona (Balaban et al., 2022, p.2). Ample studies have comprehensively captured this process from how initial exposure to a media persona can have an impact on customers' perception of the persona and link that perception to marketing outcomes such as purchase intention, trust towards the persona and the sponsored brand (e.g Munukka et al., 2016; Seiler & Kucza, 2017; Munnukka et al., 2019; Penttinen et al., 2022). While this process is the key that explains the dynamic between customers and social media personas, it has only been briefly touched upon in VI literature (e.g Mei, 2021; Stein et al., 2022).

Furthermore, although some studies have denoted that VIs are most effective for Gen Z users than other age groups (e.g Muostakas et al., 2020; Wibawa et al., 2022, p.58), previous research has not quantified this relationship. Given that VI studies have pointed out the inherent differences between HIs and VIs, such as Batist & Chimenti (2021, p.10-18) did when they proposed the primary categories to better understand VIs. It is worth examining how users perceive these different attributes and whether or not they have an impact on Customer Engagement with these synthetic humans. On this notion, prior VIs studies have also called for an investigation of what plays a role in user perception towards VIs (Arsenyan & Mirowska, 2021; Moustakas et al., 2020; Park et al., 2021; Shin & Lee, 2020). Thus, this study will address this literature gap:

Research Objective

This study aims to examine how Parasocial Interaction with VIs affects Gen Z's perceived VIs' attributes and Customer Engagement; and to develop a framework that encapsulates this dynamic.

Research Questions

1. To what extent does parasocial interaction with Virtual Influencers affect Gen Z Instagram customers' perception of the Virtual Influencers' attributes?
2. To what extent do Virtual Influencers' attributes have an impact on Gen Z Instagram Customer Engagement?

1.3 Clarification of key concepts

Virtual Influencers (VI) are defined as artificially created identities that have accumulated a large following base on social media and are used in marketing communication to promote brands and products. These identities do not exist in real-life but can resemble humans and they are owned by their programmers or media agencies.

Generation Z (Gen Z) in this study refers to users born between 1992-2004. From a generational perspective, Gen Z is characterised by the heavy use of social media.

Human influencers (HIs) refer to real human users that have accumulated a following base on social media but are not traditional celebrities.

Engagement in this study refers to **Customer Engagement (CE)**, which is "a psychological state resulting from specific interactive episodes that a customer experiences with a focal agent or object" (Brodie et al., 2011, p.260). The study also notes related terms such as brand engagement and Customer Engagement behaviour, although they are not considered in the empirical part.

Influencer attributes refer to factors that are considered important to an influencer. An influencer's attribute is a 'minor factor' that impacts the influencer's ability to persuade (Benito et al., 2020).

Parasocial Interaction (PSIs) refers to one-sided interactivity with an online persona. This study focuses on how users may react after initial exposure to the VIs, rather than a stronger state of wanting to develop a relationship with the VI (as in parasocial relationships (PSR)).

1.4 Study structure

This study is divided into five chapters (figure 2). In this first introductory chapter, the study's context was presented, after which, the research questions were formulated and key concepts were briefly clarified. The remainder of the thesis is as followed: the second chapter discusses VIs definition, categorisations and their application in the field of marketing. The three pillars of the research model: Parasocial Interaction, VIs' attributes, and Customer Engagement will subsequently be examined. Next, the Research Methodology chapter justifies the philosophical approach as well as the research method. From there, the hypotheses are formulated and the data collection method will be introduced. The fourth chapter presents the data analysis procedure and the results. The fifth chapter summarizes the study through key findings, contributions, limitations and further implications.

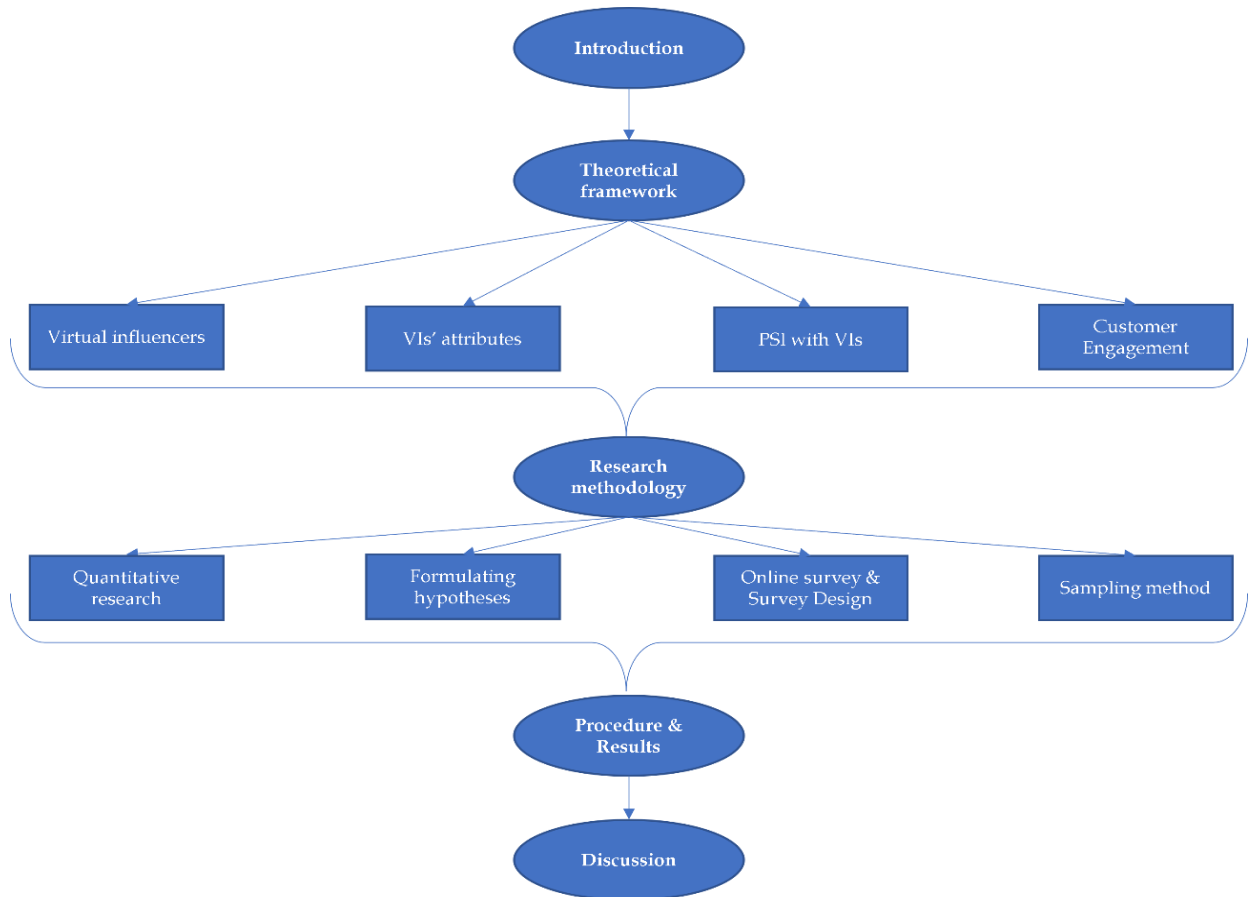


FIGURE 2 Structure of the study

1.5 Disclosure of AI usage

The author declares that no AI software or tools were used during the writing process of this thesis.

2 THEORETICAL FRAMEWORK

This chapter first narrows the context of the study to Gen Z Instagram users. Then, it discusses Virtual Influencer's definition, categorisation and implementation in marketing. The chapter will subsequently propose four attributes through which VIs will be examined. Additionally, customer relationships with VIs will be explored through Parasocial Interaction and Customer Engagement.

2.1 Generation Z and Instagram

2.1.1 Generation Z

Traditionally, marketers segment users by age groups to highlight consumers' similarities in beliefs, lifestyles and habits (Chaney et al., 2017, p.179-180). Considering the studies of digitalization and SMIs, a 'generational' perspective is considered more suitable than an 'age group' perspective. That is, members from the same generation share the same historical, cultural, political and economic events during their "coming-of-age" years (Chaney et al., 2017, p.180). Distinguished from an 'age perspective' where customers are only segmented through their age group, a generational perspective takes into account the main events that shape customers' social, cultural and psychological similarities. Although the definition of a generation varies, Chaney et al. (2017, p.179-180) outline that a generation is a group of people that live simultaneously with a shared sense of youth, values and belonging. As a result of this viewpoint, researchers and practitioners coined terms such as Gen Z, Baby Boomers, Millennials, and Generation Alpha. Although the definitions of each generation and its associated age range may vary between studies, they are closely related in terms of cohort characteristics.

Generation Z, also known as Gen Z or Zoomers, is considered a younger generation of customers, specified as those who were born in the late 1990s till early 2010 (Haenlein et al., 2020, p.6; Düzenli, 2021, p.897). Unlike previous generations, Gen Z is known for the heavy use of streaming services and social media. They are considered "digital natives" who grow up with access to the internet and digital technology (Düzenli, 2021, p.897). In 2022, 61.6% of users on Instagram are between 18 to 34 years old (McLachlan, 2022). Gen Z represents the largest generation of consumers on social media platforms, as 71% of them use a smartphone for accessing news (Castro et al., 2021, p.60). On average, a Gen Z user consumes digital media for almost eight hours a day (Wielki, 2020), with 4.5 hours on different social media platforms (Castro et al., 2021). Gen Z is tech-savvy as they are continuously connected through smartphones, tablets, and the Internet of Things (Chaney et al., 2017, p.182; Castro et al., 2021, p.60). They are

also characterized by their expectation of quick results and answers; short attention span; use of technology for interaction; and high connectedness (Düzenli, 2021, p.897 – 898). They prefer communication in written formats, which is also the main form of communication used by SMIs as designed by social media platforms. The availability of technology and information shapes the way Gen Z interact with brands, connect with peers, and makes purchases (Fromm, 2016).

Because this generation spends a large part of their adolescent lives online, they are exposed to a wider range of influencers' content and thus, have ongoing dynamic relationships with SMIs (Castro et al., 2021, p.59). Gen Z tends to over-identify with an external group to search for an identity, and therefore, are more likely to interact with influencers to associate with their characteristics (Castro et al., 2021, p.62). Cho et al. (2022, p.120) revealed that 41% of Generation Z users regularly purchase products based on recommendations by influencers while only 19 per cent of Generation Y (millennials) would do the same. On the other hand, SMIs have been demonstrated to have a negative impact on Gen Z. For example, Media Kix (2018, as cited in Castro et al., 2021, p.62), found that around 38% of Gen Z holds a negative view of advertisements and adopt distinctive behaviour to isolate themselves from advertisements. Because the relationship between the followers and SMIs is usually parasocial, with the followers looking to be inspired and become like the influencers, Gen Z is more susceptible to depression, obsession with body image, and anxiety correlated to instant fame (Castro et al., 2021, p.68).

Commercially wise, Gen Z is the first digital era customer segment to enter the market which means firms need to approach them through digital channels rather than traditional channels and thus, fortifying the promotional role of SMIs. Generation Z is also suggested to be more open to other cultures but with lower brand loyalty and lower risk aversion compared to previous generations (Chaney et a. 2022, p.186). Coupled with the rising numbers of SMIs and Virtual Influencers who battle to win Customer Engagement, it is important to understand the factors that retain Gen Z's attention and engagement.

2.1.2 Instagram

Brands acknowledge the increasing importance of investing in the digital space, especially in social media platforms, with global spending in the digital space increasing from \$491.70 billion in 2021 to \$785 billion in 2025 (Lim & Rasul, 2022).

Social media is considered a tool for social interaction, using highly accessible and scalable communication techniques such as web-based and mobile technologies. The main advantage of using social media for brand communication is that they allow quick, direct and flexible communication with the customers. At the same time, it is also easier to track communication effectiveness using social media analytical functions compared to an offline environment (Lim & Rasul, 2022).

Social media can be considered one of the major evolutions of relationship marketing as they are integrated with smart devices that allow customers to access brand-related information quickly as well as to express their opinion related to the brands (Lim & Rasul, 2022).

In 2022, 58.7% of the global population use social media (Walsh, 2022), as many of them use social media as a primary source of information. Although having the same core mechanic of sharing and interacting, each social media platform has its own twist. For example, Instagram and Pinterest are visual platforms on which popular SMIs portray themselves through images of lifestyle. TikTok users can only post short videos that encapsulate different moments or moods. Reddit users share mainly text stories and interact a lot through comments while Youtube users mostly watch longer videos. (table 1).

TABLE 1 The most popular social media platforms by monthly active users (adopted from Walsh, 2022)

	Social media platform	Monthly active users	Launched
1	Facebook	2.9 billion	2004
2	Youtube	2.2 billion	2005
3	WhatsApp	2 billion	2009
4	Instagram	2 billion	2010
5	Tiktok	1 billion	2016
6	Snapchat	538 million	2011
7	Pinterest	444 million	2005
8	Reddit	430 million	2010
9	LinkedIn	250 million	2006
10	Twitter	217 million	2003

As Gen Z is considered the first generation to grow up in a post-digital era, these platforms largely account for how they interact with brands and SMIs (Fromm, 2016). Different from how the previous generations use social media, Gen Z is more selective about the platforms and the group of people with whom they share stories to (Fromm 2016). Gen Z tends not to overshare on Facebook and use Instagram or Snapchat for a more selective audience (Fromm, 2016). In the context of the Gen Z - SMIs relationship, Castro et al. (2021, p.62) consider Instagram to be the most important channel for advertising and SMIs reach, followed by Tiktok. Instagram and Tiktok are also the most used social media platforms by Gen Z, with 61.6% Instagram users and 72.7% Tiktok users between 18 to 34 years old (McLachlan, 2022; Statista, 2022; Clement, 2020). Other social media platforms such as Facebook and Youtube, despite having a larger monthly active user base, are more common among previous generations and are less used by influencers (Statista, 2018). While Instagram and Tiktok are used by more than 50% of

influencer marketing campaigns, Facebook and Youtube are only used in 42.1% and 38.3% influencer marketing campaigns respectively (Geysler, 2023). Similarly, Jambulingam et al. (2018, p.3) and Baker (2018, p.81) found Instagram and Tiktok to be the most preferred social media platforms among Gen Z to stay connected and entertained while Facebook and Twitter are among the least preferred platforms.

From a managerial perspective, with the average cost of an influencer marketing post on Facebook ranking the lowest among these platforms, only less than 25% of marketing managers consider Facebook to be a suitable platform for influencer marketing (Haenlein et al., 2020, p.10). Instagram and Tiktok, with a younger user base, combined with how the platforms are designed to be images-and-vidEOS-friendly, allow the influencers to express themselves and reach a sizable follower base (Haenlein et al., 2020, p.10). Almost all of the most popular Virtual Influencers (e.g. @magazineluiza, @lilmiquela, @knoxfrost, @thalasya) start their career on Instagram (Conti et al., 2022, p.2) and only a few have expanded to other platforms.

With regards to VIs, social media platforms provide affordances, an environment in which the platforms create visibility for the influencers while the influencers interact with members (Ciuchita et al., 2022). With this visibility, Instagram created the possibility for influencers to sell online through its channel using shopable tags (Brooks, 2019). The platform also plays a regulative role, as it moderates user accounts and ensures that users build their online persona in an honest way (Robinson, 2020, p.6). However, it is up to each platform to determine what is acceptable. For example, in January 2022, Meta announced that it is developing an ethical framework for the use of Virtual Influencers on its platforms, with concern over how synthetic media – the technology used to create Virtual Influencers, can cause “representation and cultural appropriation” issues. Many things related to AI and emerging technologies are hard to be regulated and enforced. For example, it is unclear how the famous virtual influencer [@Lilmiquela](#) was created, as some speculate that she is completely computer-generated while some believe that she is partially human-based (Robinson, 2020, p.2). As the technology behind the VIs remains unknown to the public, it is up to the platforms to enforce what is considered adequate when it comes to VIs.

2.2 Virtual Influencers

2.2.1 Virtual influencer Definition

Most studies before 2012 viewed “influencers” and “influencers marketing” through a traditional lens where the firms collaborate with a famous celebrity for

an advertisement or a campaign. Since 2012, with the steep rise in the number of social media influencers due to the popularity of social media platforms such as Instagram, Tiktok and streaming sites such as Twitch, studies began to examine social media influencers with social media platforms as the facilitator (Haenlein et al., 2020, p.6). In 2019, the word “influencer” was officially added to the English dictionary (Castro et al., 2021, p.62). The definition of influencers and their extent has also developed. For example, Haenlein et al. (2020, p.6) defined an influencer as someone with a large and engaged follower base that we need to follow to know them (Haenlein et al., 2020, p.17). This definition alone is already different from how companies viewed influencers before the social media era, as influencers back then are celebrities who are well-known in the field (e.g Beyoncé in the music industry).

Being a relatively new concept, the definition of Virtual Influencers is fluid. The first study documenting the concept (Kádeková & Holienčinová, 2018, p. 96) described them as influencers created to promote selected brands, highly successful and do not exist in real life. Studies then from 2019, have included or subtracted different components from their definition, depending on the field and declamation of the study. Table 2 summarizes the definition of VIs from the most relevant studies ranging from 2018 to 2022. The most consistent theme from these definitions (table 2) is that VIs do not exist in real life and are created to promote brands, products or services on social media.

Table 2 Relevant Virtual Influencers’ studies and definitions

	Relevant literature	Title	Virtual influencer Definition
1	Kádeková & Holienčinová, 2018	Influencer marketing as a modern phenomenon creating a new frontier of virtual opportunities	A brand-owned influencer created to promote selected brands. Successful and appealing to millions of fans on Instagram. Do not exist in real life.
2	Monlin & Nordgren, 2019, p.1	Robot or Human? The Marketing Phenomenon of Virtual Influencers: A Case Study About Virtual Influencers’ Parasocial Interaction on Instagram	“A fictive computer-generated image, that is built on artificial intelligence (AI) and inspires followers on Instagram with content on e.g., fashion and experiences”.
3	Darner & Arvidsson, 2019, p.11	Virtual Influencers: Anonymous celebrities on social media	“ A person or thing that influences another made by software to appear physically existing”
4	Powers, 2019	Virtual Influencers Are Becoming More Real—Here’s Why Brands Should Be Cautious	“Carefully curated AI-generated personas who promote products and services on social media”.
5	Andersson & Sobek, 2020 , p.7	Virtual Avatars, Virtual Influencers & Authenticity	Virtual individuals with commercial purposes on social media, that have a sub-

			stantial number of followers, and can affect the purchasing behaviours of other individuals
6	Muostakas et al., 2020	Blurring lines between fiction and reality: Perspectives of experts on marketing effectiveness of Virtual Influencers	" Computer-generated influencers (CGI) or artificial intelligence influencers (AII) with a social media presence".
7	Robinson, 2020, p.1	Towards an Ontology and Ethics of Virtual Influencers	" Someone who holds social power and shapes the behaviour of others through their words and actions."
8	Batist & Chimenti, 2021, p.1	"Humanized Robots": A Proposition of Categories to Understand Virtual Influencers	"Virtual robots that can emulate human appearance and behaviour have become a trend in marketing"
9	Mohanty, 2021	Role of the Appearance of the Virtual Influencers on Social Presence and Brand Attitude	"Fictional computer-generated 'people' with human features/characteristics/personalities"
10	Arsenyan & Mirowska, 2021, p.5	Almost human? A comparative case study on the social media presence of virtual influencers	" Agents augmented with digital avatars, designed to look like a human"
11	Mei, 2021, p.104	Virtual Influencers: Walking Around the Boundary of Real and Virtual.	" Computer-generated imagery with hyper-realistic appearance and personalities akin to human beings, primarily controlled by media agencies."
12	Zhang & Wei, 2021, p.5	Influencer Marketing: A Comparison of Traditional Celebrity, Social Media Influencers, and AI Influencer	"Computer-generated artificial characters with a strong social media presence/fame"
13	Thomas & Fowler, 2021, p.12	Close Encounters of the AI Kind: Use of AI Influencers As Brand Endorsers	"A digitally created artificial human who is associated with Internet fame and uses software and algorithms to perform tasks like humans"
14	Park et al., 2021	Computers as Social Actors? Examining How Users Perceive and Interact with Virtual Influencers on Social Media	"Fictive computer-generated images (CGIs), which are generated by artificial models with computer vision-oriented graphic technologies"
15	Sands et al., 2022B	False Idols: Unpacking the opportunities and challenges of falsity in the context of Virtual Influencers	Cited Thomas & Fowler's (2021) Definition
16	Stein et al., 2022, p.2-3	Parasocial Interaction with real and Virtual Influencers: The role of perceived similarity and human-likeness	"Artificial media personas that are created by single programmers or whole media agencies, who often decide to remain anonymous."
17	Zhang & Ren, 2022, p. 298	Virtual Influencers: The Effects of Controlling Entity, Appearance Realism and	"A type of computer product" that is "highly anthropomorphic in appearance, voice, identity, interaction."

		Product Type on Advertising Effect	
18	Michaelsen et al., 2022, p.33	The impact of Influencers on advertising and consumer protection in the Single Market	“virtual, artificial (or AI), digital, or computer-generated imagery (CGI) influencers are computer-generated characters resembling a human active on social media.”
19	Conti et al., 2022, p. 1	Virtual Influencers in Online Social Media.	“A person or thing created by software that can influence others, primarily through marketing collaborations or participation in social campaigns, and is solely created and consumed via digital mediums”
20	Rodrigo-Martín et al., 2022, p.251	Virtual Influencers as opinion leaders and their use in political communication technics	“Avatars created thanks to augmented reality and which, in recent months, have gained ground on traditional influencers among younger audiences”
21	Wibawa et al., 2022, p.53	Virtual Influencers: Is The Persona Trustworthy?	“Virtual Influencers are human avatars created by computers with a large social media following”. “Computer-generated influencers (CGI) or artificial intelligence influencers (AII) with a social media presence are known as Virtual Influencers.”
22	Wolff, 2022	A trend or is the future of influencer marketing virtual – The effect of Virtual Influencers and sponsorship disclosure on purchase intention, brand trust and Customer Engagement	Cited Moustakas et al., 2020
23	Cornelius et al., 2023, p.3421	How Influential are Virtual Influencers? Impact of Visual Realism on Credibility	“Computer-generated avatars on social media that project themselves as “virtual beings”, “robots”, and “aliens”, but can look and behave less or very much like human beings.”

It appears that consensus has not been reached concerning **how the VIs are created as** some studies are more ‘technical’ about the boundaries of VIs. For example, Thomas & Fowler (2021, p.13) emphasize the **artificial intelligence** parts of a VI, suggesting that a VI consist of five AI building blocks: problem-solving, image recognition, machine learning, natural language processing, and speech recognition.

There also seems to be a varying degree of **realism** in the VI definitions. For instance, some studies consider VIs to be human avatars created by computers or AI (Wibawa et al., 2022, p.53; Michaelsen et al., 2022, p.33; Thomas & Fowler, 2021, p.12-13) while some studies suggest that a VI does not necessarily have to resemble a human as they can be a character or a persona (e.g Conti et al., 2022;

Zhang & Ren, 2022; Stein et al., 2022, p.2; Zhang & Wei, 2021). Stein et al. (2022, p.2) also discussed how VIs may even use a real human body if only their face is computer-generated. Robinson (2020, p.3), also mentioned that some VIs, such as @lilmiquela use a blend of both human and computer inputs to change over time.

In terms of **functionalities**, Thomas & Fowler (2021, p.12-14) and Batist & Chimenti (2021, p.11) suggest that VI should be able to use software and algorithms to perform tasks like humans while most other studies do not share the sentiment, as they do not restrict VIs to only artificially created VIs. Some definitions mentioned the **origin** of VIs - how they are owned by brands, agencies or programmers (e.g Kádeková & Holienčinová, 2018, p.96; Mei, 2021; Stein et al., 2022, p.2).

Still, all definitions of VIs share many fundamental characteristics with human influencers such as promoting brands through WOMs, engaging with an audience, and having a large number of followers. Through the review of the 23 studies, it can be observed that most definitions will include the: (1) technology behind the VI (how they are created); (2) functions of the VI; (3) and sometimes the origin of the VIs. For those reasons, in this study, VI will be defined as artificially created identities that have accumulated a large following base on social media and are used in marketing communication to promote brands and products. These identities do not exist in real-life but can resemble humans and they are owned by their programmers or media agencies. Lastly, it is important to notice how different terms that refer to VIs are often used interchangeably such as CGI influencers, digital influencers, virtual endorsers, algorithmic online celebrities (Berryman, 2021), virtual avatars, virtual agents (Stein et al., 2022, p.3).

2.2.2 Categorizing VIs

There are mainly four ways of categorizing influencers: through the number of followers, their motivation to take action, their primary communication platform, and their type of activity (Weilki, 2020; Stein et al., 2022, p.15). However, in practice, influencers are mostly categorized based on the number of followers (figure 3) because having a high number of followers may indicate a higher level of follower engagement, authenticity, intimacy or expertise (Campbell & Farrell, 2020).

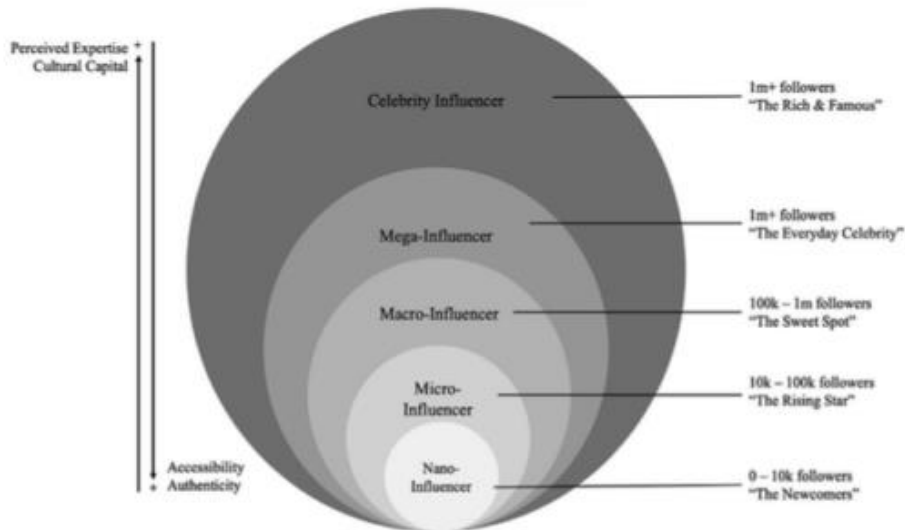


FIGURE 3 Categorizing influencers based number of followers (Campbell & Farrell, 2020, p.3)

Companies may consider working with an influencer with a lower number of followers if they are well-known in their specific 'influential hub' (Haenlein et al., 2020). Macro-Influencers (100k-1m followers) are considered 'the sweet spot' for brands as they are usually established in their field while still maintaining a relatively high degree of authenticity. Both 'Celebrity Influencers' and 'Mega-influencers' share the same mark of 1m+ followers. However, a distinction between traditional celebrities and social media influencers is made (Zhang & Wei, 2021, p.3-4) because the former are known for their achievements in their respective field while the latter are known for their online persona through their respective social media platform. In other words, celebrity influencers are known through achievements in their professions (e.g doctors, chefs, musicians, athletes) while mega-influencers can just be 'ordinary people' who are known for their online persona. Another way of categorizing influencers is through their motivation to take action, which can be considered as the influencer's aspiration to become: idols, experts, lifestylers, activists and artists (Wielki, 2020). Idols mainly focus on themselves and try to reflect who they are through messages on various topics. Experts are well-known industry specialists who discuss field-related developments. Lifestylers are focused on lifestyle and leisure activities. Lastly, activists present strong arguments related to the worldview they represent (Wielki, 2020).

Currently, there lacks studies that categorize VIs although the same methods of categorizing human influencers can be applied to VIs to an extent. For example, VIs may be categorized based on purely follower numbers. As of December 2022, many Virtual Influencers are in the 'sweet spot' range, having accumulated around 100k - 1m followers (e.g @noonouri; @kyraonig; @shudu.gram). A few of them have also surpassed the 1 million followers mark and are often seen in

brand campaigns (e.g @magazineluiza, @lilmiquela, @barbie). In addition, it is also possible to categorize VIs through the platforms, type of activity and motivation to take action (Weilki, 2020). However, it is worth noticing that a VI's type of activity and motivation to take action may not be fixed because they are designed to tailor to the needs of the brands.

From a design perspective, six main types of VIs can be found in the literature (figure 4). These types can first be categorised into two main groups: humanoid VIs and non-humanoid VIs. Virtual avatars are digital representations of real humans (Stein et al., 2022, p.3; Weilki, 2020). Cartoonish humans have a low degree of realism as they are purposely created similar to cartoon characters (Muostakas et al., 2020). AI influencers have built-in AI technologies to continuously learn, improve, create content and interact with users (Thomas & Fowler, 2021, p.12-14). Some VIs are speculated to be not 100% digitally created, as part of their face or body may be real human parts, while parts of their body are distorted or modified before being uploaded online (Robinson, 2020). Besides humanoid VIs, pet VIs and robots VIs are great alternatives, considering the possibilities of a fully digital world such as the Metaverse (Koay et al., 2022).

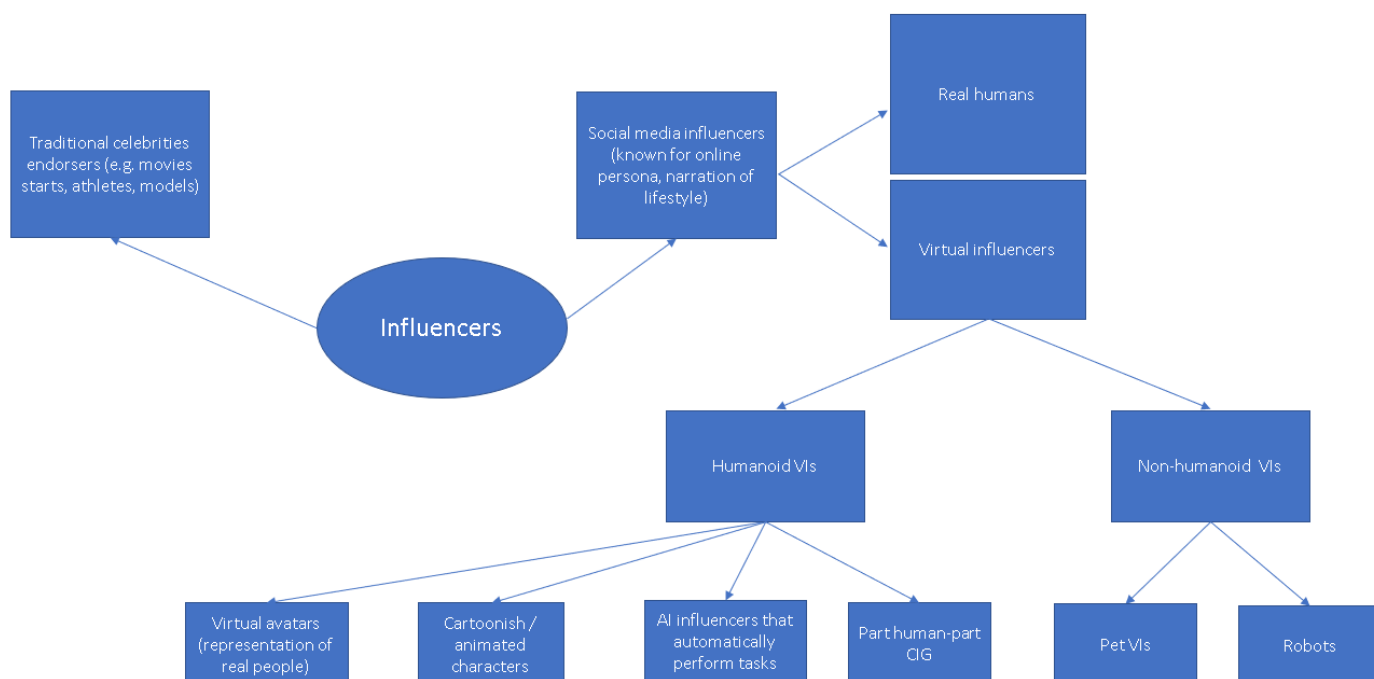


FIGURE 4 Types of influencers

2.2.3 Virtual Influencers in marketing

Representing a \$16.4 billion industry in 2022, the influencer marketing industry is characterised by the collaboration between brands and influencers to stimulate company growth (Santora, 2022). In industries such as fashion, beauty, travel or food, there are only a few firms that are not collaborating with popular individuals on social platforms (Haenlein et al., 2020, p. 5). Influencer marketing studies date back to 1995, when Abratt et al. (1995, p.31) refer to influencers as the 'the market maven', with the view that each of us is a follower in one way or another, and for brands to send their marketing mix messages, there need to be influencers that deliver the messages effectively.

Haenlein et al. (2020, p.7) discussed how social media platforms and influencer marketing are inherently linked as influencers depend on the platforms for exposure and the platforms benefit from the content that users make. The role of social media platforms is so prevalent that they are adopted by traditional influencers for better notoriety while existing users try to seek fame through their own attractive content. As brands always seek to engage and influence consumers' decisions and desires, influencers usually serve as an "independent third party endorser" that configures audience attitudes through the use of social media (Enke & Borchers, 2019, as cited in Mohcine et al., 2022, p.18). Social media influencers (SMIs) hold a variety of roles in a firm's marketing strategy, from content producers, content distributors, to community managers that shape how businesses operate. More than ever, since the direct communication path between brands and consumers is distorted by WOMs, forums, user-generated content and social media platforms (Kannan & Li, 2017, p.24), the vital role of SMIs is amplified. Brands collaborate with SMIs through paid advertorials which are advertisements but written in an authentic fashion by the influencer.

From a brand's perspective, influencer marketing is lucrative and highly effective. For example, Tomoson (2015) found that companies are making \$6.50 for every \$1 spent on influencers. Two-thirds of firms plan to increase their influencer marketing spending in 2022 as the number of influencer marketing-related services grew by 26% in 2021 (Geysler, 2022). Brands also see an average increase in stock price by 4% after they announce a collaboration with an influencer (Zhang & Wei, 2021).

In the fashion industry, some VIs are brand-owned and represent one brand, while many operate independently. Similar to HIs, VIs attracts users through narrations of their life and persona. Many VIs are open about the fact that they are robots and have robotic quirks. There is little difference in content created by VIs compared to HIs. This is because VIs need their messages to be perceived as reliable and engaging so that their followers trust their judgments and brands work with them (Mohcine et al., 2022).

Being digitally created characters, there is an abundance of advantages associated with VIs. One of the advantages of VIs compared to humans is their availability. In other words, VIs are not geographically restricted, as evident through IKEA, Renault and Prada's marketing campaigns during the COVID-19 restrictions. In terms of availability, "Virtual Influencers never have an off day, always stick to a script" and can be modified to suit any objective the company is trying to achieve through their marketing communication (Powers, 2019). VIs are also a safer option compared to HIs since they can communicate sponsored messages with high controllability (Batist & Chimenti, 2021, p.14-16). Brand-owned VIs such as Prada's Candy was introduced as "free of constraints" as their appearance can be modified to suit the product, place, message, and brand aesthetics. However, because the endorsement strategy must be consistent with the company's objectives (Mohcine et al., 2022, p. 26; Haenlein et al., 2020), VIs are not a one-fit option for any kind of product, despite boasting higher customizability. Fashion brands can benefit from them but brands may still need to create a different VI or work with a HIs for other product lines.

In terms of controllability, VIs serve as an extra protection layer for brands. This aspect is very important, evident by influencer management software raising \$800M of investments in 2021 alone (Geyser, 2022). Automation also brings in risks of transgressions which has a spillover effect that lowers brand attitude (Thomas & Fowler, 2021; Reinikainen et al., 2021). Thomas & Fowler (2021) demonstrated that the brand is perceived as responsible if they replace a VI that has committed a transgression with a HI. While the use of automation is usually justified by lower long-term costs, currently, there are contradicting opinions about whether or not implementing VIs is cheaper than HIs. While they may cost more than human endorsers with the same number of followers (Baklanov, 2019), the company face lower risks of transgression while VIs also allow brands to scale their interactions in the long term (Thomas & Fowler, 2021).

Another benefit of VIs and technology-enabled agents, in general, is their ability to reduce human workload. Batist & Chimenti (2021, p.18) refers to this as VIs' scalability. VIs with built-in AI technologies can create content with minimal human assistance (Thomas & Fowler, 2021, p.12-14). These VIs are speculated to be worth much more than just the company's tangible assets once they can reliably create content and interact with customers with minimal human assistance or even by themselves (Conti et al., 2022). For larger companies, AI influencers allow them to respond to customers' sentiments in real-time while maintaining a one-on-one conversation with customers throughout their purchase process (Campbell et al., 2020). The content produced by the VIs can always be controlled and approved by humans before being posted while they provide the same brand benefits as a HI (Thomas & Fowler, 2021). Although AI 'context awareness' is not within the current realms of possibility (Davenport et al., 2019), a third of UGC on social media is already created by bots using AI technology (Liu, 2019, as cited

in Thomas & Fowler, 2021) and we might see more of such implications from VIs in the near future. Some studies discuss how VIs may replace humans (Kádeková & Holienčinová, 2018, p.103) due to the marketing disruption of machine learning and AI (Batist & Chimenti, 2021, p.18). It is worth noting that without the functionalities that allow VIs to scale, VIs are just anonymous social media profiles run by a human. Lastly, Conti et al. (2022) found that only 12% of participants would trust a VI equally or more than a HI because entities such as robots or digitally created agents are still perceived to be inferior to real people in terms of cognitive ability and experience (Stein et al 2022, p.4).

2.3 Virtual influencer's attributes

Managers have increased difficulty in selecting the right influencer, as Haenlein et al. (2020) point out that many have less than adequate knowledge regarding influencer marketing, platforms and selecting the right influencer. Influencer marketing can be very damaging if it is implemented in the wrong way. For example, Thomas & Fowler (2021) show that endorsers who have committed a transgression will lead to a firm's declining financial performance, lower customer evaluation of the brand and lower intention of purchase. Reinikainen et al. (2020) also support that such transgressions will have a spillover effect which negatively affects attitude, trust and purchase intention.

There is a large body of literature that has identified and categorized SMIs' important factors (i.e. attributes) that drives engagement and purchase intention. These factors are also known as 'influencer's attributes'. Each influencer's attribute is a 'minor factor' that affects the influencer's ability to persuade (Benito et al., 2020). These attributes are usually concepts that cannot be measured directly such as trustworthiness, expertise and attractiveness (Ohanian, 1990). Other attributes are numbers and parameters that brands can use to quickly gather information about influencers such as likes, followers, and subscriptions to more complex metrics such as new followers in recent months or likes/followers ratio. It was also based on these numerical parameters that studies have categorized influencers (e.g Macro vs Micro influencers). The drawback of quantitative parameters is that they cannot reflect feelings, changes in behaviour, or ethical problems and that they are susceptible to fake followers and feedback (Cho et al., 2022). Although using numerical assessments may help brands to sort influencers and determine their visibility, these numbers do not express how fans view them or what is unique about them. For niche businesses and niche products, an influencer with only a few thousand followers can be a relevant choice if they match the characteristics, demographics, hobbies or behaviour of the audience (Haenlein et al., 2020). Without qualitative attributes such as passion, authenticity, and credibility, companies may have to put in extra effort to micromanage the influencer (Haenlein et al., 2020).

All in all, qualitative attributes mitigate the drawbacks of quantitative attributes and vice versa. For that reason, researchers should always build upon existing factors and parameters. The impact of any endorsers should consider the context of the study and should not be restricted to only one or a few factors (Ohanian, 1990; Benito et al., 2020; Cho et al., 2022). For example, Cho et al.'s (2022) literature review of 37 influencer journal articles found 10 qualitative attributes that are common in SMI studies (table 3).

TABLE 3 Important influencers' attributes (Cho et al., 2022, p.122)

Factor	Literature
Expertise/credibility	McQuarrie et al. [36]; Lim and Cheung [34]; Kim [33]; Wielki [53]; Hassan et al. [21]; Xiao et al. [54]; Balaban and Mustătea [4]; Ki and Kim [32]
Trustworthiness	Sekhon et al. [45]; Harris and Goode [20]; Almström et al [56]; Wielki [53]; Vodka et al. [51]; Wiedmann and von Mettenheim [52]
Quality content	Casaló et al. [10]; van Driel and Dumitrica [49]; Sokolova and Kefi [47]; Glucksman [17]
Quality presentation	Casaló et al. [10]; Jun and Yi [26]; Khalid et al. [31]; Glucksman [17]
Public relations	Bergstrom [6]; Bian and Moutinho [7]; Freberg et al. [15]; Damásio et al. [13]; Jarrar et al. [24]
Appearance	D'Alessandro and Chitty [12]; Akhtar [2]; Yuan and Lou [55]; Bauer [5]
Quality communication	Enke and Borchers [14]; Jun and Yi [26]; Khalid et al. [31]; Ryu and Han [44]
Participatory activities	Yuan and Lou [55]; Jun and Yi [26]; Villi and Matikainen [50]
Affability to the audience	Kaplan and Haenlein [28]; McQuarrie et al. [36]; Lim and Cheung [34]; Ruiz-Gomez [43]
Connectedness	van Dijck and Poell [48]; Hanna et al. [19]; Cho and Son [11]; Jin et al. [25]

When examining Virtual Influencers through these attributes, it can be expected that there would be at least minor differences in how the VIs are viewed because VIs are ontologically different from HIs (Robinson, 2020). The next section will summarize four VIs' attributes that are identified from the literature. Each of these attributes, although can be applied to HIs to some extent, may be perceived differently due to the expected differences and inherent differences between VIs and HIs.

2.3.1 Virtual Influencers' credibility

One of the most prominent models that highlight the relationship between influencer attributes and purchase intention would be the source credibility model (figure 5). VIs' credibility can be defined as the endorser's positive traits that affect the receiver's acceptance of the message (Ohanian, 1990, p.39-52). The model

suggests having a credible endorser can lead to positive customer attitudes towards the endorsement, brand attitude and purchase intention. Initially, normal customers were chosen to be a brand's representatives due to their similarity to the brand's target audience (Ohanian, 1990, p.39-52). Then, there came an age of commercials where celebrities were considered suitable due to traditional media coverage. Now, the preeminence of social media platforms once again allows ordinary people to play the role of endorser (Driel & Dumitrica, 2020). From the influencer's perspective, having a high degree of credibility will ensure that their messages receive attention, attract new followers, and potentially generate engagement with current followers (Balaban et al., 2022, p.3).

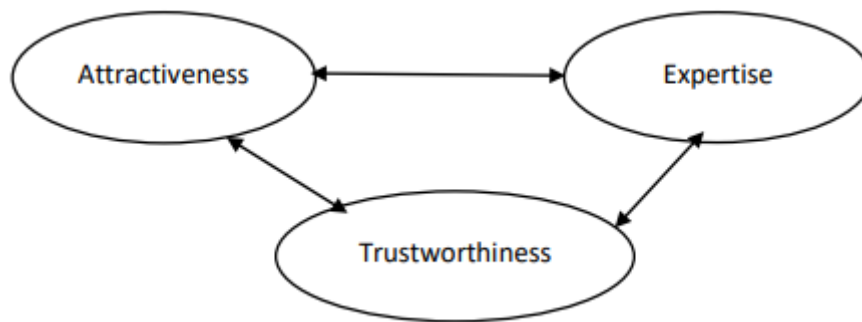


FIGURE 5 Source credibility model (adapted from Ohanian, 1990, p.46)

The endorser's attractiveness, expertise and trustworthiness altogether form the endorser's credibility. Consumers usually assess the endorser's credibility through these three characteristics. The higher the evaluation is, the more likely the consumers will accept the endorsed messages, trust the endorser and transfer this trust to the endorsed brand (Munnukka et al., 2019). This model holds true, given that studies in recent years have tested its implication of social media influencers on social media platforms (e.g Chung & Cho, 2017; Munnukka et al., 2019). The source credibility model was developed and used in many influencer studies, with subtracted or added elements. For example, some studies do not measure attractiveness as it was a part of the source attractiveness model, together with familiarity, likability, and similarity (Ohanian, 1990, p.41). Bakker (2018) added the dimensions of visibility and power to better determine how strong the endorsers can instil the endorsed message, while Nirschl & Steinberg (2018, as cited in Bakker, 2018) added 4Rs (reach, relevance, resonance and reputation) to the dimensions of credibility. To ensure that the VIs' attributes are exhaustive and exclusive, in this study, the VIs' credibility consists of the VI's expertise and trustworthiness. VIs' attractiveness will be a part of the discussion of VI's humanization (chapter 2.3.3).

The first dimension of VIs' credibility - expertise, is the VI's perceived knowledge of the source being advertised (Bakker, 2018). When customers encounter an endorser and their messages, customers build up a perception of the person's sense of authority and competence. On social media, customers' perception of the VI's

expertise can determine how well the customers adopt or reject the information provided by the VI. When we say that a VI is an **expert** in a certain field, we are actually referring to the controlling entity of the VI, which is also driven by the collaborating brand. For example, considering the different types of VI's motivation to take action Wielki (2020, p.5), expertise becomes crucial for VIs who post "experts, lifestylers, activists" content. As a VI carries a brand's or an organization's message, the perceived authority of that brand or that organization may also transfer to the VI. For example, in 2020, the World Health Organization (WHO) partnered with a VI, Frost Knox, to raise awareness about the spread of COVID-19 (Williams, 2020). While Frost Knox cannot be considered an expert on COVID-19, his messages carry authority as he was trusted by WHO.

VIs' credibility is also indicated by how much users trust the robot, as **trustworthiness** is the VI's ability to provide accurate information (Cho et al., 2022). The endorser perceived trustworthiness can lead to customers' favourable disposition, better message acceptance, psychological safety and even attitudinal changes (Ohanian, 1990, p.41). If the audience trusts the influencer and the endorsed brand, the uncertainty they feel towards that influencer and brand is reduced, which has been found to be positively associated with outcomes such as purchase intention (Reinikainen et al., 2021, p.4). Although the audience can see and perceive the VI, its controller remains anonymous and try to maintain a sense of transparency through 'self-disclosure' and interactivity 'techniques' (e.g see Penttinen et al., 2022; Munnukka et al., 2019).

The VIs' credibility can be considered a grey area topic, as they are controlled by the company or the agency. Another potential hindrance to VIs' credibility would be the social media environment. As ambiguity and anonymity were identified to be the inherent parts of these platforms (e.g Ciuchita et al., 2022; Balaban et al., 2022, p.3), when coupled with the faceless controller of the VI, pose challenges for brands and managers in marketing communication outcomes.

2.3.2 Virtual Influencers' authenticity

VIs' authenticity is one of the most discussed aspects of current VIs literature, as the discussion involves their ontological nature (Robinson, 2020), the commercial and the legal aspects of the VIs (Kádeková & Holienčinová, 2018, p.97). Authenticity refers to how 'genuine' the influencer's personality is (Hearn & Schoenhoff, 2016). VIs' authenticity is a disputed topic as studies point out different arguments. For example, Robinson (2020) argued that there is no meaningful difference between HI and VIs authenticity and how much customers decide to trust VI is based largely on the customer's personality and generation. Batist & Chimenti (2021) supports this argument, supplementing that customers do not show consistency when assessing VIs' authenticity, as certain users group may be more open to the concept. However, some argue that VIs can be lesser than

HIIs as they cannot build a relationship with customers or have a personality and therefore, their authentic nature should be questioned (e.g Conti et al., 2022).

Lee & Eastin (2021) found SMI's authenticity to be a multi-dimensional construct which includes truthful endorsement and uniqueness. An influencer is perceived as authentic if they can share random intimate moments and thoughts that are relatable to the audience (Driel & Dumitrica, 2020). In addition, this authenticity can also be maintained by choosing influencers that share the same style as the sponsored brand which is referred to as 'endorser-brand fit' (Pöyry et al., 2019). As the most discussed topics on Instagram are related to food, travel, fashion and fitness (Ross, 2021), VIs can appear 'more real' as they are also regular people with interests in seemingly common topics, which in turn can make the brand's messages more authentic. An influencer's authenticity has been shown to positively affect purchase intention and favourable perception of sponsored posts (Pöyry et al., 2019). If the influencer is perceived to be both authentic and attractive, the audience is more likely to exhibit a positive attitude towards the influencer's photo as well as a positive purchase intention (Pöyry et al., 2019). Considering the crucial role of visual elements on Instagram, it is important for VIs to maintain a degree of authenticity and for brands to select products that match the influencer's style, personality, and aesthetics.

On the other hand, VIs face authenticity and transparency issues (Monlin & Nordgren, 2019) which have been shown to be important for Instagram users (Driel & Dumitrica, 2020; Wolf, 2020; Brorsson & Plotnikova, 2017, p.41). It is difficult for a VI to stay authentic because sometimes, the audience may immediately deem a post unauthentic if it is about a commercial product (Driel & Dumitrica, 2020), while it is clear that the primary purpose of VIs is to serve brands commercially. Many studies also emphasise authenticity being the major disadvantage of VIs (Andersson & Sobek, 2020; Robinson, 2020; Conti et al., 2020; Michaelsen et al., 2022, p.33-34). First, it is usually ambiguous who is behind VIs, as many VIs accounts do not share who is responsible for the uploaded content (Robinson, 2020; Stein et al., 2022). Even when it is known who owns the VI, the company is still not disclosing the technology behind the VI (Conti et al., 2022), which may raise the question of whether or not the content was created using AI or humans. Second, because social media platforms were originally created for any 'normal person' to share about their lives, using VIs to push brand messages may be considered 'unauthentic' as it takes away the allure of these platforms. Third, the authenticity of VIs is also dependent on how the audiences ontologically view the VI. While some may accept that VIs are not real, how can VI experience and provide honest reviews about places, food, or even clothes if they are not really there to experience the products? The negative impact of this ambiguity may be stronger for an audience with high familiarity with technology due to the VI's perceived lack of transparency (Stein et al, 2022, p.4). For example, a

study from Finland has shown that consumers with high technology familiarity may recognise influencing attempts patterns better (Malinen & Koivula, 2020).

Lastly, one of the paradoxes revealed through the literature review process is the concept of being “authentically fake” (Arsenyan & Mirowska, 2021, p.8). As customers know that they are following and interacting with a robot who is incapable of emotional connection and senses, this perceived lack of authenticity can become a major advantage because customers may now view the VI through other lenses such as entertainment value. An example of this could be when watching cartoons, because the viewers are aware that some cartoon characters are not real, the viewers are less likely to be emotionally invested in negative things that happen to them and therefore, watch the cartoon with more positive emotions. Similarly, it can be considered that some customers have already accepted a certain degree of fakeness when following and interacting with a VI (Sands et al., 2022B).

2.3.3 Virtual Influencer's humanization

VI's humanization refers to the perceived similarity between the VIs and humans. This attribute can be considered ‘attractiveness’ in the source credibility model because humans look forward to a certain degree of homophily from the endorsers (Ohanian, 1990). VI's anthropomorphisation is not just about how the VIs visually resemble humans, but it also includes how cognitively (Stein et al., 2022) and emotionally the VI may resemble humans. As humans, we can build an expectation about how virtual characters ‘should behave’ according to what we consider social norms. Similarly, in a typology of virtual avatars, Miao et al. (2022, p.84) recognize that for a virtual agent, realism is vital to customer outcomes when interacting with that agent. VI's realism consists of form realism and behaviour realism. Form realism includes visual aspects such as the spatial dimension (2D pictures vs 3D pictures), how the VI moves and perceived human characteristics such as name, gender, age, and race. Behaviour realism is important when interacting with users, as it includes how the VI communicates and responds (Miao et al., 2022, p.71-73) to customer needs and sentiments.

The discussion surrounding VI's humanization usually involves the aspect of attractiveness, evident through how VIs can maintain their appearance through time as they are computer-generated. Kádeková and Holienčinová (2018, p.97) speculate VI's attractiveness is due to their ability to provide ‘virtual intrigues’, a sense of beauty and unpredictability shrouded in mystery. On the other hand, Batist & Chimenty (2021) argue that this same attractiveness can have a negative effect due to promoting an image of ‘unattainable perfection’. One of the ways to mitigate the unrealistic beauty standard of artificially generated characters is for them to look less like a robot (Batist & Chimenti, 2021). Zhang & Ren (2022) also confirms that virtual idols with a high level of appearance realism can improve

the users' ability to perceive virtual idols and advertisement attitude. Molin & Nordgren (2019) also showed that similarities with the audience in terms of age and gender are important to Virtual Influencers because female followers are likely to be attracted by influencers of similar demographics.

In addition to the visual aspects of humanization, VIs' "mental human-likeness" refers to how users perceive the VIs in terms of mental property, ability to think, plan and feel (Stein et al., 2022, p.5). Robots are often perceived to be inferior to humans in terms of mental prowess, as Stein et al. (2022) find that the advantages of VIs are suppressed by their perceived lower mental and visual human-likeness. Indeed, Feine et al. (2019) also find that despite interacting with machines, consumers still adhere to social rules when interacting with these virtual agents. This is not to dismiss the benefits these digital agents have on the customer experience. For example, the mere presence of these virtual agents can alleviate distrust in online shopping for some users (Sands et al., 2022B, p.4-5). Having a humanized representative is also an effective way to mitigate the "faceless" image of brands on social media.

The discussion of VI's humanization is also connected to the uncanny valley theory (e.g Arsenyan & Mirowska, 2021; Wibawa et al., 2022, p.59) which suggests that the more VI resemble a human, the more emotional responses they can evoke. However, if the resemblance surpasses a certain point, this similarity will lead to a negative user reaction (Wibawa et al., 2022). Many VIs are designed to resemble humans closely while users are aware that the VI is not real, the overwhelming uncanny may lead to the feeling of creepiness and negative user emotions (Arsenyan & Mirowska, 2021). To explore this issue, Cornelius et al. (2023, p.3427-3428) studied three VIs with varying degrees of realism, as their results leaned toward the existence of an uncanny valley. This provides an implication that although humans are more likely to relate to those similar to them, there is still a limit to how 'real' the VI should be.

2.3.4 Virtual Influencer's novelty value

One of the recurring themes that are noted in VIs literature is the remark about how 'new' and 'exciting' these digital creations are. Applications of new technologies and AI have always been the agency of transformation. When customers seek luxury products, not only do they want to own high-quality goods, but to also signal self-reference objects that are symbolic, distinctive and transformative (Loureiro et al., 2020). It can be considered that a similar dynamic is at play when interacting with VIs.

Content generated by AI arouses new interest in the audience due to its unpredictability. VIs is a fresh concept. They include the success factors due to their originality, appeal, extraordinariness, and popularity (Warren et al., 2019). In

other words, VIs are perceived to be ‘cool’, which is defined as a subjective and dynamic, socially constructed positive trait attributed to cultural objects inferred to be appropriately autonomous (e.g see Reinikainen et al., 2021; Zhang & Wei, 2021). VIs are cool because they are aesthetically pleasing, interesting and fun (Zhang & Wei, 2021). They are unpredictable in a way that they do not confront our usual expectations of HIs (Zhang & Wei, 2021). The unpredictability of VIs is a hallmark of ‘autonomy’ (Warren et al., 2019), which describes how they can forge their own path rather than conform to expectations. This positive novelty value can also spread to the brands that the VI represents, as well as their followers (Zhang & Wei, 2021; Reinikeinen et al., 2021).

As it seems like these technologies as coming “to life”, they satisfy the customer need for social engagement and interactive experience (Grewal et al., 2019, p.96). Following, interacting, and talking about VIs implies users’ autonomy (Zhang & Wei, 2021, p.6). Through those interactions, the customers want to establish an identity of being original, unique, and different. As some customers are always facing tension between self-identity and the presentation of themselves to others (Luoreiro et al., 2020), VIs provide a way to alleviate this pressure. Arsenyan & Mirowska (2021) found that some customers value VIs more than HIs because the former is an expression of the users’ innovativeness, open-mindedness, and trend. It is also worth noticing that in the source attractiveness model, the elements of “likability, familiarity, similarity” were determined to be indispensable factors of celebrities (Ohanian, 1990, p.41-42) as they play a role in expressing users' mimetic desire towards the VIs (Kim & Park, 2023).

However, it is difficult to determine how autonomous a VI truly is without understanding who or what is behind the VI. Currently, it is unsure whether the high engagement level of VIs is due to their novelty value (Batist & Chimenti, 2021) or something else. Although Stein et al. (2022, p.14) attribute VIs’ success to their novelty value, Robinson (2020, p.6) predicts that this factor may have no effect because the younger generations just genuinely do not care if the influencer was real. Like many human rising stars, attributing the success of VIs to their novelty value also implies that they are not truly intrinsically captivating and that they may one day be left by the road.

2.4 Parasocial Interaction (PSI) with Virtual Influencers

A parasocial relationship originally refers to the illusion of a relationship with a person encountered through media (Horton & Wohl, 1956). From an evolutionary perspective, (para-)social responses are believed to be stimulated by cues associated with human characteristics, such as a human face (Stein et al., 2022, p.5). Engaging in PSIs satisfies humans' basic needs for connectedness as they become part of a group.

Parasocial Interaction (PSI) and parasocial relationships (PSR) are characterized by a lack of reciprocity from the media persona (Horton & Wohl, 1956). PSI is defined as "felt reciprocity with a TV performer that comprises a sense of mutual awareness, attention, and adjustment" (Hartmann & Goldhoorn, 2011, p. 1107). PSI is connected to how users initially respond to a media persona during media exposure, while PSRs reflect a strong and lasting relationship with the media persona after long exposure (Balaban et al., 2022, p.2).

Nowadays, with the presence of new social media platforms and new types of influencers, the concept further develops into a "bond that spans across multiple reception situations and may, to some degree, resemble real-life instances of friendship or even romance" (Stein et al., 2022, p.5-6). The concept now is more than just an illusion (Horton & Wohl, 1956), as it involves cognitive, affective and conative interactions with the media character, as well as the facilitation of intimacy (Stein et al., 2022, p.5-7). The term 'para' indicates that the relationship is not balanced as the viewer knows much more about the influencer, to the point that they develop identification and interest in the performer, feeling like they are with friends and wanting to meet the influencer in real life (Munnukka et al., 2019) whilst the reverse is not true. Extant literature has demonstrated how a strong PSR impacts the perceived credibility of HIs, which translates to positive endorsement outcomes (e.g Reinikainen et al., 2020; Sokolova & Kefi, 2020; Penttinen et al. 2022; Balaban et al. 2022).

Being the focus of recent VIs studies, PSIs with VIs have been measured in several ways:

In a video streaming context, when comparing PSIs between a real human and an animated version of that person (human avatars), the avatars are interesting enough to yield similar viewer involvement compared to a fully human influencer (Stein et al., 2022). This means that there was no advantage of a human over a virtual online persona in terms of parasocial experience (Stein et al., 2022, p.14). Robinson (2020) also supports that from the perspective of Instagram users, there is no difference in the psychological continuity displayed by a VI and that by HIs. Sands et al. (2022) also find that consumers are equally open to following AI or human influencers, as both provide a similar level of personalisation. Concerning the detailed process, PSIs with VIs are different from HIs and can be understood through three main themes: rational scheme, confusion scheme and entertainment scheme (Mei, 2021). While the followers understand that the VIs are not real and do not physically exist (rational), users are also curious about what they are and display strong emotional resonance, intimacy and connection to the VI (confusion) as well as view the VI through an entertainment perspective (Mei, 2021).

On the other hand, not all users' initial reaction favours these synthetic humans. For example, sixty per cent of participants deemed it impossible to build a relationship with a VI (Conti et al., 2022). Users also report stronger parasocial responses towards humans than animated personas (Bond & Calvert, 2014; Giles, 2002; as cited in Stein et al., 2022, p.4). It has been shown that humans can still develop PSI for cartoon or anime characters (e.g. Ramasubramanian & Kornfield, 2012, as cited in Stein et al., 2022, p.5) although characters with a lower degree of realism such as cartoonish humans are a safer option to mitigate the uncanny valley effect. It is still possible to have Parasocial Interactions with them although the reduced mental prowess may result in less empathy and different moral expectations (Stein et al., 2022, p.5). Lastly, Thomas & Fowler's (2021) results also support that AI influencers are trusted less than traditional influencers, and urge brands not to rush in replacing HIs with VIs.

This study focuses on the discussion of Parasocial Interaction with Virtual Influencers, as opposed to related terms such as Parasocial Engagement, Parasocial Attachment, or Parasocial Relationships. Particularly, because VI is a relatively fresh concept, this research focuses on measuring users' PSI with VIs, which could be understood as an initial reaction to the VIs, rather than measuring how they develop parasocial relationships (PSRs) with VIs after long exposure. There has been conceptual confusion between the terms, as many authors originally refer to long terms relationships as PSI. Recently, Bérail & Bungener (2022, p.184) shed light on this perplexity, as they clarify that PSI occurs during an initial media reception. PSI consists of three dimensions: (1) the desire to engage in a parasocial process; (2) the feeling of intimacy towards the VIs; and (3) the feeling of attraction towards the VI. Particularly, previous scales that measure PSI with media personas (e.g Bérail & Bungener, 2022; Penttinen et al., 2022) ask whether the users feel comfortable or attracted to the persona as well as whether users would want to see the persona elsewhere.

2.5 Customer Engagement (CE)

2.5.1 The history of engagement

The concept of "engagement", has been a topic of interest since the early 2000s (Brodie et al., 2011). The term "engagement" has been used in a wide variety of disciplines including political science, psychology and sociology (Brodie et al., 2011). In the marketing discipline, the term began to receive scholarly interest around 2005. Engagement research becomes more widespread when the Marketing Science Institute put 'consumer engagement research' in its 2010 research priority. In 2014, a study by Hollebeek et al., currently still the most cited Customer Engagement study, proposed a comprehensive framework to understand engagement through different dimensions. The term is developed along with the

transition of assigning the consumers an active role, rather than a passive role in relationship marketing and service-dominant logic (Hollebeek et al., 2014).

Building on Hollebeek et al.'s (2014) study, many scholars have captured engagement through many different contexts (table 4). Most studies before 2016 examined Customer Engagement (CE) through a single object such as a brand, while later studies usually examine CE more comprehensively, such as brand engagement through online community members (E.g Bowden et al., 2017; Wang et al., 2022). This is the reason why there are so many corresponding terms that suggest different engagement forms from different stakeholder perspectives (e.g online community engagement (Wang et al., 2022; Bowden et al., 2017); employee engagement (Catteeuw et al., 2007; stakeholder engagement (Greenwood, 2007) (table 4). It is important to note that these concepts are mostly interchangeable as they reflect a similar construct (Hollebeek et al., 2014), although they may change to reflect the context of the study in which they are discussed. For example, CE studies in the business domain can be categorized by the business situation, which Lim & Tasul (2022) did, as they find that around 75% of CE studies are in a B2C situation, with the rest being in a B2B or mixed situation. Santos et al. (2022) also summarize the main contexts of CE studies which consist of: fans, online, virtual, social media communities, online brand communities, and platforms. Santos et al. (2022) also identified three main streams of approach to the term: from a behavioural perspective, from an attitudinal perspective or from an intrinsic motivation to interact with the brand. Now in 2023, scholars continue to solidify the importance of CE, as the Marketing Science Institute continues to include CE into the tier 1 research priority for 2018-2020 and 2020-2022.

TABLE 4 Customer Engagement definitions and related concepts

Concepts	Literature	Definition
Customer Engagement	Brodie et al., 2011, p.260	"A psychological state that occurs by virtue of interactive, co-creative customer experiences with a focal agent/object(e.g., a brand) in focal service relationships."
	Vivek et al., 2012, p.133	"The intensity of an individual's participation and connection with the organization's offering and activities is initiated by either the customer or the organization."
	Bowden et al., 2017, p.879	"A consumer's cognitive, emotional, and behavioural investments in interacting with focal objects or agents"
	Leek et al., 2019, p.115	"A psychological state resulting from specific interactive episodes that a customer experiences with a focal agent or object"

Customer brand engagement	Hollebeek, 2011, p.790	"The level of a customer's motivational, brand-related, and context-dependent state of mind is characterized by specific levels of cognitive, emotional, and behavioural activity in brand interactions"
Brand engagement	Wang et al., 2022, p.15	"The extent to which consumers are motivated in terms of cognition, affection, and behaviour during their interaction with the focal brand"
Customer Engagement behaviour	Van Doorn et al., 2010, p. 254	"The customers' behavioural manifestation toward a brand or firm, beyond purchase, resulting from motivational drivers."
	Dolan et al., 2015, p.5	"A customer's behavioural manifestations that have a social media focus [adapted], beyond purchase, resulting from motivational drivers"
Media engagement	Calder et al., 2009, p.322	"The sum of the motivational experiences consumers have with a media product"
Social media Customer Engagement	Ajiboye et al., 2019, p.241	"The extent to which the organisation's important customers are active in using social media tools"
	Wahid et al., 2022, p.5	"Behaviours go beyond transactions, and may be specifically defined as a customer's behavioural manifestations that have a social media focus[adapted], beyond purchase, resulting from motivational drivers."
Community engagement	Wirtz et al., 2013, p.229	"The customer's intrinsic motivation to interact and cooperate with community members"
Online engagement	Paruthi & Kaur, 2017, p.133	"Consumers' psychological state of mind and intensity of their awareness, affection, participation, and connection with the brand. It is characterized by the consumers' specific interactive experiences with the brand. "

2.5.2 Understanding Customer Engagement as a marketing outcome

In this study, CE is defined as "a psychological state resulting from specific interactive episodes that a customer experiences with a focal agent or object" (Leek et al., 2019, p.115). Very early on, Customer Engagement has been a strategic goal to enhance corporate performance, sales growth and profitability (Brodie et al., 2011). It can be rationalised that engaged customers will benefit the endorsers and the company by referring/recommending products, services or brands to others; participating in the development of new products/services; cocreating value (Brodie et al., 2011). Today, building and maintaining CE is considered a vital agenda that marketers must actively pursue if they wish to build long-term customer interactions and relationships and solidify customer loyalty for their

brand (Lim & Rasul, 2022). The term CE suggests a multi-sided interaction between the customer and the focal agent or object (in this case, aVI). From a relationship marketing perspective, CE explains and predicts the dynamic of the consumer–VIs relationship. CE can be understood as the VIs' desire to connect with its customer with the goal being the customer's favourable attitude towards the brand (Lim & Rasul, 2022).

CE is multi-dimensional. It is very difficult to fully conceptualise CE due to the sheer diversity of the dimensions of CE (table 5). This diversity has created challenges for scholars and practitioners. Although there is a huge body of literature conceptualising and inspecting Customer Engagement through different dimensions, with the **cognitive, affective and behavioural** of CE remain the three major dimensions. These three dimensions were solidified by Hollebeek et al. (2014) as they attempt to quantify the term. Specifically, **cognitive engagement** is an individual's level of brand or online brand community-related thought processing and elaboration (Bowden et al., 2017, p.888). The cognitive aspect dictates consumers' brand-related thoughts and elaboration processing (Brodie et al., 2011). The **emotional/ affective** aspect of CE refers to how consumers feel towards the focal agent which indicates the degree of negative or positive brand-related emotions (Bowden et al., 2017, p.888). The **behavioural** aspect of CE represents consumers' real actionable effort in brand interaction (Brodie et al., 2011). Behaviour engagement is measured through the customer's interest in devoting their energy, effort and time to the brand's focal object, which may include different practices with the VIs and associated community.

These aspects saw development in recent years, with an emphasis still on the 'interactive' dynamic between the brands and the customers. For example, Baldus et al. (2015) measured engagement through a focus on different **intrinsic motivations** to interact with the brand community: reflectional motivation, experimental motivation, and instrumental motivation. Dolan et al. (2015) studied the concept through mostly behavioural practices. Wang et al. (2022) and Bowden et al. (2017) study the role of engagement in the online brand community.

Along with Hollebeek et al.'s (2014) conceptualisation, other streams of research also tried to measure CE through different dimensions (table 5). This is where things get complicated as all the major CE studies (e.g Brodie et al., 2011; Hollebeek et al., 2014; Santos et al., 2022; Lim & Rasul, 2020) all point out that there lack of a holistic understanding of the phenomena and in many cases, "Customer Engagement" is still used as a buzzword. For example, Vivek et al. (2012) add the provider and customer focus to CE through **value, trust, affective commitment, WOM, loyalty, and brand community involvement**. Wang et al. (2022) measured CE through the dimensions of **cognitive processing, affection, and activation**. Wang et al.'s (2022) affection focus on positive emotions, affection

and dedication to the brand. Activation is not restricted to only behaviour engagement but also the “consumer’s energy and mental resilience in interacting with a brand” (Wang et al., 2022, p.3). Verma et al. (2020) also recognise CE to be a multidimensional construct comprising **utilitarian, hedonic and social** dimensions. Pöyry (2016) also found that hedonic motivations can lead to higher customer participation while utilitarian motivation relates to more private behaviour such as browsing.

TABLE 5 Diversity in dimensions of CE captured in selected studies

	Dimensions of Customer Engagement
Hollebeek et al., 2014 Dessart et al., 2016 Bowden et al., 2017	Cognitive, affective, behavioural
Van Doorn et al., 2010	Valence, modality, scope, and nature of impact, customer goals
Vivek et al., 2012	Value, trust, affective commitment, WOM, loyalty, BC involvement
So et al., 2014	Identification, attention, absorption, enthusiasm, and interaction
Carlson et al., 2019	Co-creation, functional, emotional [or hedonic
Verma et al., 2020	Hedonic, social, utilitarian
Rasmuz, 2022	Identification, enthusiasm, attention, Absorption, and Interaction
Wang et al., 2022	cognitive processing, affection, and activation

There are also constructs that are studied as antecedents or consequences of CE that can be confused with CE such as customer attachment, customer/ brand involvement, or brand love (Rasmus, 2022). With only 3 original antecedents and consequences to CE: consumer involvement, self-brand connection, and brand usage intent, discovered by Hollebeek et al. (2014), now, Lim & Rasul (2022), after reviewing 34 studies that discuss CE from 2000-2022, identified 41 antecedents and 18 consequences of CE (figure 6). To further complicate things, CE has been studied as a dependent variable, independent variable, mediator and moderator in social media (Lim & Rasul, 2022; Santos et al., 2022). In the marketing domain, CE precedes consumers’ continuance intention (Wang et al., 2022), satisfaction (Rasmuz, 2022), brand trust (So et al., 2014; Reinikainen et al., 2020), brand advocacy (Sashi, 2012), brand loyalty intention (Rasmuz, 2022), brand awareness (Santos et al., 2022), and in a broader sense, the company’s financial performance

(Razmus, 2022). Consumers receive a sense of belonging when they interact with a brand, other brand members or its sponsors. If the interaction was positive, the customer trusts the brand and stays connected (Santos et al., 2022). It is important to understand that there can be overlapping meanings in these terms as they represent CE as the main construct. These variables may change depending on the context of the study.

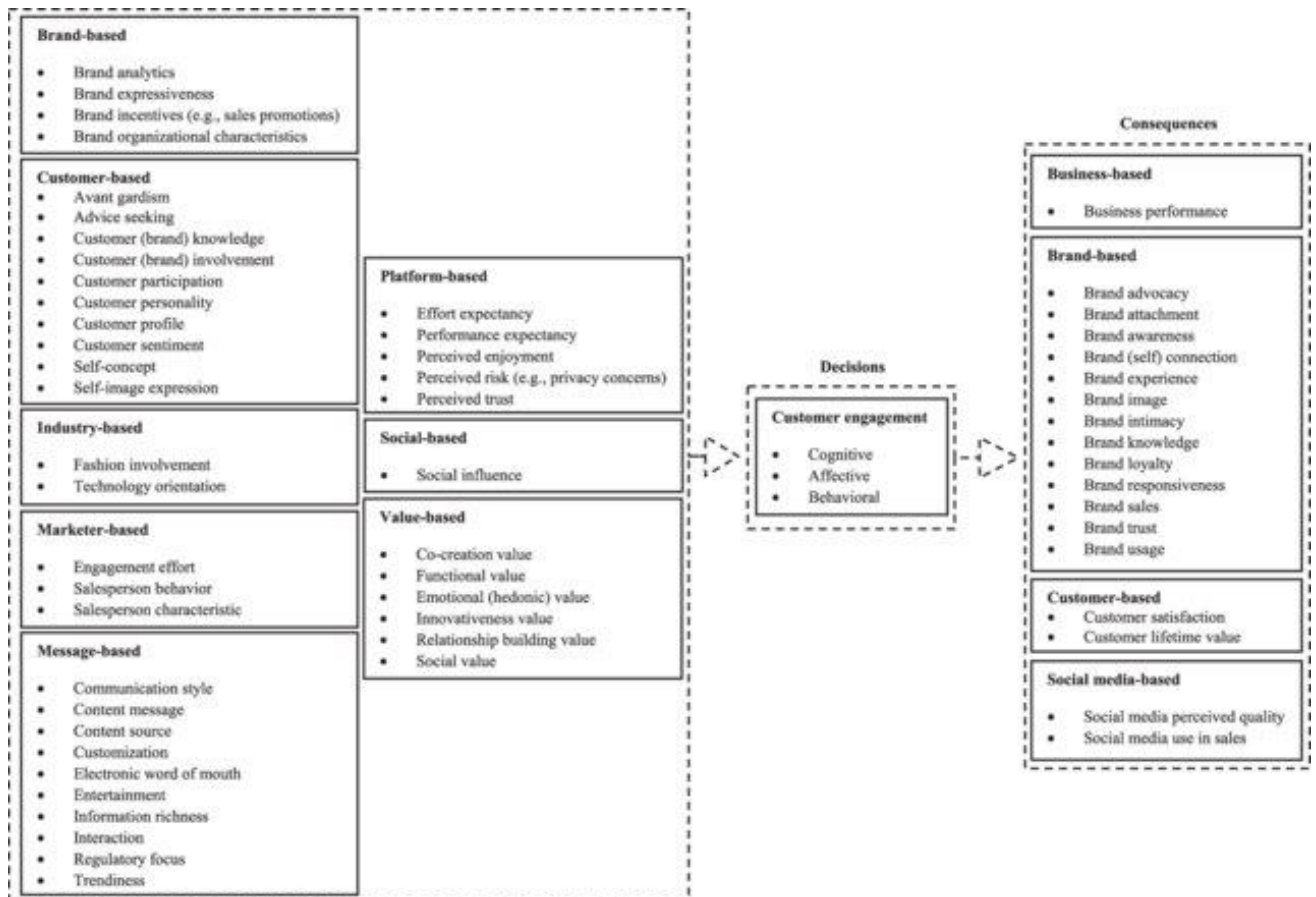


FIGURE 6 41 antecedents and 18 consequences of Customer Engagement from 2000- 2022 (Lim & Rasul, 2022, p.331)

Drawbacks of CE

The concept of Customer Engagement is not without drawbacks. First, there have been several attempts to summarize and conceptualise the concept (e.g Hollebeek et al., 2014, Santos et al., 2022; Lim & Tasul, 2022) since it was studied under a multiplicity of expressions and different domains. These studies all conclude that

there lack of an understanding of the terms as well as related terms, as there have been many attempts to quantify engagement.

Second, streams of research also argue that current engagement measurements are too focused on the online context (Rasmus et al., 2017, as cited in Rasmus, 2022), while in reality, CE beyond the internet remains unmeasured. In a real-life setting, it is not easy to determine whether CE plays a role in its outcomes such as brand trust as customers do not always express their attitude. For example, Santos et al. (2022) found that most brand community members are lurkers rather than active advocators. Opposed to public engagement behaviour, private Customer Engagement behaviour includes three constructs: vigour, absorption and dedication which are often unknown to other members (Pöyry, 2016) and are harder to measure, while still largely contributing to marketing outcomes.

Third, it is difficult to apply the concept to products with low attractiveness. Measuring CE for generic products such as salt or pepper will result in a higher score in behavioural engagement than emotional or cognitive engagement which means these products may have an overall lower engagement score. However, the concept does not explain the continuous usage of such brands due to habitual buying or convenient buying. Penttinen et al. (2022) proposed research to examine more diverse types of products (ie. High-involvement vs. low involvement; hedonic vs. utilitarian; products vs services) in the future to truly understand how CE may differentiate between products and contexts.

Fourth, there lacks discussions regarding negative engagement. Higgins and Scholer's (2009, p.6) proposed the "Regulatory Engagement Theory", which is one of the first to consider the negative aspects of engagement, as they conceptualised engagement as "a [consumer's] state of being occupied, fully-absorbed or engrossed", thus generating a level of attraction to, or repulsion from, a focal engagement objects. In fact, there are usually more negative interactions than positive ones, and both can exist at the same time (Fournier & Alvarez, 2013, as cited in Lievonen et al., 2022). Negative engagement also shares the three dimensions of affective, cognition and behaviour with positive engagement, as the manifestation of negative engagement behaviour and its intensity can impact brand performance (Lievonen et al., 2022).

Lastly, because CE is tied to the social media platforms they use, there is no one method to measure engagement effectively based on the platform's metrics, considering each social network has its own idiosyncrasies and parameters (Muñoz et al., 2022). On Tiktok for instance, the video playback rate is a strong indicator of engagement (Muñoz et al., 2022) while on Instagram, likes and followers are better indicators. It is also important to note that most measurement frameworks nowadays tend to focus on measuring engagement from an online context, while behaviour engagement can extend beyond the internet.

2.5.3 Customer Engagement with Virtual Influencers on social media

Because VIs exist mainly on social media platforms, Customer Engagement with VIs is also tied to the platform environment. There has been a large body of literature that studies CE in the context of social media, which was comprehensively reviewed (see e.g. Lim & Rasul, 2022; Santos et al., 2022). CE is a measure of success for brands on social media (Muñoz et al., 2022), or in this study, a measure of success for the VI as a brand focal agent.

The dynamic between VIs and CE can be explained by the Uses and Gratification Theory (UGT) (e.g. see Dolan et al., 2015), which explains how users expect benefits from interacting with the VIs (Santos et al., 2022). CE includes the customer's economic exchange with the VIs or the brands and also social exchange including intangible rewards (Rasmus, 2022). Vice versa, VIs benefit from enhancing their engagement with target customers using digital technologies and social media (E.g. see Brodie et al., 2013, Hollebeek et al., 2014, Lim & Rasul, 2022).

VIs can provide potentially new realms of CE in many ways. First, interaction with a VI should be similar to HI, which has been shown to fulfil users' need for social identity and social relatedness (e.g. Gaines, 2019). Even more so, interaction with VIs is a strong way of signalling one's identity, especially in terms of open-mindedness, trends and autonomy. VI can also fulfil customers' need for diversion (Arsenyan & Mirowska, 2021, p.8-9) in a way that the customers get to see and experience new virtual characters doing similar things to a human. Second, customers' interaction with VI could be understood through the rational scheme, confusion scheme and entertainment scheme (Mei, 2021). This can be linked to Verma et al.'s (2020) three dimensions of engagement: utilitarian, hedonic and social. Utilitarian engagement with the VI may be the result of the user's rational reactions to the VI as they might try to figure out what the VI 'really is', or what the technology behind VI is like. Mei's (2021) entertainment reaction scheme can be linked to hedonic engagement – just having fun by looking at the VI from an entertaining perspective. Because confusion may be the general community's reaction to the VI, users may be socially engaged to interact with the VI's community to debate their true identity. Third, in practice, CE assists VIs and brands to configure and share marketing messages more effectively with existing and potential customers (Lim & Rasul, 2022). The main difference between Customer Engagement on social media compared to an offline context is that Customer Engagement on social media is a multi-way process that allows a reciprocating and communicative dynamic between the VIs and the customers (Lim & Rasul, 2022).

On the other hand, despite suggestions that VIs could provide similar or more CE than HI, another stream of research highlights certain disadvantages of VI and virtual avatars in general. Feine et al. (2019) argue that customers will always apply social rules when interacting with machines through the attribution of social traits, and they may be disappointed when the virtual agents are not the way

they expected (Miao et al., 2022, p.79-80). While some VIs are managed by a human, some AI VI may lack the cognitive ability of humans and thus, resulting in users' disconfirmation. Customer' disconfirmation stems from the customers' expectations when interacting with the VI, while the VI is unable those expectations (Miao et al., 2022, p.79-80). This disconfirmation effect can be amplified if the VI's cognitive ability is much lower than the VI's visual attractiveness, considering that most VIs are designed to be aesthetically attractive to suit the Instagram platform. On this notion, Stein et al. (2022) found that although VIs may be disadvantageous in some aspects, the whole concept is still interesting enough to yield similar reactions to HIs.

To measure CE, researchers usually take into consideration the platforms' already established metrics such as likes and followers and use them in conjunction with more complex mathematical metrics, such as the TOPSIS composite index proposed by (Muñoz et al., 2022). In addition, these metrics are also compared internally (Muñoz et al., 2022) to determine 'engagement gaps'. On Instagram, if an influencer has a much higher follower index than the 'likes' index, this can indicate that the followers are not responding to the influencer's content. Vice versa, if the likes index is higher than the follower index, the influencer has a loyal and active follower base (Muñoz et al., 2022). For SMIs, engagement is also measured by periods, usually before, during and after the collaboration. This can be useful when the period being studied is crucial (Muñoz et al., 2022), such as when there is a collaboration campaign or a political campaign (Rodrigo-Martín et al., 2022). To determine whether or not an influencer is currently topical or 'in-fashion', metrics such as 'new followers in the last 30 days or 'likes in the last 30 days can be used. Depending on the influencer, the platform and the industry, brands can select their composite index with different weighting to different indicators to measure CE generated by the influencer. While measuring CE with VIs carries one of the major criticisms of measuring engagement - not taking into the offline context, social media platforms still offer analytical functions that make this measurement highly accessible and instantaneously available (Lim & Rasul, 2022).

In this study, Customer Engagement with VIs will be measured using a combination of validated scale questions from previous HIs studies (e.g Hollebeek et al., 2014; Pöyry, 2016; Santos et al., 2022; Wang et al., 2022). Due to the absence of a validated scale to measure engagement in the context of VIs, some of the questions will be minimally adjusted to be more relevant to this new context while still reflecting the three dimensions of CE (see appendix 1).

3 RESEARCH METHODOLOGY

This chapter outlines the philosophical and methodological approaches to the research problem. Hypotheses were formulated to complement the quantitative research design. An online survey was used to collect primary data. The chapter also provides a detailed description of the survey design and the sampling method.

3.1 Quantitative research

Using Saunders et al.'s (2019) onion framework, starting from the outer layer, the ontology of this study is objective. With an objective ontological stance, the researcher seeks to understand the interaction between two or more objects (O'gorman & MacIntosh, 2015), which is in this case, PSI, VIs' attributes and CE. This study will adopt a positivist epistemological position, in which the researcher takes into consideration facts, gather and measure data from a large sample and try to aggregate generalisations (Saunders et al., 2019).

An objective ontology with a positivist epistemology is usually associated with quantitative research (O'gorman & MacIntosh, 2015, p.59). Quantitative research is defined as "quantifying the problem and understanding how widespread it is by seeking projectable outcomes for a larger population" (O'gorman & MacIntosh, 2015, p.153). In a quantitative study, the researcher tries to describe the research problem through a description of trends and tries to examine the relationship between variables to understand how they interact with each other (Creswell, 2012). Quantitative studies measure data numerically and analyse them using statistical techniques (Saunders et al., 2019). Quantitative research usually contains a set of structured questions with pre-established answer options that are sent to a large number of respondents (Burns, 2017, p.143). A quantitative approach is useful when the researcher wants to gather opinions and attitudes, establish causes and effects, test relationships or hypotheses, provide summary information, and track trends (Hair et al., 2015; Saunders et al., 2019).

The choice of a research methodology should take into consideration previous studies on the topic. As mentioned, there is still a limited number of studies on VIs, as most of them are explorative studies, with some of them have discovered different categories to understand VIs (e.g Batist & Chimenti, 2021) and discussed how VI might be effective among Gen Z (e.g Wibawa et al., 2022). In addition, extant SMIs studies have captured different factors that are important to the success of a HIs (e.g Cho et al., 2022; Bakker, 2018). There is a need to advance

the VIs literature by examining the impact of these attributes on customer outcomes.

Quantitative research is usually deductive, which tests existing theories or frameworks. Theories are necessary to inform the readers of the overall research topic as they suggest relationships or causalities (Hair et al., 2015). They are used to provide structure and rationale when converting the research questions into hypotheses and statements that are tested with empirical data (Hair et al., 2015). In this study, the relevant literature on VIs, CE and PSIs will be selected as the theoretical foundation. From there, hypotheses will be drawn to connect those concepts. The literature is used to refine the research questions and develop the hypotheses. In addition, indicators for each construct will also be identified and adopted from the literature.

3.2 Formulating hypotheses

Hypotheses are unproven propositions that tentatively explain facts or phenomena (Hair et al., 2015). Following Hair et al.'s (2015) process of conceptualization, the three steps taken were: (1) Identify variables and constructs, (2) specify hypotheses and relationships, (3) create a diagram that visually represents those relationships.

3.2.1 Identify variables and constructs

In order to draw connections between relationships, they must first be grouped into different latent variables. Table 6 summarizes the main concepts from the theoretical framework (chapter 2) and highlights key literature that discusses each concept.

TABLE 6 Latent variables and key literature

Concepts	Adapted from
Parasocial Interaction (PSI)	Horton & Wohl, 1956 Mei, 2021 Reinikainen et al., 2020 Penttinen et al., 2022 Stein et al., 2022
Credibility (includes Expertise, Trustworthiness)	Ohanian, 1990 Bakker, 2018 Munnukka et al., 2019

Authenticity	Kádeková & Holienčinová, 2018 Monlin & Nordgren, 2019 Pöyry et al., 2019 Robinson, 2020
Humanization	Batist & Chimenti, 2021 Stein et al., 2022
Novelty value	Robinson, 2020 Reinikainen et al., 2021 Batist & Chimenti, 2021 Stein et al., 2022
Customer Engagement (CE)	Hollebeek et al., 2014 Pöyry, 2016 Santos et al., 2022 Wang et al., 2022

3.2.2 Specify hypotheses

Although PSI and PSR have been conceptualised as a driver of the influencers' credibility (Munnukka et al., 2019; Sokolova & Kefi, 2020; Reinikainen et al., 2020; Penttinen et al., 2022; Balaban et al., 2022), not much has been done about how the user's initial reaction to the VI may affect the VI's perceived credibility. Even more so, as VIs' unique attributes cannot be applied to humans, it is paramount to examine how users' PSI with VI affect how they perceive these VIs' attributes. Considering that exposure to the presence of VI may reduce customers' perceived uncertainties during interaction (Reinikainen et al., 2020) and that there are unique attributes to VIs that remain unexplored, the first four hypotheses are as follow:

H1: Parasocial Interaction with Virtual Influencers is positively associated with the Virtual Influencers' perceived credibility.

H2: Parasocial Interaction with Virtual Influencers is positively associated with the Virtual Influencers' perceived authenticity.

H3: Parasocial Interaction with Virtual Influencers is positively associated with the Virtual Influencers' perceived humanization.

H4: Parasocial Interaction with Virtual Influencers is positively associated with the Virtual Influencers' perceived novelty value.

In the endorsement context, the effect of one or more of these attributes towards marketing outcomes such as brand attitudes, brand trust, or engagement in has been studied vigorously (e.g Seiler & Kucza, 2017; Munnukka et al., 2019; Reinikainen et al., 2020; Wang et al., 2022; Penttinen et al., 2022). According to Ohanian (1990), the influencer needs to satisfy certain conditions in terms of their

traits for the audience to perceive them favourably and thus, for the endorsement to be effective. This means that before the customers can trust or develop an attitude towards the endorsed brand, they need to form engagement towards the VI through how they perceive the VI traits.

Accordingly, the rest of the hypotheses are as follows:

H5: Virtual Influencers' credibility is positively associated with Customer Engagement towards the Virtual Influencer

H6: Virtual Influencers' authenticity is positively associated with Customer Engagement towards the Virtual Influencer

H7: Virtual Influencers' humanization is positively associated with Customer Engagement towards the Virtual Influencer.

H8: Virtual Influencers' novelty value is positively associated with Customer Engagement towards the Virtual Influencer.

3.2.3 Visual representation of the hypotheses

Figure 7 highlights the conceptual framework to be tested. From the framework, Parasocial Interaction (PSI) with the VI is hypothesized to positively affect the VI's perceived attributes which are credibility, authenticity, humanization and novelty value. These four attributes are then hypothesized to positively affect Customer Engagement (CE) with the VI.

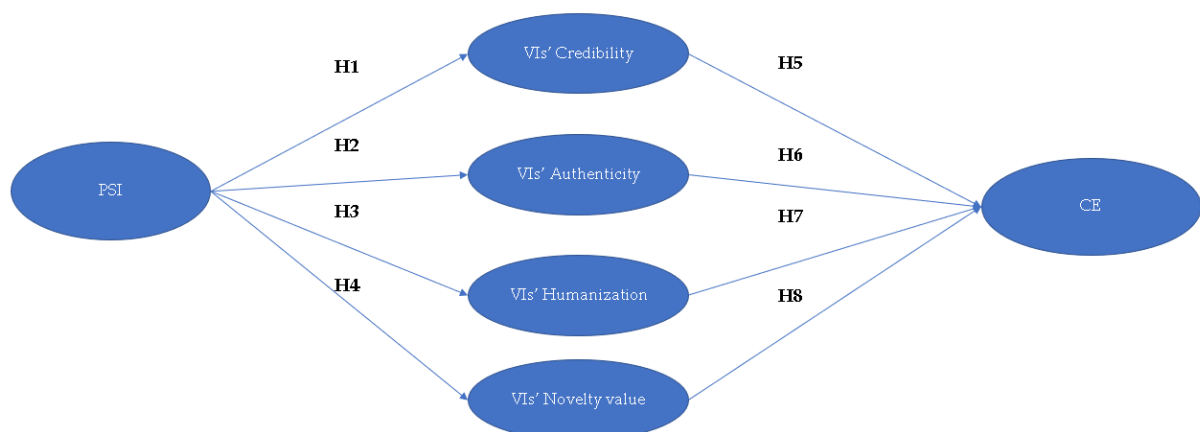


FIGURE 7 Conceptual framework

3.3 Online survey as the data collection method & survey design

3.3.1 Online survey as the data collection method

In a quantitative study, the research gathers numerical data ranging from beliefs, opinions, attitudes, behaviour, and demographics (Hair et al., 2015). Data in quantitative research can be gathered through a variety of methods such as direct measurement, historical records, or surveys (Burton & Steane, 2004). There are two main types of data: secondary data and primary data. Before formally collecting primary data, researchers should determine whether their objectives can be completed using readily available secondary data (Hair et al., 2015; Saunders et al., 2019). Because there is no relevant, applicable secondary data concerning VIs that could address the research objectives, data collected from this study will be primary data.

Primary data was collected through a self-completion Webropol online survey. A self-completion survey includes structured questions with pre-defined answers (Hair et al., 2015). An online survey is a suitable option for research that involves a large sample of individuals in a short period of time at a relatively low cost. This method complements the target's audience familiarity with technologies and access to the Internet. Using a survey as a data collection method reduces interviewer bias, as all the participants are presented with the same questions. Therefore, the data gathered can be standardized, analysed, and used as a generalization (Saunders et al., 2019). On the other hand, one of the disadvantages that are inherently linked to surveys is response bias, in which the participants are aware of the fact that their attitude is being collected (Hair et al., 2015). The participants may even make 'uninformed' answers, which means answering without fully understanding the questions, as the researcher is not in their presence (Saunders et al., 2019). In addition, this survey was cross-sectional, which means it only captures a snapshot of the phenomenon at a particular time (Saunders et al., 2019). VIs and the development of AI in marketing are always changing and customer perception of VIs may change in the near future. Several measures have been taken to improve the validity and reliability, as well as to mitigate the limitations of the survey:

First, as data collected through a survey is heavily standardized, it is important to ensure that the questions are expressed clearly and understood the same way by participants (Saunders et al., 2019, p.178). Words, phrases and sentences in the survey questions were formed based on the existing theoretical background from chapter 2. The key concept of the study, Virtual Influencers, was briefly explained and clarified before the respondents answer the survey. The questions were designed to be concise and there were no complex, long sentences or phrases. All questions of the survey are tied to the conceptual model and no extra questions were added.

Second, predetermined answers need to be mutually exclusive and exhaustive (Heir et al., 2015). For Linkertscale questions, all the attitude options were exhausted by using a scale of 7 from strongly disagree to strongly agree. This includes an option to be 'neutral'. Questions that measure the same construct are on the same page and all reflect the same construct based on literature. These questions are based on the discussion of the constructs in chapter 2, where each construct was defined and separated. To minimize error, all attitude questions used the same Linkert scale of 7. The questions sequence follow the hypotheses sequence.

Last, the survey was optimized for PC, tablet and mobile. Webropol's survey is compatible with SPSS and Smart-PLS, which eliminates data transferring errors.

3.3.2 Survey Design

The design of the survey is crucial to the study because once data is collected, it is not possible to redesign and correct mistakes that lead to the limitations of the study. The data is only accurate if the survey is properly designed (Hair et al., 2015).

The participants first have to give their consent and agree to the data privacy notice in accordance with the GDPR. Here it is stated that the study does not collect and process personal data and that the participant has the option to withdraw from the study.

Then, an introduction page shows the purpose of the study and estimated completion time. To familiarize the participants with the topic, a short description of VIs was provided. The participants were also shown a picture of a VI. The survey then asks the participants to spend some time checking the VI's real Instagram profile, posts, and videos before proceeding.

The next 39 Linkert-scale questions (multi-item scale) measure the participants' attitudes toward the aforementioned VI. These questions were grouped to indicate the six latent variables of the research framework (appendix 1). Indicators of each construct were designed to be closely related and to represent that single construct, and all questions used the same scale from 1 to 7.

Next, there were four demographic questions. Demographic questions are facts about the respondents such as usage frequency, age group, gender, and educational background (questions 41- 44). If a participant indicated that they were not born between 1992 - 2004 or that they use Instagram less than once a month, they are immediately taken to the end page and their response was not recorded.

Last, to further ensure the quality of the responses, question 45 attention-checks the participants by asking the name of the VI they just visited.

3.4 Sampling method

This study is limited to:

- Users born between 1992-2004.
- Instagram users with a usage frequency of at least once a month.

Although the age range of Generation Z varies between studies, considering the generational perspective suggested by Chaney et al. (2017), this study limits the population age range from 18 – 30 years of age, while taking into the participants' familiarity with social media to be a controlling characteristic of Gen Z. The study further restricting participants to those who use Instagram at least once a month. This study surveys only Instagram users, as it is the most prominent social media platform for Gen Z users and VIs.

Because it is not possible to collect a response from the whole population, a sample is needed. Non-probability sampling (non-random sampling) was used. Non-probability sampling is utilised when the researcher does not have access to the whole population or database as the technique is commonly used for online surveys (Saunders et al., 2019). The drawback of non-probability sampling is that it can be subjective and may add uncertainty to the representation of the sample. Two techniques of non-probability sampling were implemented, which are convenience sampling and snowball sampling (table 7). The survey was sent to email lists and social media. Participants were recommended to pass the survey to other members.

TABLE 7 Nonprobability sample design (Henry, 1990, p.18)

Type of Sampling	Selection Strategy
Convenience	Select cases based on their availability for the study.
Purposive	Select cases that judged to represent similar characteristics.
Snowball	Group members identify additional members to be included in the sample.
Quota	Interviewers select a sample that yields the same proportions as the population proportions on easily identified variables.

4 PROCEDURE & RESULTS

This chapter details the steps taken to process and analyze the data, as well as the analysis techniques used to test the hypotheses, validity and reliability. Then, the results obtained from the data are presented.

4.1 Procedure

Data collected from the Webropol survey was first transferred to IBM SPSS Statistics. Here, the data was coded and scanned to remove insufficient data. SPSS Statistics was used for descriptive analysis of the scale items and to get an overview of the participants' gender, usage habits and level of education.

Next, data was transferred to Smart-PLS 4.0. A measurement model based on the hypotheses was created and assessed for validity and reliability using partial least square structural equation modelling (PLS-SEM). Finally, the hypotheses were tested using the Smart-PLS 4.0 bootstrapping procedure.

4.2 Results

The Webropol survey was opened from 11.03.2023 – 14.03.2023. A total of 347 participants submitted their responses. However, 126 responses were removed due to failing to answer the attention-check question and the demographic-check questions. There is no missing data and no cases with irregular answering patterns. In total, there are 221 usable responses (51.6% female). 100% of the participants fit into the research age group of 18-30 and use Instagram at least once a month. 46.2% of the participants use Instagram at least once a day. 58.4% of the participants are currently enrolled in/have completed a bachelor's degree or equivalent (appendix 2).

Frequency analysis of all the 39 indicators (appendix 3) shows no abnormality in the distribution as all items have a skewness value between +1 and -1. The Kurtosis value of 38 items also ranges from +1 and -1, except for Engagement 5 (Kurtosis = -1.050), indicating the distribution is not too flat or too peaked. The standard deviation of all indicators ranges from 1.424 to 1.864, indicating a moderate level of consistency between participants' answers (see Hair et al., 2015, p.337-338).

Chi-Square tests show no statistical significance between gender and Instagram use frequency, as well as no statistical significance between gender and level of education (appendix 4).

4.2.1 Measurement model

The measurement model was tested using PLS-SEM 4.0 partial least squares structural equation modelling. Eight indicators were removed due to poor outer loadings: AUTH3, AUTH5, AUTH6, NOV2, NOV3, HUM1, HUM8, and ENG4. The rest of the indicators are reliable as their outer loadings are all above 0.7 (appendix 1).

Table 8 shows that the model's reliability and validity are met (Cronbach's $\alpha > 0.7$; Reliability (ρ_A) > 0.6 ; Composite Reliability (ρ_C) > 0.6 ; AVE > 0.5).

TABLE 8 Validity and reliability of the measurement model

Con-struct	Cronbac h's al-pha (α)	Compo-site reli-ability (ρ_A)	Compo-site Re-liability (ρ_C)	AVE	Correlations and the Square Root of AVE					
					AUTH	CRE	ENG	HUM	NOV	PSI
AUTH	0.720	0.721	0.843	0.641	0.801					
CRE	0.889	0.893	0.916	0.644	0.741	0.803				
ENG	0.910	0.911	0.930	0.690	0.688	0.793	0.726			
HUM	0.874	0.878	0.905	0.614	0.727	0.696	0.035	0.784		
NOV	0.797	0.801	0.868	0.623	0.658	0.780	0.598	0.679	0.789	
PSI	0.893	0.894	0.918	0.651	0.628	0.801	-0.153	0.628	0.695	0.807

Specifically, the model's convergent validity is met as all AVE values of the latent variables are above the 0.5 threshold. In terms of internal consistency reliability, all ρ_A and ρ_C values are above the 0.6 threshold. The Fornell-Larcker criterion (discriminant validity) is also met because each of the constructs' square root of AVE (**Bold numbers**) is higher than the construct's highest correlation with any other construct in the model (table 8) (see Hair et al., 2015). SPSS's descriptive statistics of the latent variable show a positive customer attitude toward all latent variables as their mean value range from 4.42 – 4.75, with all standard deviations ranging from 1.24 – 1.43 (appendix 5).

4.2.2 Structural model

To assess the structural model, a bootstrapping procedure with 2210 subsamples was executed using Smart-PLS 4.0. The path coefficients (direct effect & indirect effects), T value, and P value are presented in table 9. In order for a relationship to be significant, the T value needs to exceed +/-1.6 and the P value needs to be ≤ 0.05 (confidence level 95%) (Hair et al., 2015, p.449).

TABLE 9 Path Coefficients

	Coefficient (Direct effect)	T value	P value
PSI -> CRE	0.801**	26.429	0.000
PSI -> AUTH	0.628**	12.255	0.000
PSI -> HUM	0.628**	11.558	0.000
PSI -> NOV	0.695**	18.402	0.000
CRE->ENG	0.322**	4.218	0.000
AUTH -> ENG	0.111	1.728	0.084
HUM -> ENG	0.079	1.121	0.262
NOV -> ENG	0.429**	5.663	0.000
	Coefficient (Indirect effect)	T value	P value
PSI -> ENG	0.674**	19.142	0.000
PSI -> CRE -> ENG	0.258**	3.919	0.000
PSI -> AUTH -> ENG	0.069	1.624	0.105
PSI -> HUM -> ENG	0.050	1.054	0.292
PSI -> NOV -> ENG	0.298**	5.013	0.000
Note: **p<0.01			
R ² : ENG = 0.730			

The path coefficients in table 9 show significant direct effects of Parasocial Interaction on Credibility ($\beta = 0.801$; $p = 0.000$); Parasocial Interaction on Authenticity ($\beta = 0.628$; $p = 0.000$); Parasocial Interaction on Humanization ($\beta = 0.628$; $p = 0.000$); and Parasocial Interaction on Novelty Value ($\beta = 0.695$; $p = 0.000$).

In addition, the effect of Credibility on Engagement ($\beta = 0.322$; $p = 0.000$) and Novelty Value on Engagement ($\beta = 0.429$; $p = 0.000$) are also positively significant.

The multiple coefficient of determination (R^2) of Engagement is 0.730, which shows a high level of predictive accuracy (table 9). This means that the four identified VIs' attributes (Credibility; Authenticity; Humanization; Novelty Value) explain a total of 73% of Customer Engagement with Virtual Influencers. (see Hair et al., 2015, p.390).

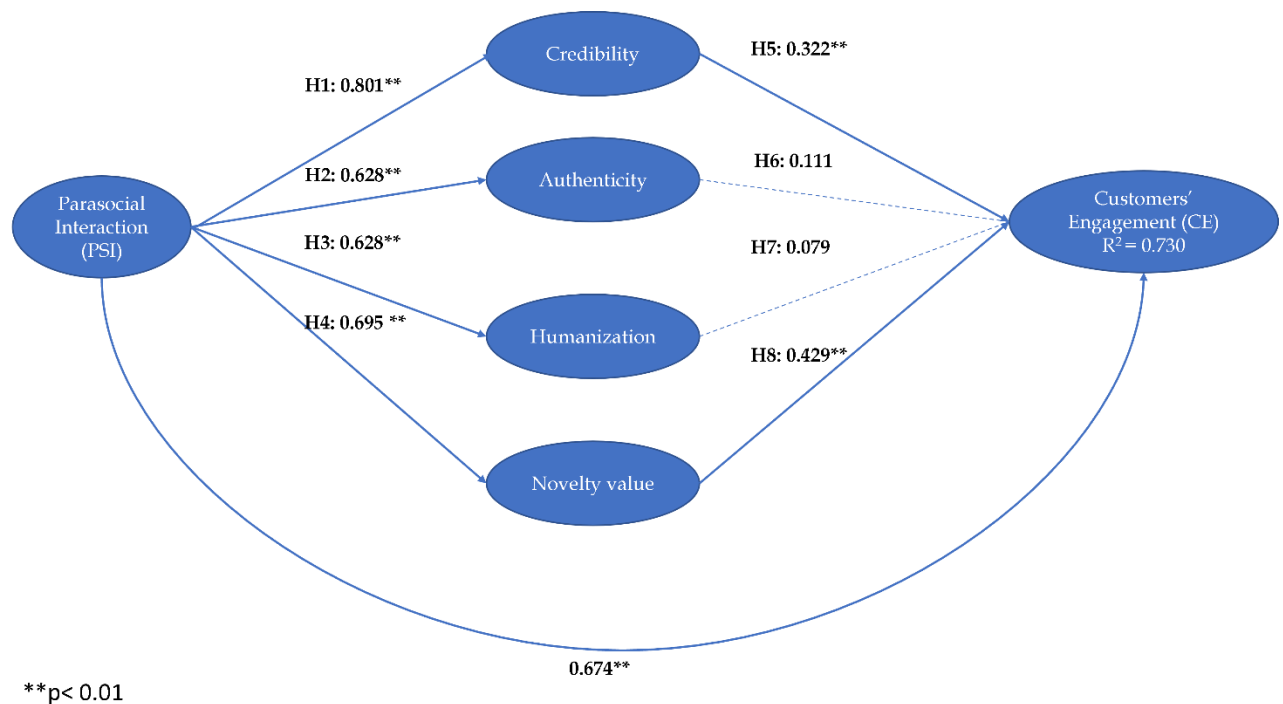


FIGURE 8 Structural model with path coefficients and significant effects

In terms of indirect effect (table 9):

- (1) Parasocial Interaction has a significant indirect effect on Engagement through Credibility ($\beta = 0.258$; $p = 0.000$) and through Novelty Value ($\beta = 0.298$; $p = 0.000$).
- (2) Parasocial Interaction has a significant effect on Engagement ($\beta = 0.674$; $p = 0.000$)
- (3) PSI \rightarrow ENG; PSI \rightarrow CRE; PSI \rightarrow NOV; CRE \rightarrow ENG; NOV \rightarrow ENG were all found to be significantly positive.

(1); (2); (3) \Rightarrow In this case, Credibility and Novelty Value become a mediator between Parasocial Interaction and Engagement. In statistical terms, this is called *complementary partial mediation* (Zhao et al., 2010). This means that although Parasocial Interaction has a direct effect on Customer Engagement, the effect can be partly strengthened or weakened by how customers perceive the VI's Credibility and Novelty Value.

Lastly, all control variables gender, use frequency and education shows no significant effect on Customer Engagement. Hence, they are not shown in the model.

5 DISCUSSION & CONCLUSION

This final chapter provides an overview of the key findings. Then, theoretical contributions and managerial implications are discussed. Next, the chapter evaluates the study in terms of its limitations, validity and reliability, to provide suggestions for future research. Lastly, the chapter also offers a summary of the thesis.

5.1 Overview

This study examines how PSI with VIs affects customers' perception of the VIs' attributes, and how those perceptions affect CE with the VIs (table 10).

TABLE 10 Summary of research questions, hypotheses and result

Hypotheses	Result
RQ1: To what extent does Parasocial Interaction with Virtual Influencers affect Gen Z Instagram customers' perception of the Virtual Influencers' attributes?	
H1: PSI with VIs -> perceived VIs' credibility.	Supported
H2: PSI with VIs -> perceived VIs' authenticity.	Supported
H3: PSI with VIs -> perceived VIs' humanization.	Supported
H4: PSI with VIs -> perceived VIs' novelty value.	Supported
RQ2: To what extent do Virtual Influencers' attributes have an impact on Gen Z Instagram Customer Engagement (CE)?	
H5: Perceived VIs' credibility -> CE.	Supported
H6: Perceived VIs' authenticity -> CE.	Not Supported
H7: Perceived VIs' humanization -> CE.	Not Supported
H8: Perceived VIs' novelty value -> CE.	Supported

The four key findings are:

- (1) Parasocial Interaction with Virtual Influencers positively affects all four perceived VIs' attributes (credibility, authenticity, humanization, novelty value).
- (2) Virtual Influencers' credibility and novelty value mediate the positive relationship between Parasocial Interaction and Customer Engagement with Virtual Influencers.
- (3) Virtual Influencers' perceived authenticity and humanization do not significantly affect Customer Engagement with Virtual Influencers.

- (4) Customers demonstrated a positive attitude towards all latent variables: PSI, credibility, authenticity, humanization, novelty value, and engagement. Altogether, VI's perceived attributes (credibility, authenticity, humanization, novelty value) explain 73% of Customer Engagement as the outcome.

Out of eight hypotheses, 6 were supported (table 10). The four VIs' attributes (credibility, authenticity, humanization, novelty value) identified from extant literature explain 73% of CE toward the VI (table 9). PSI with VIs is also found to be positively associated with CE toward the VI, although this effect is mediated by customers' perception of the VI's credibility and novelty value (table 9).

5.2 Theoretical contribution

Being a relatively new topic, most studies on VIs have laid bricks on the key differences between these artificial entities and HIs. While these differences are discussed through many lenses such as ontology (e.g Robinson, 2020), realism (e.g Zhang & Ren, 2022; Arsenyan & Mirowska, 2021), or brands benefits (e.g Thomas & Fowler, 2021; Zhang & Wei, 2021; Batist & Chimenti, 2021), there lacks a focus on how these differences play a role in customers' perception and marketing outcomes. To advance the explorative literature on VIs, this study turns to extant literature that has highlighted the process of how users perceive and react to media personas (e.g Munnukka et al., 2016, Seiler & Kucza, 2017; Penttinen et al., 2022). By doing so, this study developed a framework that highlights how customers' initial reactions affect how they perceive VIs, and how that perception may affect marketing outcomes of that VI.

First, this study highlights the aforementioned process by relating to the concepts of Parasocial Interaction, influencers' attributes, and Customer Engagement. The data indicate that initial exposure to the VI is highly important, as it directly impacts how users perceive all four VIs' attributes (β ranging from 0.628 to 0.801; $p < 0.000$). This supports that customers can establish Parasocial Interaction from initial exposure (Munnukka et al., 2019; Penttinen et al., 2022; Balaban et al., 2022) and that it is also possible to develop PSI towards VIs (Mei, 2021; Stein et al., 2022). Customers were able to relate to the VIs and express their wish to see the VI again after just viewing the VI's Instagram profile ($PSI_{Mean} = 4.45$, $StdD = 1.38$). As PSI is valid and reliable as a latent variable (table 8), this study also affirms the distinction between Parasocial Interaction (PSI) and closely related concepts such as parasocial relationships (PSR) or parasocial engagement (PSE), with PSI describing initial exposure to a media persona (Balaban et al., 2022).

Second, because the literature on VIs is still fragmented, this study summarizes the key differences between VIs and HIs under four main attributes: credibility, authenticity, humanization, and novelty value. The data shows that these attributes are quite exhaustive, as they explain a total of 73% of CE towards VIs. These attributes directly answer to authors who have compiled VIs literature (e.g. Batist & Chimenti, 2021; Wibawa et al., 2022), as they all call for a more comprehensive summary to understand VIs. In addition, this study supports the notion that these attributes need to be constantly developed based on the context of the study and that researchers should not limit the impact of endorsers based on just one factor (Ohanian, 1990; Benito et al., 2020; Cho et al., 2022). Indeed, when it comes to VIs, there are two main effects at play: the impact of credibility on CE and the impact of novelty value on CE. The VI's novelty value was shown to be more impactful than credibility in terms of the effect on CE (figure 8). This answers the discussion of whether or not VIs are popular due to their novelty value (Batist & Chimenti, 2021, p.18; Stein et al., 2022, p.14). This novelty value also reflects Generation Z from the role of customers, as many users may interact, follow, and discuss VIs as a signal of self-reference (Loureiro et al., 2020; Zhang & Wei, 2021). The result also supports the prominent role of credibility, which has always been the centre of many endorser studies (e.g Munnukka et al., 2019; Wielki, 2020; Penttinen et al., 2022; Balaban et al., 2022). It can be considered that despite the insignificance of being authentic or resembling humans, customers still expect a degree of expertise and trustworthiness in VIs, as they do with any endorsers (Ohanian, 1990).

Third, this research recognizes the significant indirect impact of PSI on CE ($\beta = 0.674$; $p < 0.000$), which is mediated by the VI's perceived credibility and novelty value. That is, positive initial exposure to the VI will lead to the desire to further cognitively, affectively, and behaviorally interact with the VI. However, this effect can be partly strengthened or weakened by how credible and how novel the customers perceive the VI. This implies that brands and VI owners can foster CE through either (1) improving PSI with the VI, (2) making the VI more authoritative and trustworthy, and (3) emphasising the cool, new and unpredictable aspects of the VI. This finding contributes to the ongoing discussion of 'engagement' (e.g Lim & Rasul, 2022; Santos et al., 2022), particularly through the lenses of Gen Z users (Robinson, 2020; Castro et al., 2021; Cho et al., 2022) in the social media environment (Ciuchita et al., 2022). The mediating role of credibility also affirms that the endorsers' effectiveness (outcome) is subjected to how customers perceive the endorsers' personal traits (Ohanian, 1990).

Fourth, unexpectedly, the VIs' perceived authenticity and humanization did not significantly impact CE, although these two attributes slightly correlate with CE (figure 8).

The insignificance of authenticity on CE: For HIs, there has always been an emphasis on the 'genuine aspect' of their personalities (Hearn & Schoenhoff, 2016;

Pöyry et al., 2019; Driel & Dumitrica, 2020), particularly in terms of uniqueness and truthful endorsement (Lee & Eastin, 2021). The VIs literature also reaffirms this importance, as most studies discussed the authenticity of these new influencers to some extent (table 2). To explain this paradox, a reference to the ongoing discourse of how VIs are “authentically fake” should be made (Arsenyan & Mirowska, 2021, p.8). The idea is that a VI cannot be ‘authentic’ because they are already artificially created to play the role of humans. This means that no matter how they try to become original or naturally human, they simply cannot. To elaborate, Sands et al. (2022B) also mention that VIs cannot fool customers because the customers already choose to be fooled by following the VI. Customers expect most things from the VIs to be ‘staged’, even the VIs’ mistakes (Thomas & Fowler, 2021). As customers understand and accept this, the effect of authenticity on CE may have been neutralized. This finding supports that Gen Z users already accept a certain degree of ‘falsity’ and ‘uncertainty’ when choosing to follow a VI (Sands et al., 2022B, p.9-11). However, this poses the question of what would happen if the participants were not informed that they were participating in a **virtual** influencers study.

The insignificance of Humanization on CE: Humanization refers to how similar Vs are to a human in terms of appearance and mental-likeness. This finding contradicts the discussions that VIs with a high level of realism can improve advertisement attitudes (Zhang & Ren, 2022) and users’ attraction to the VI (Molin & Nordgren, 2019). Even more so, this finding also contradicts the suggestion that the VIs’ ‘unattainable attractiveness’ has a negative effect on customers’ mental health (Batist & Chimenti, 2021; Conti et al., 2022). The elements of humanness are found to be insignificant toward CE. Two possible explanations for this result could be (1) generation Z, as Robinson (2020), suggested, are generally more acceptant in online spaces that they did not care about the presence or absence of human traits in the influencer. In addition, as this study has not explored the impact of different age groups on CE, it could be that including other age groups could yield different results. And (2), the VI that was shown to the participants in the study, was not too humanized or unhumanized to make a significant impact on CE. Particularly, the choice of Lil Miquela as the studied VI may have played a role in this result as she is quite neutral in terms of anthropomorphism. Because studies on VI realism suggest the existence of an uncanny valley, where VIs that are too “realistic” can evoke feelings of creepiness (Arsenyan & Mirowska, 2021; Cornelius et al., 2023), the effect of humanization should be further tested by including VIs with different degrees of realism.

5.3 Managerial implications

Virtual Influencers are becoming more popular as more brands are collaborating with these artificial agents, while some brands even fabricate a virtual avatar of

their own. With Generation Z becoming the largest segment on social media (McLachlan, 2022), firms cannot ignore the potential of these computer-generated personas in terms of availability, scalability and controllability.

This study has demonstrated how PSI with VIs may impact customers' perception and engagement. From a practical point of view, firms can foster PSI with VIs through initial exposure by including more *elements of interactivity* or *self-disclosure communication techniques* in the VI content on social media (Penttinen et al., 2022). For example, in an Instagram Reel, the VIs can cultivate interactivity with the audience by addressing viewers by using 'you' pronoun, chatting in the comment section, and sharing more personal experiences and reviews. The VI should also implement self-disclosure techniques by providing basic personal information, expressing more emotions, and sharing experiences. (Penttinen et al., 2022, p. 570). Furthermore, managers should also encourage *customers' participation* in discussions and online activities to strengthen PSI with the VI, although audience participation remains one of the biggest challenges for brands (Munnukka et al., 2019, p.20). It is also worth noticing that different forms of interaction with VIs are also restricted by the platforms. Particularly, on Instagram, users can only like, comment, share, or send private messages to the VIs. The discussion of how to improve PSI with SMIs should be evolved with social media platforms as the catalyst.

Due to the positive significance of VIs' credibility and novelty on CE, it is vital to include the elements of sincerity and trustworthiness, as well as to demonstrate familiarity and expertise when developing content for the VI. The results show that at the moment, the novelty value of VI plays a slightly bigger role in determining CE. This calls for the disclosure of being a robot, having unique concepts, being in trends, and focusing on own artificial nature. This study also confirms Robinson's (2020, p.6) speculation that younger users simply just do not care that the VI is not real, evident through the high impact of the 'shock' value, coupled with the insignificance of humanization and authenticity (figure 8). This, however, brings the implication that the novelty value may wear out and that VIs may not be perceived as positively as HIs without their abnormalities (Stein et al., 2022, p.14). For managers, it is important to leverage this novel effect by implementing VIs at an appropriate time while staying on trends, discussing topical issues, and maintaining a certain degree of unpredictability.

As having a brand representative becomes an increasingly important issue, partnering with the right SMIs for a positive outcome is just as crucial. This study affirms that the process of developing interest between customers and VIs is similar to customers and humans in terms of how initial exposure (PSI) can affect perceived credibility and the desire to continue endorsers (e.g Munnukka et al., 2019; Penttinen et al., 2022). This brings the implication that it is possible to choose a VI as a representative, with the focus still on establishing the credibility of the VI and demonstrating the familiarity and expertise of the VI in the industry.

In addition, brands should consider VIs for new, fresh products when targeting a younger audience to further leverage the novelty value of VI in the eyes of this audience. For example, Sands et al. (2022B, p.5) point out that the metaverse, customer service, virtual communities, and physical holograms should harness the advantages of VIs. For fashion, food and travel brands, VIs can act as brand ambassadors while being customized to fit into the brand's aesthetics, product concept, and geographic stipulation. As VI's authenticity is not positively associated with CE, it is possible to leverage the "authentically fake" paradox in VI endorsement (Arsenyan & Mirowska, 2021, p.8). For example, a VI can be seen eating, drinking, and trying out products even though they lack a sensory system and do not exist in the physical world. This study supports that Gen Z customers can tolerate a certain degree of "falsity" when interacting with VI (Sands et al., 2022B, p.9-11), provided that they find the VI to be credible, cool, new, and entertaining. Similarly, because the VIs' humanization was found to be not positively associated with CE, companies can refrain from investing too much into creating an ultra-realistic or highly intelligent VI. This finding alleviates some of the concerns related to VIs' cost (Baklanov, 2019), as well as the need to align VIs' form realism with behaviour realism (see Miao et al., 2022, p.83).

Implementing VIs is not without drawbacks. In practice, while VIs must abide by all the regulations that are applied to humans, they can be further constricted by another set of rules by the platform, such as Meta's (2022) "ethical framework" for the use of VIs. As these entities do not exist in real life, they are almost completely at the mercy of the platforms in which they operate. Even more so, mistakes committed by VIs will lead to the firms' declining financial performance, customers' evaluations, and purchase intention (Thomas & Fowler, 2021). In many product categories and industries, it can be argued that at the moment, the machine learning technologies behind VI are not advanced enough to justify all the risks of implementing these new agents.

5.4 Limitations and suggestions for further studies

The validity of a study refers to the extent to which the answer truly measures what the researcher intended to examine, while the reliability of a study refers to how consistent and replicable it is (Saunders et al., 2019, p.213-214). In quantitative studies, external validity is usually maintained by using validated scales that have been tested in prior works, while internal validity is ensured through collecting empirical data that correctly answer the research questions. Due to a lack of prior quantitative studies on VIs, some questions from validated scales could not be applied to the context of this study. Therefore, this study did not fully apply any original validated scales, as indicators are taken from different scales with minimal adjustment to fit into the VIs context (appendix 1). The results,

however, show that the construct validity and reliability are met (table 8) and that participants answered consistently across the Linkert-Scale indicators (appendix 3).

Another limitation of the study is that it has not been able to compare relationships between customers-HIs and customers-VIs from a single sample. Although generalisation can be made on customers' relationship with VIs, no internally significant comparisons to human endorsers have been made. For that reason, future research should implement experimental designs with different conditions such as the differences between HIs and VIs (e.g Muostakas, 2020), the differences between different types of VIs (figure 4), or the effectiveness of VIs on different product types (e.g Penttinen et al., 2022, p.577). In addition, it is worth examining other scenarios such as (1) the disclosure of being a VI, (2) the difference between followers and non-followers, (3) different user demographic and consumption habits, or (4) different VIs endorsement contexts such as B2B. While the SMIs literature emphasizes the importance of endorsers-product fit or endorser-brand fit (e.g Pöyry et al., 2019; Driel & Dumitrica, 2020; Balaban et al., 2022), this study has not established such conditions to test their significance. The findings of this study are also limited to Gen Z users' initial reaction to the VI phenomenon. To better understand the longitudinal impact of VIs and their novelty effect, future research could measure how customers react to VIs after a sustained period.

From a practical side, this study has not been able to connect customers perception of VIs to more impactful marketing outcomes such as purchase intention (e.g Reinikainen et al., 2021; Penttinen et al., 2022) or brand attitude (e.g Munnukka et al., 2019). Moreover, engagement questions often do not reflect negative outcomes (e.g Lievonen et al., 2022), while various drawbacks of VIs are noted in the literature. VI is a fresh concept and it is important to advance the literature by pointing out their exact impact on endorsement (negative vs. positive).

Lastly, another understudied part of the VIs literature lies in the scalability of AI VIs, due to a lack of internal insight into the operations of programmers. Particularly, Batist & Chimenti (2021) identified the scalability and controllability of VIs to be an important avenue for future research, which are crucial from a brand's perspective. Future research could shed light on the implications of such VIs in the age of interactive content and personalised interaction.

5.5 Conclusion

As Customer Engagement becomes increasingly crucial, VIs offer a fresh solution for brands to communicate and interact with audiences. While the explorative

VIs literature has identified key differences between HIs and these new influencers, there is little empirical data on how these differences may play a role in customers' perception of the VIs attributes and marketing outcomes.

This study seeks to develop a framework that highlights how customers' initial exposure to VIs affects their perception of the VIs' attributes, and how that perception affects marketing outcomes. Particularly, the study measures how PSI with the VIs may impact customers' perception of the VIs' credibility, authenticity, humanization and novelty value. In addition, the study also measures the impact of these attributes on Customer Engagement as the marketing outcome. The study limits the respondents to Gen Z users on Instagram.

In total, 221 responses were analysed using SPSS Statistics and Smart-PLS 4.0. The findings show that PSI with VIs positively affects all four perceived VIs attributes. In addition, the VIs' perceived credibility and novelty value were found to mediate the positive relationship between PSI and CE. The structural model explains 73% of CE with VIs.

This study theoretically advances the VIs literature by quantifying the relationship between these new endorsers and customers, as it conceptualises VIs into four main attributes and links those attributes to a marketing outcome. The findings also complement existing endorsers studies through the lenses of VIs in a B2C context. The data fortifies the importance of having a credible endorser while emphasizing the novel aspects of VIs. This study also offers managerial implications on how brands can use VIs as a representative by fostering VIs' PSI, credibility and novelty value. Although it is important to have trustworthy, new, and exciting VIs who stay on trend, brands can also explore more innovative approaches to these synthetic endorsers. This is because being authentic and humanized did not significantly affect customer evaluation.

As VIs are strongly linked to digital platforms and technologies, future research should investigate the regulatory and facilitative role of these platforms. Moreover, the impact of artificial intelligence and machine learning on VIs creation and operation should also be studied. Researchers could build upon the limitations of this study by comparing VIs with HIs through more experimental conditions to understand how the emerging technologies of VIs are shaping the customer-endorser-brand relationship.

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APPENDICES

APPENDIX 1 Questionnaire items and outerloadings

Items	Questions	Indicators		Outer loadings
		To what extent do you agree with the following statements (1=Strongly disagree, and 7=Strongly agree)		
Parasocial Interaction Some questions adapted from Reinikainen et al., 2020; Penttinen et al., 2022; Stein et al., 2022	Q2	PSI1	I find the VI relatable	0.782
	Q3	PSI2	I want to learn more about the VI	0.807
	Q4	PSI3	I want to see the VI on other platforms	0.794
	Q5	PSI4	I would read about the VI elsewhere	0.836
	Q6	PSI5	I wants to meet the VI in real life	0.788
	Q7	PSI6	I notice and like certain attributes of the VI	0.834
Credibility Some questions adapted from Ohanian, 1990; Bakker, 2018; Munnukka et al., 2019	Q8	CRE1	is experienced in her field	0.791
	Q9	CRE2	demonstrated expertise in her field	0.747
	Q10	CRE3	is knowledgeable	0.766
	Q11	CRE4	would trust the VI product review	0.845
	Q12	CRE5	is trustworthy	0.847
	Q13	CRE6	is sincere	0.815
Authenticity	Q14	AUTH1	shares random thoughts and moments about their life	0.774
	Q15	AUTH2	posts authentic photos and videos	0.843
	Q16	AUTH3	discloses information about her origin	
	Q17	AUTH4	unique personality	0.784
	Q18	AUTH5	unique appearance	
	Q19	AUTH6	transparent about sponsorship	

Humanization Some questions adapted from Stein et al., 2022	Q20	HUM1	achievable appearance	
	Q21	HUM2	the VI looks like a human	0.771
	Q22	HUM3	the VI moves like a human	0.780
	Q23	HUM4	the VI expresses human emotions	0.805
	Q24	HUM5	natural facial expressions and gestures	0.844
	Q25	HUM6	the VI has personalities	0.748
	Q26	HUM7	the VI has feelings	0.751
	Q27	HUM8	the VI can think	
Novelty value	Q28	NOV1	the VI's concept is new and exciting	0.734
	Q29	NOV2	does not confront my usual expectations	
	Q30	NOV3	offers content that cannot be found elsewhere	
	Q31	NOV4	has more potential than other influencers	0.799
	Q32	NOV5	the VI is trendy	0.857
	Q33	NOV6	the VI is popular	0.760
Engagement	Q34	ENG1	I feel positive toward the virtual influencer	0.838
	Q35	ENG2	I think the virtual influencer is interesting.	0.843
	Q36	ENG3	I think the virtual influencer is entertaining.	0.837
	Q37	ENG4	I want to understand what/who is really behind the virtual influencer.	
	Q38	ENG5	I consider following the virtual influencer.	0.807
	Q39	ENG6	I consider interacting with the virtual influencer	0.814
	Q40	ENG7	I want to discuss/talk about the influencers with other people.	0.845
Demographics	Q41-43			
	Q44			

Attention check question				
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APPENDIX 2 Participants' Overview

Gender		Use Frequency		Education	
Male	48.4%	At least once a day	46.2%	No highschool diploma	0.5%
Female	51.6%	At least once a week	40.3%	Highschool diploma	9%
		At least once a month	13.6%	Enrolled/completed bachelor's	58.4%
				Enrolled/completed master's	28.5%
				Enrolled/completed PhD's	3.6%

APPENDIX 3 Descriptive statistics of all indicators

	N		Mean	Std. Deviation	Skewness	Kurtosis
	Valid	Missing				
PSI1	221	0	4.33	1.648	-.449	-.478
PSI2	221	0	4.65	1.701	-.537	-.559
PSI3	221	0	4.32	1.743	-.321	-.844
PSI4	221	0	4.52	1.757	-.450	-.756
PSI5	221	0	4.40	1.855	-.497	-.805
PSI6	221	0	4.45	1.588	-.565	-.124
CRE1	221	0	4.73	1.480	-.661	-.009
CRE2	221	0	4.73	1.524	-.613	-.120
CRE3	221	0	4.52	1.527	-.374	-.383
CRE4	221	0	4.04	1.693	-.337	-.702
CRE5	221	0	4.05	1.756	-.265	-.873
CRE6	221	0	4.05	1.678	-.363	-.690
AUT H1	221	0	4.69	1.448	-.610	.100
AUT H2	221	0	4.38	1.776	-.478	-.713
AUT H3	221	0	4.89	1.554	-.705	.028

AUT H4	221	0	4.71	1.452	-.536	.122
AUT H5	221	0	5.10	1.519	-.758	.159
AUT H6	221	0	4.80	1.424	-.570	.102
HUM 1	221	0	4.87	1.512	-.579	-.150
HUM 2	221	0	4.94	1.620	-.758	-.132
HUM 3	221	0	4.83	1.583	-.699	-.225
HUM 4	221	0	4.72	1.493	-.536	-.097
HUM 5	221	0	4.67	1.580	-.537	-.278
HUM 6	221	0	4.81	1.641	-.506	-.529
HUM 7	221	0	4.52	1.734	-.626	-.490
HUM 8	221	0	4.42	1.747	-.439	-.761
NOV 1	221	0	4.85	1.615	-.702	-.154
NOV 2	221	0	4.24	1.594	-.345	-.533
NOV 3	221	0	4.05	1.717	-.279	-.903
NOV 4	221	0	4.22	1.760	-.360	-.801
NOV 5	221	0	4.66	1.549	-.671	.049
NOV 6	221	0	4.70	1.591	-.675	-.052
ENG1	221	0	4.51	1.557	-.432	-.412
ENG2	221	0	4.69	1.656	-.670	-.279
ENG3	221	0	4.54	1.680	-.511	-.400
ENG4	221	0	4.93	1.530	-.754	.126
ENG5	221	0	4.18	1.864	-.256	-1.050
ENG6	221	0	4.08	1.853	-.299	-.987
ENG7	221	0	4.51	1.806	-.540	-.670

APPENDIX 4 Crosstabulations of Gender* Use Frequency and Gender * Education

Crosstab of Gender * Education					
			Gender		Total
			Male	Female	
Education	No high school diploma	Count	1	0	1
		Expected Count	.5	.5	1.0
		% within Gender	0.9%	0.0%	0.5%
		% of Total	0.5%	0.0%	0.5%
	High school diploma	Count	8	12	20
		Expected Count	9.7	10.3	20.0
		% within Gender	7.5%	10.5%	9.0%
		% of Total	3.6%	5.4%	9.0%
	Enrolled/ have completed a bachelor	Count	61	68	129
		Expected Count	62.5	66.5	129.0
		% within Gender	57.0%	59.6%	58.4%
		% of Total	27.6%	30.8%	58.4%
	Enrolled/ have completed a master	Count	31	32	63
		Expected Count	30.5	32.5	63.0
		% within Gender	29.0%	28.1%	28.5%
		% of Total	14.0%	14.5%	28.5%
currently enrolled/ have completed a PhD	Count	6	2	8	
	Expected Count	3.9	4.1	8.0	
	% within Gender	5.6%	1.8%	3.6%	
	% of Total	2.7%	0.9%	3.6%	
Total	Count	107	114	221	
	Expected Count	107.0	114.0	221.0	
	% within Gender	100.0%	100.0%	100.0%	
	% of Total	48.4%	51.6%	100.0%	
Pearson Chi-Square 3.978 ^a Asymp. Sig. (2-sided) 0.409 a. 4 cells (40%) have expected count less than 5. The minimum expected count is .48					

Crosstab of gender * Use Frequency					
			Gender		Total
			Male	Female	
Use-Frequency	At least once a day	Count	44	58	102
		Expected Count	49.4	52.6	102.0
		Count			

		% within Gender	41.1%	50.9%	46.2%
		% of Total	19.9%	26.2%	46.2%
	At least once a week	Count	45	44	89
		Expected Count	43.1	45.9	89.0
		% within Gender	42.1%	38.6%	40.3%
		% of Total	20.4%	19.9%	40.3%
	At least once a month	Count	18	12	30
		Expected Count	14.5	15.5	30.0
		% within Gender	16.8%	10.5%	13.6%
		% of Total	8.1%	5.4%	13.6%
Total	Count	107	114	221	
	Expected Count	107.0	114.0	221.0	
	% within Gender	100.0%	100.0%	100.0%	
	% of Total	48.4%	51.6%	100.0%	
Pearson Chi-Square		2.914 ^a			
Asymp. Sig. (2 -sided)		0.233			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 14.52					

APPENDIX 5 Descriptive statistics of the latent variables

	PSI	Credibility	Authenticity	Humanization	Novelty Value	Engagement
Mean	4.445701	4.352187	4.592760	4.747360	4.606335	4.417044
Std. Deviation	1.383732	1.294129	1.254112	1.258466	1.284304	1.441767
N=221						