Unveiling how consumers accept digital-only fashion: an empirical examination building upon the functional theory of attitudes

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Abstract

Purpose – Digital-only fashion represents an ideal fusion of sustainability and fashionability, garnering growing interest among fashion professionals. However, there is a noticeable gap in research focusing on digital-only fashion acceptance among consumers. Hence, this study aims to empirically examine consumers' motivations, evaluations and acceptance of digital-only fashion based on the Functional Theory of Attitudes.

Design/methodology/approach – A US-based research agency was hired to collect data, resulting in 247 completed survey responses. Data analysis was conducted using the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach.

Findings – Testing results highlight that consumer acceptance of digital-only fashion is directly influenced by both overall attitude and self-expressive attitude. Self-expression is particularly pivotal in digital-only fashion acceptance. Adorning avatars and dressing realistic on-screen bodies are distinct yet complementary aspects of using digital-only fashion. Consumers with positive environmental beliefs about digital-only fashion are concerned about how well digital-only fashion items allow them to express such beliefs.

Originality/value – This study innovatively applied the functional theory of attitudes to the emerging domain of digital-only fashion and identified consumers' four functional attitudes toward digital-only fashion, along with the underlying motivations served by each functional attitude. Furthermore, this study provides valuable practical insights across the digital-only fashion value chain.

Keywords Digital fashion, Digital-only fashion, Sustainability, Self-expression, Functional theory of attitudes, Generative artificial intelligence, Partial least squares structural equation modeling (PLS-SEM)

Paper type Research paper

Introduction

The intersection of sustainability and fashionability has spurred significant interest in digital fashion among scholars and fashion industry stakeholders (Baek *et al.*, 2022; Casciani, Chkanikova, & Pal, 2022; Schauman, Greene, & Korkman, 2023; Zhang & Liu, 2024). Embracing dematerialization, digital fashion provides a sustainable alternative to traditional practices by reducing resource-intensive processes (Casciani *et al.*, 2022). This approach, especially in product design and development, decreases material resource consumption, shortens lead time to market, and lowers costs and waste linked with physical sampling (Wagner & Kabalska, 2023). As virtual end-products, digital fashion typically

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encompasses two primary forms: digital-twins fashion, which replicates physical garments in virtual spaces, and digital-only fashion, which exists exclusively within digital environments and is not intended for physical production (Chan, Henninger, Boardman, & Blazquez Cano, 2024; Wagner & Kabalska, 2023). Particularly noteworthy, digital-only fashion, a distinct subset of digital fashion, completely bypasses physical production and paves the way for a promising nonphysical economy (Särmäkari & Vänskä, 2021; Schauman et al., 2023).

Digital-only fashion enables designers to unleash their creativity and innovation, resulting in visually stunning and imaginative designs (Särmäkari, 2021; Särmäkari & Vänskä, 2021; Zhang & Liu, 2024). Accordingly, digital-only fashion provides consumers with unparalleled freedom of expression, transcending constraints like material limitations, craftsmanship, size, and societal norms (Baek et al., 2022; Schauman et al., 2023). It can be used to adorn avatars in virtual spaces and to dress realistic on-screen bodies like individuals' images and videos, effectively showcasing diverse identities, fashion preferences, individuality, and social statuses (Chan et al., 2024; Mogaji, Dwivedi, & Raman, 2023). Beyond aesthetic appeal, digital-only fashion offers immersive experiences, heightening hedonic enjoyment (Venturini & Columbano, 2023). Digital-only fashion epitomizes sustainability and fashionability, increasingly appealing to fashion practitioners. For instance, Fabricant, a burgeoning digital fashion enterprise, partnered with blockchain companies, facilitating the auction of the digital-only Iridescence dress for cryptocurrency valued at $9,500 (Särmäkari & Vänskä, 2021). Established fashion brands such as Balenciaga, Jimmy Choo, and Dolce & Gabbana are introducing exclusive digital-only garments (Mogaji et al., 2023). The emergence of image-generation-systems based on generative artificial intelligence, such as Midjourney and Stable Diffusion, has also provided unprecedented chances for advancing digital-only fashion (Zhang & Liu, 2024). Overall, digital-only fashion holds significant potential to address the environmental challenges posed by physical fashion, while still meeting consumers' fashion preferences and desires.

Existing research largely focuses on digital fashion's role in supporting physical fashion practices, such as 3D apparel design and sampling and virtual try-on services for retail fittings (Baek et al., 2022; Wagner & Kabalska, 2023). A few studies have explored digital fashion as end products for virtual use, particularly for dressing avatars, but have not distinguished digital-only fashion that involves no physical production from general digital fashion. For instance, Zhang, Liu, and Lyu (2023) confirmed that consumers' evaluation of digital fashion influences their intent to purchase luxury brands' digital fashion collections, but this research considered both digital replicas of physical items and virtual designs that may lead to physical production, not purely digital-only fashion. Moreover, Park and Kim (2023) found that consumers' purchase intentions for virtual products can significantly impact their interest in buying the corresponding physical products, indicating that some digital fashion products may ultimately lead to physical production. Thus, it is unclear whether prior studies that focus on digital fashion either as a tool for physical production and consumption or as a kind of general digital product, can meaningfully address physical fashion-related environmental concerns. To date, there is a noticeable gap in research specifically focusing on digital-only fashion, which involves no physical production or consumption, despite its potential significance. This study aims to fill that gap by empirically investigating consumers' motivations, evaluations, and acceptance of digital-only fashion.

The Functional Theory of Attitudes, widely applied in consumer studies, emphasizes that attitudes serve various functions beyond mere evaluation, including utilitarian, value-expressive, social-adjustive, and hedonic functions, to meet individuals' diverse needs (Cho, Kim-Vick, & Yu, 2022; Grewal, Mehta, & Kardes, 2004; Katz, 1960). This theory aids in understanding people's psychological motivations for attitude formation and alteration,

linking underlying motivations to the evaluation and subsequent responses (Katz, 1960). Building upon the Functional Theory of Attitudes, we identified four functional attitudes toward digital-only fashion and their underlying predominant functions. Through an extensive literature review, a research model comprising multiple attitudes and purchase intention in the digital-only fashion context, along with corresponding hypotheses, was proposed. Subsequently, we used the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach to test this model and the predictivity of all identified attitudes.

This study offers both theoretical and practical contributions in three key areas. First, it is among the first to empirically examine how consumers perceive and evaluate digital-only fashion. We differentiate digital-only fashion from general digital fashion, highlight its unique value, and identify four key applications of digital-only fashion as end-products. Second, we applied the Functional Theory of Attitudes to the emerging field of digital-only fashion. Through this theoretical lens, we identified consumers' four functional attitudes toward digital-only fashion, along with the underlying motivations. Our findings confirm the importance of both evaluative and functional attitudes in shaping consumer acceptance of digital-only fashion. Third, this study provides practical guidance for professionals throughout the digital-only fashion value chain and offers important insights to relevant stakeholders. Overall, these contributions establish our study as a seminal piece in the digital-only fashion field, with the potential to help address sustainability issues in traditional fashion production and consumption.

Literature review
Digital-only fashion
The existing literature lacks a precise definition of digital-only fashion for consumer use, but three key characteristics can clarify it. Firstly, digital-only fashion items are dematerialized, existing solely in digital realms without physical production or associated practices (Casciani *et al.*, 2022). This sets digital-only fashion end-products apart from digital twins or 3D digital design models, which simulate physical fashion products either transitioning from physical to virtual or from virtual to physical (Wagner & Kabalska, 2023). Secondly, digital-only fashion is typically visually captivating, showcasing creativity, imagination, and high aesthetic value (Särmäkari & Vänskä, 2021). Thirdly, consumers can acquire and utilize digital-only fashion to adorn their avatars (digital identities) and realistic on-screen bodies (physical identities) within virtual reality environments (Zhang *et al.*, 2023). Therefore, digital-only fashion can be defined as virtual apparel and accessories exclusively existing in virtual environments, designed to dress avatars or realistic on-screen bodies, presenting visually appealing effects.

In today's fashion landscape, consumers face a dilemma: the desire for ever-changing fashion choices for self-expression and communication clashes with growing concerns about the textile industry's environmental harm (Schauman *et al.*, 2023). Digital-only fashion emerges as a promising solution to alleviate this conflict. With the rapid advancement of digital technologies, online activities like work, study, shopping, and entertainment have become increasingly integrated into daily life (Mogaji *et al.*, 2023; Willcocks, 2024). Digital-only fashion enables consumers to express themselves freely in virtual reality by offering unlimited creative possibilities, meanwhile reducing physical fashion consumption (Casciani *et al.*, 2022; Chan *et al.*, 2024; Särmäkari, 2021).

By dressing avatars that typically represent digital identities in 3D gaming realms or metaverse-related social platforms, individuals can present multiple personas, protect privacy through anonymity, and assume desired forms, even as fantasy characters (Park & Chun, 2023; Patruti, Zbuchea, & Pînzaru, 2023). On the other hand, digital-only fashion facilitates the styling of consumers' realistic on-screen bodies through techniques such as virtual try-ons using Augmented Reality (AR) filters and direct alterations of clothing in

images or videos using Generative Artificial Intelligence (GAI) technologies (Venturini & Columbano, 2023; Zhang & Liu, 2024). When shared on social media, individuals dressed in digital fashion attire on their realistic on-screen bodies can be easily recognized by their peers and families, enhancing their real-world identities. By embracing digital-only fashion, consumers can reduce their reliance on physical fashion consumption and express themselves freely in virtual worlds; thereby enjoying guilt-free excitement (Schauman et al., 2023). The key distinction between avatars and realistic on-screen bodies lies in the degree of resemblance to users' physical appearances. Specifically, the term "avatar," whether in 2D or 3D form, refers to a representation distinct from the user's actual appearance, while "on-screen body" denotes a depiction closely resembling an individual's physical attributes, particularly focusing on facial features, indicating a high degree of fidelity or realism. In summary, there are four typical applications of digital-only fashion: enhancing avatars (Patruti et al., 2023), styling realistic on-screen bodies (Zhang et al., 2023), enabling self-expression (Venturini & Columbano, 2023), and advancing environmental sustainability (Schauman et al., 2023).

Most previous research has not distinguished between digital fashion as end products and digital tools that support physical fashion practices until the term "Metaverse" gained widespread attention in 2021 (Chan et al., 2024). Metaverse refers to an evolving network that integrates various virtual environments and features a unique interconnection between digital spaces and the physical world (Barrera & Shah, 2023; Cheng et al., 2022; Lee et al., 2021). As the Metaverse progresses, virtual environments for presenting and disseminating digital fashion have expanded beyond gaming worlds to include various social platforms such as Roblox, Animal Crossing, Minecraft, and Sandbox, among others (Park & Kim, 2023; Venturini & Columbano, 2023). As such, digital fashion products designed for consumer use have drawn increasing scholarly interest. For example, a qualitative study using semi-structured interviews identified five key consumption values associated with fashion in the Metaverse: utilitarianism, social identity, personification, hedonism, and personal beliefs (Venturini & Columbano, 2023). Additionally, an empirical study using an online survey revealed that dressing avatars and realistic on-screen bodies are two central ways consumers engage with digital fashion products (Zhang et al., 2023).

However, existing literature reveals seemingly conflicting findings regarding consumers' perceptions of digital fashion. For instance, Luong, Tarquini, Anadol, Klaus, and Manthiou (2024) found that consumers expressed concerns about the aesthetics and perceived value of digital fashion products based on an analysis of YouTube comments. In contrast, Schauman et al. (2023) identified four emerging consumer expectations of digital fashion, particularly from a sustainability perspective. A recent literature review research traced the development of digital fashion from tools supporting physical fashion design and retail to virtual products sold to consumers, identifying six types of digital fashion products: digital skins for gamified environments, digital skins for virtual influencers, image-based superimposed fashion, AR filter-based fashion, fashion NFTs, and digital twins (Chan et al., 2024). While these products may be sold entirely in digital formats, they cannot all be classified as digital-only fashion since some, like digital twins, are digital replicas of physical garments. These highlight the need for research that focuses specifically on digital-only fashion from the consumer perspective. Since digital-only fashion is still in its early stages, it is critical to comprehend how consumer acceptance is influenced by underlying motivations and evaluations regarding the applications of digital-only fashion.

Theoretical background and research framework
According to the Functional Theory of Attitudes, individuals' attitudes are formed, shaped, or altered by the perceived functions of the relevant attitudinal objects, which are believed to

satisfy their needs or desires (Katz, 1960). This theory aims to understand the underlying psychological motivations that drive individuals to form or change attitudes (Katz, 1960). Scholars in consumer studies have confirmed four typical functions served by attitudes, including utilitarian, value-expressive, social-adjustive, and hedonic functions (Cho *et al.*, 2022; Grewal *et al.*, 2004; Katz, 1960). These underlying functions contribute to individuals' evaluative outcomes, satisfying their needs and preferences, consequently exerting a profound influence on subsequent cognitive and emotional responses and behaviors (Cho *et al.*, 2022; Katz, 1960).

The Functional Theory of Attitudes aids in identifying and understanding underlying dynamics that may impact consumers' acceptance of digital-only fashion. Guided by this theory, we identified four key functional attitudes toward digital-only fashion and developed a conceptual model with corresponding hypotheses. First, adorning avatars using digital clothing and accessories has been long well-received among gamers (Chan *et al.*, 2024). This represents a fundamental application of digital-only fashion, particularly catering to consumers' hedonic needs, as digital-only fashion is known for its visually striking designs, allowing users to express a variety of desired identities and immerse themselves in fantasy environments (Särmäkari & Vänskä, 2021; Venturini & Columbano, 2023). According to the Functional Theory of Attitudes, the hedonic function relates to the positive emotions generated by an attitudinal object (Grewal *et al.*, 2004). As a result, we identify the attitude toward dressing avatars (ADA) as one of the functional attitudes regarding digital-only fashion, mainly serving the hedonic function. ADA denotes the assessment of utilizing digital-only fashion to adorn avatars distinct from users' physical appearances.

Second, the emerging application of dressing people's realistic on-screen bodies in digital-only fashion has garnered increasing popularity, especially among young consumers who enjoy receiving likes and comments on their digital outfits through social media (Chan *et al.*, 2024; Mogaji *et al.*, 2023). Resembling physical fashion presentation, this application could enhance people's real-world identities and social statuses (Casciani *et al.*, 2022; Schauman *et al.*, 2023). The Functional Theory of Attitudes indicates that the social-adjustive function focuses on gaining social approval or fitting into social groups (Cho *et al.*, 2022). The social-adjustive function may be the primary motivator for this application of digital-only fashion. As such, we identified the attitude toward dressing on-screen body (ADO) as a functional attitude toward digital-only fashion, denoting the evaluation of using digital-only fashion to adorn individuals' realistic on-screen bodies that closely resemble their physical appearances.

Third, according to the Functional Theory of Attitudes, the utilitarian function concerns the effectiveness of attitudinal objects in fulfilling specific needs, often achieved by maximizing external rewards and minimizing related punishments (Katz, 1960). The leading utilitarian function of digital-only fashion lies in its potential for environmental contributions due to its fully dematerialized nature (Casciani *et al.*, 2022; Särmäkari & Vänskä, 2021). Thus, we identify environmental attitude (EA) toward digital-only fashion as a functional attitude, representing consumer evaluation of the extent to which digital-only fashion can contribute to environmental protection.

Fourth, digital-only fashion allows consumers to express themselves freely by showcasing various identities, enhancing their real-life personas, and communicating their core values (Chan *et al.*, 2024; Särmäkari, 2021). Self-expression has emerged as a key motivation for consumers across various uses of digital-only fashion. The Functional Theory of Attitudes suggests that the value-expressive function refers to the positive expression of personal values, beliefs, and self-images (Katz, 1960). Accordingly, we identified self-expressive attitude (SA) toward digital-only fashion as a crucial functional attitude, mainly serving the value-expressive function. SA represents consumers' assessment of using digital-only fashion to convey self-images, values, and beliefs.

Figure 1 illustrates our proposed research model, which examines four functional attitudes, overall attitude, and purchase intention related to digital-only fashion. In this conceptual framework, three of the identified functional attitudes, each linked to one key application of digital-only fashion, act as antecedents, as they likely influence consumers' overall evaluations of digital-only fashion based on distinctive predominant motivations. Self-expression plays a dual role, functioning as both a motivation and an outcome in virtual consumption (Park, Ko, & Do, 2023; Venturini & Columbano, 2023). Consequently, the functional attitude, SA, is considered both an independent and dependent variable in this model. Overall attitude also functions as both an independent and dependent variable, while purchase intention is the ultimate dependent variable.

Hypotheses development

Purchase intention, a subset of customer behavioral intention, signifies consumers' conscious willingness to engage in specific acceptance behaviors (Spears & Singh, 2004). The attitude commonly refers to an individual's predisposition to evaluate specific objects either favorably or unfavorably (Katz, 1960). Numerous studies across diverse domains have consistently confirmed the positive link between evaluative attitude and purchase intention, including the fashion industry (e.g. Cho *et al.*, 2022; Park, Jeon, & Sullivan, 2015; Spears & Singh, 2004). In this study, purchase intention (PI) specifically denotes consumers' intent to acquire digital-only fashion products, while overall attitude (OA) reflects consumers' evaluative attitudes toward digital-only fashion products. Consequently, we proposed the following hypothesis:

H1. Overall attitude (OA) toward digital-only fashion influences purchase intention (PI) of digital-only fashion.

Consumers aim to affirm their self-concepts and convey core values by acquiring items that align with their goals (Stuppy, Mead, & Van Osselaer, 2020). In traditional fashion consumption, consumers buy and utilize apparel and accessories as communicative tools to express and refine a unified self-concept, embodying either an ideal or authentic self and conveying cherished beliefs and values (Anand & Kaur, 2018). Similarly, in virtual environments, purchasing digital fashion items can also serve as a means to express
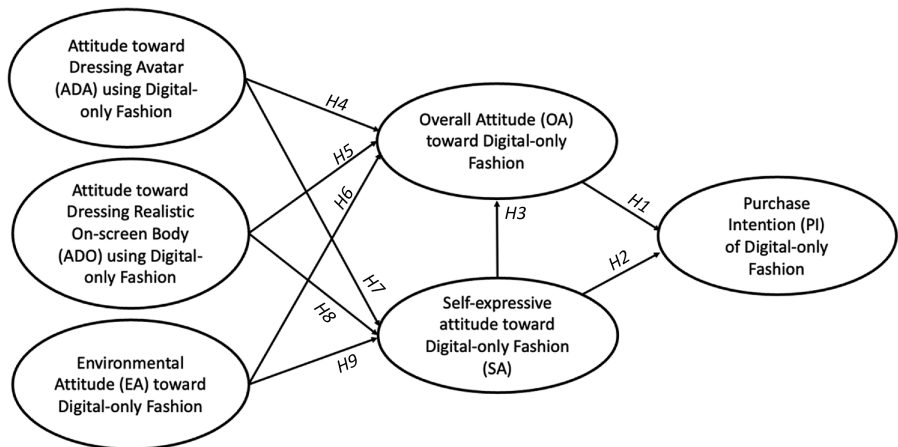

Figure 1.
Proposed
research model

Source(s): Authors' own work

consumers' consistent self-images and communicate their beliefs (Patruti *et al.*, 2023; Schauman *et al.*, 2023). According to the Functional Theory of Attitudes, the value-expressive function of attitudes plays a crucial role in shaping consumer behavior (Katz, 1960). Hence, self-expression is likely a crucial factor motivating consumers to purchase digital-only fashion, driven by their value-expressive motivations. Accordingly, individuals with positive self-expressive attitudes toward digital-only fashion may be inclined to purchase digital-only fashion items, leading to the following hypothesis:

H2. Self-expressive attitude (SA) toward digital-only fashion impacts purchase intention (PI) of digital-only fashion.

As per the Functional Theory of Attitudes, while attitudes may serve multiple functions, a certain functional attitude primarily aligns with a specific motivational process context (Katz, 1960). In other words, a primary psychological factor tends to guide the motivation process for each functional attitude (Cho *et al.*, 2022). In this study, the four identified functional attitudes are associated with key applications of digital-only fashion: adorning avatars, dressing people's on-screen bodies, reducing environmental harms of physical fashion, and self-expression. While each functional attitude may address different consumer needs, one predominant function behind a specific attitude typically drives the motivation process for how consumers engage with digital-only fashion.

Self-expression is a key application for consumers of digital-only fashion. While the self-expressive attitude may fulfill various functions, the value-expressive function, centered on expressing self-images and conveying beliefs, is likely to be the main driver motivating consumers to use virtual attire for self-expression. The hedonic function, which emphasizes the enjoyment of pleasurable experiences, is expected to be the primary motivation for consumers' attitudes toward using digital-only fashion to dress avatars. The major reason lies in avatars allow users to customize their appearance to reflect any desired identity. Similar to physical fashion consumption, individuals using digital-only fashion to dress their realistic on-screen bodies can enhance their real-world identities (Casciani *et al.*, 2022; Schauman *et al.*, 2023). In this case, the social-adjustive function, which is concerned with gaining social approval, tends to be the primary motivator behind consumer attitudes toward dressing on-screen bodies in digital-only fashion. Additionally, to support environmental protection and sustainability, consumers may shift their fashion habits by reducing physical purchases and favoring expressive and creative digital-only fashion (Särmäkari & Vänskä, 2021; Schauman *et al.*, 2023). As such, the utilitarian function tied to environmental protection may serve as the primary motivation behind consumers' environmental attitudes toward digital-only fashion.

In certain contexts, consumers may form multiple attitudes that coexist in a hierarchical structure (Bian & Forsythe, 2012). When faced with these different attitudes, consumers mentally activate them in a prioritized sequence, with attitudes toward specific targets being more prominent (Harben & Kim, 2008). According to the Functional Theory of Attitudes, consumers' overall evaluation could be shaped by their functional attitudes, which address their particular needs and desires, within a particular context (Katz, 1960). Therefore, the four identified functional attitudes, each driven by distinct primary motivations, are likely to collectively influence consumers' overall attitudes toward digital-only fashion.

Specifically, consumers with favorable self-expressive attitudes toward digital-only fashion may tend to hold a positive overall assessment of it, mainly driven by value-expressive function. Consumers who hold satisfactory attitudes toward accepting digital-only fashion for avatar dressing may also maintain a positive overall attitude toward digital-only fashion, primarily motivated by hedonic function. Consumers' attitudes toward dressing their on-screen bodies in digital-only fashion attire may impact their overall attitude toward digital-only fashion, particularly propelled by the social-adjustive function.

Consumers who perceive the environmental benefits of digital-only fashion positively are likely to have a favorable overall attitude toward it, driven by its perceived utilitarian function. The following hypotheses are accordingly proposed:

H3. Self-expressive attitude (SA) toward digital-only fashion affects overall attitude (OA) toward digital-only fashion.

H4. Attitude toward dressing avatar (ADA) using digital-only fashion affects overall attitude (OA) toward digital-only fashion.

H5. Attitude toward dressing realistic on-screen body (ADO) using digital-only fashion affects overall attitude (OA) toward digital-only fashion.

H6. Environmental attitude (EA) toward digital-only fashion affects overall attitude (OA) toward digital-only fashion.

Utilizing fashion items to express either ideal or real selves and convey core values is crucial for individuals engaging in fashion consumption (Casciani *et al.*, 2022; Mogaji *et al.*, 2023; Orzada & Kallal, 2021). In the context of digital-only fashion, self-expression can serve both as a motivation and an objective across various scenarios, such as showcasing different personas, highlighting social status, and communicating core values, fashion tastes, and preferences (Casciani *et al.*, 2022; Chan *et al.*, 2024; Särmäkari, 2021). According to the Functional Theory of Attitudes, the perceived functions of the attitudinal objects play a pivotal role in influencing and altering consumers' attitudes (Katz, 1960). Consequently, if consumers tend to primarily express themselves or their core values through various applications of digital-only fashion, the predominant motivator behind the three functional attitudes (ADA, ADO, and EA) may shift to the value-expressive function.

Dressing avatars using digital-only fashion items not only enhances hedonic experiences but also enables users to socialize and express their cherished concepts and values freely (Park & Chun, 2023; Patruti *et al.*, 2023). This includes representing underrepresented and marginalized cultures through diverse identities that diverge from mainstream voices (Särmäkari, 2021). Hence, consumers who appreciate dressing avatars with digital-only fashion may tend to hold favorable self-expressive attitudes toward it, leading to the following hypothesis:

H7. Attitude toward dressing avatar (ADA) affects self-expressive attitude (SA) toward digital-only fashion.

Previous studies indicate that consumers have a preference for sharing photos or videos showcasing their realistic on-screen bodies dressed in digital fashion attire on social media platforms and seeking comments or compliments similar to those received when displaying physical fashion items (Chan *et al.*, 2024; Schauman *et al.*, 2023; Venturini & Columbano, 2023). This suggests a tendency to use digital-only fashion items to enhance consumers' real-world self-images. As such, consumers who hold a positive attitude toward dressing their on-screen bodies in digital-only fashion may also shape satisfactory self-expressive attitudes toward digital-only fashion. Accordingly, the succeeding hypothesis is proposed:

H8. Attitude toward dressing realistic on-screen body (ADO) impacts self-expressive attitude (SA) toward digital-only fashion.

Existing research has shown that environmentally conscious consumers tend to adopt sustainable consumption practices (Cheng, Chang, & Lee, 2020). Nowadays, consumers show increased awareness of the environmental harm associated with the fashion industry (Casciani *et al.*, 2022; Wagner & Kabalska, 2023). They acknowledge and advocate for collective efforts in addressing sustainability concerns (Schauman *et al.*, 2023). Accordingly,

consumers who perceive the environmental benefits of digital-only fashion positively may seek to express these beliefs and garner more public attention. Thus, spurred by the reinforcement of self-images and the efficient communication of values and beliefs, consumers who positively perceive the environmental advantages of digital-only fashion may tend to hold favorable self-expressive attitudes toward it. As a result, the following hypothesis is formulated:

H9. Environmental attitude (EA) toward digital-only fashion influences self-expressive attitude (SA) toward digital-only fashion.

Research method

Research instrument

An online survey was developed and administered via Qualtrics. The survey started with the institutional review board (IRB) approval information and an introduction to digital-only fashion, comprising the definition, the salient attributes, and the difference between avatar and on-screen body, along with a set of digital-only fashion visual references. This section aims to ensure that survey participants can comprehend and distinguish digital-only fashion products and their associated applications. To confirm participants' understanding of the key concepts, we then utilized true-or-false filtering questions. One example was: "Digital-only fashion refers to a type of fashion that typically features visually appealing effects and is not intended for physical production. Is this statement True or False?" The subsequent section included multi-item scales to assess research constructs. The final part of the survey included questions to collect demographic information.

All six research constructs were assessed through multi-item scales either adopted or adapted from previous research (see Table 1). In this study, self-expressive attitude (SA) refers to how consumers evaluate using digital-only fashion to express their self-image and core values. To measure this, we adapted the fashion self-congruity scale developed by Anand and Kaur (2018), which has been extensively employed to empirically assess how well consumers perceive fashion items or brands align with their actual and ideal self-images (e.g. Kaur & Anand, 2021; Legere & Kang, 2020; Xue, Caiguo, Yi, & Chenxia, 2022). SA was measured using eight items, based on this established scale. SA employed a 7-point Likert scale, with 1 indicating "strongly disagree" and 7 denoting "strongly agree". Environmental attitude (EA) represents consumer evaluation of how much digital-only fashion can contribute to environmental protection. This concept aligns with a well-established and widely verified measurement scale of consumer involvement, which gauges the extent of consumers' engagement with specific objectives (e.g. Hollebeek, Glynn, & Brodie, 2014; Zheng, Li, & Na, 2022). Consequently, we adapted the EA scale from Zaichkowsky (1985), utilizing a 7-point bipolar semantic scale to assess this variable. The semantic differential scales for measuring attitude and purchase intention, developed by Spears and Singh (2004), have been widely utilized and validated by researchers in the fashion industry, including both physical and digital fashion consumption contexts (e.g. Gomes, Marques, & Dias, 2022; Johnstone & Lindh, 2022; Zhang *et al.*, 2023). Therefore, the other four constructs—overall attitude (OA), attitude toward dressing avatar (ADA), attitude toward dressing realistic on-screen body (ADO), and purchase intention (PI)—also utilized a 7-point bipolar semantic scale and were adopted from Spears and Singh (2004).

Sample and sampling

A U.S.-based research firm was hired to manage participant recruitment and data collection. Our survey link was disseminated to individuals within this firm's consumer panel. Out of 333 responses, 247 participants completed the survey after passing attention-check

Construct	Indicators	Coding	References
Self-expressive attitude toward digital-only fashion (SA)	*How do you evaluate the self-expression function of digital-only fashion?*		Anand and Kaur (2018)
	Digital-only fashion style can be consistent with how I see myself	SA1	
	Digital-only fashion style can be a part of my identity	SA2	
	Digital-only fashion clothing can be an important tool to express my self-image	SA3	
	Using digital-only fashion items could enhance my self-image before others	SA4	
	Digital-only fashion clothes could reflect how I feel about myself	SA5	
	Digital-only fashion clothes could help me become the person I want to be	SA6	
	Digital-only fashion clothes could help me achieve the identity I want to have	SA7	
	Digital-only fashion clothes could help me narrow the gap between what I am and what I try to be	SA8	
Overall attitude toward digital-only fashion (OA)	*How do you evaluate digital-only fashion in general?*		Spears and Singh (2004)
	Unappealing. . . . . .. Appealing	OA1	
	Unlikable. . . . . .. Likable	OA2	
	Bad. . . . . .. Good	OA3	
	Unpleasant. . . . . .. Pleasant	OA4	
	Unfavorable. . . . . .. Favorable	OA5	
Attitude toward dressing avatar in digital-only fashion (ADA)	*How do you evaluate using digital-only fashion to dress avatars that are different from your real appearance?*		Spears and Singh (2004)
	Unappealing. . . . . .. Appealing	ADA1	
	Unlikable. . . . . .. Likable	ADA2	
	Bad. . . . . .. Good	ADA3	
	Unpleasant. . . . . .. Pleasant	ADA4	
	Unfavorable. . . . . .. Favorable	ADA5	
Attitude toward dressing realistic on-screen body in digital fashion (ADO)	*How do you evaluate using digital-only fashion to dress your realistic on-screen body?*		Spears and Singh (2004)
	Unappealing. . . . . .. Appealing	ADO1	
	Unlikable. . . . . .. Likable	ADO2	
	Bad. . . . . .. Good	ADO3	
	Unpleasant. . . . . .. Pleasant	ADO4	
	Unfavorable. . . . . .. Favorable	ADO5	
Purchase intention of digital-only fashion (PI)	*Describing your intention to purchase digital-only fashion items in the future*		Spears and Singh (2004)
	Definitely not buy it. . . . . .. Definitely buy it	PI1	
	Very low. . . . . .. High purchase interest	PI2	
	Probably not. . . . . .. Probably buy it	PI3	
	Definitely do not intend to buy. . . . . .. Definitely intend to buy	PI4	
Environmental attitude toward digital-only fashion (EA)	*How do you evaluate the environmental benefits of digital-only fashion?*		Zaichkowsky (1985)
	Unimportant . . . . Important	EA1	
	Means nothing to me . . . . Means a lot to me	EA2	
	superfluous . . . . vital	EA3	
	Does not matter to me . . . . Matters to me	EA4	

Source(s): Authors' own work

questions. The majority of participants were females (75.3%, $n = 186$), followed by males (23.9%, $n = 59$), with a few choosing not to disclose their gender (0.8%, $n = 2$). The age groups were distributed as follows: 18–25 years (66%, $n = 163$), 26–34 years (4.9%, $n = 12$), 35–54 years (15.8%, $n = 39$), and 55–64 years (13.4%, $n = 33$). The ethnicity breakdown showed: Caucasian/White (68.4%, $n = 169$), African American (12.1%, $n = 30$), Asian (8.9%, $n = 22$), Hispanic (6.9%, $n = 17$), American Indian (0.8%, $n = 2$), and Other (2.8%, $n = 7$). In terms of education, 77% ($n = 190$) held a bachelor's degree, 15.4% ($n = 38$) had a high school diploma, and 7.3% ($n = 18$) had a graduate or professional degree, with one participant (0.4%) choosing not to disclose.

Data analysis
Data analysis, including both exploratory factor analysis (EFA) and Partial Least Squares Structural Equation Modeling (PLS-SEM), was conducted using the R programming language and RStudio software. Compared to covariance-based SEM, PLS-SEM offers greater statistical predicting power without stringent assumptions of multivariate normality (Hair, Hult, Ringle, Sarstedt, Danks, & Ray, 2021). PLS-SEM provides greater statistical predictive power than Covariance-Based Structural Equation Modeling (CB-SEM), making it especially useful for identifying relationships in smaller sample sizes and intricate models without needing distributional assumptions (Hair *et al.*, 2021). Dissimilar to CB-SEM, which uses confirmatory factor analysis (CFA) for construct assessment, PLS-SEM evaluates construct reliability and validity by assessing the measurement model.

Results
Exploratory factor analysis
Harman's Single-Factor Test was conducted to address the concern of common method bias. The result shows that a total variance of 0.46 was extracted by one factor, below the recommended threshold of 0.5. Therefore, no common method bias was found (Fuller, Simmering, Atinc, Atinc, & Babin, 2016). Exploratory Factor Analysis (EFA) identified six constructs with 31 items, explaining approximately 85% of the total variation. Communalities extraction loadings range from 0.74 to 0.95, and the Kaiser–Meyer–Olkin measure of sampling adequacy (KMO) is robust at 0.94, indicating that the data dataset is appropriate for factor analysis. Additionally, EFA indicator loadings range from 0.79 to 0.90, indicating the reliability of the research constructs. Key results of EFA analysis are summarized in Table 2.

Assessment of the measurement model
Evaluating reflective measurement models involves assessing measurement reliability at both the indicator (indicator reliability) and construct (internal consistency reliability) levels (Hair *et al.*, 2021). Convergent validity is examined through the average variance extracted (AVE), while the heterotrait–monotrait (HTMT) ratio of correlations is employed to gauge discriminant validity among reflectively measured constructs (Hair *et al.*, 2021). The indicator loadings for all constructs, ranging from 0.80 to 0.98, surpass the threshold of 0.708 (Hair, Risher, Sarstedt, & Ringle, 2019), demonstrating satisfactory reliability. All Cronbach's alpha (between 0.93 and 0.98) and the composite reliability rho$_A$ (between 0.96 and 0.98) values exceed the threshold of 0.70 (Hair *et al.*, 2019), indicating the internal consistency reliability of all construct measures.

Convergent validity is evidenced by the AVE values (ranging from 0.79 to 0.94) well above the 0.50 minimum requirement (Hair *et al.*, 2019). All HTMT values are significantly below the threshold of 0.85, supporting the discriminant validity (Hair *et al.*, 2021). The

Items	E-L	C-L	I-L	Alpha	AVE	rho$_A$
OA1	0.84	0.88	0.94			
OA2	0.84	0.85	0.92	0.96	0.86	0.96
OA3	0.83	0.87	0.93			
OA4	0.83	0.86	0.92			
OA5	0.83	0.87	0.93			
EA1	0.90	0.84	0.93			
EA2	0.90	0.89	0.95	0.93	0.82	0.97
EA3	0.87	0.74	0.80			
EA4	0.85	0.87	0.94			
ADA1	0.90	0.93	0.96			
ADA2	0.90	0.93	0.96	0.98	0.93	0.98
ADA3	0.89	0.94	0.97			
ADA4	0.89	0.92	0.96			
ADA5	0.88	0.93	0.96			
ADO1	0.87	0.92	0.96			
ADO2	0.85	0.90	0.95	0.98	0.93	0.98
ADO3	0.85	0.95	0.97			
ADO4	0.85	0.93	0.96			
ADO5	0.83	0.93	0.97			
SA1	0.84	0.79	0.88			
SA2	0.84	0.78	0.88			
SA3	0.82	0.82	0.90	0.96	0.79	0.96
SA4	0.82	0.82	0.89			
SA5	0.81	0.79	0.88			
SA6	0.81	0.81	0.90			
SA7	0.81	0.82	0.90			
SA8	0.79	0.79	0.89			
PI1	0.86	0.93	0.96			
PI2	0.86	0.95	0.98	0.98	0.94	0.98
PI3	0.85	0.95	0.97			
PI4	0.85	0.94	0.97			

Table 2.
Key results of EFA analysis and construct assessment in PLS-SEM

Note(s): E-L, EFA indicator loading; C-L, Communities extraction loading; I-L, Indicator loadings in the PLS-SEM analysis; AVE, average variance extracted value; alpha, Cronbach's alpha value; rho$_A$, composite reliability rho$_A$ value
Source(s): Authors' own work

bootstrapping procedure (10,000 bootstrap samples) of the HTMT test further confirmed the discriminant validity, as the upper boundaries of confidence intervals consistently remain below the threshold of 0.85 (Hair *et al.*, 2021), indicating that all the research constructs are distinct. The major results of the measurement model evaluation are also presented in Table 2.

Assessment of the structural model
All Variance Inflation Factor (VIF) values in the structural model are well below the value of 2, indicating no collinearity issues among predictor constructs (Hair *et al.*, 2021). The coefficient of determination (R^2) values for the endogenous constructs were assessed, signifying the proportion of variance explained in each endogenous construct and serving as an indicator of the model's explanatory capacity (Hair *et al.*, 2021). The R^2 values for these three endogenous variables are respectively SA (0.342), OA (0.443), and PI (0.424).

The model's predictive power signifies its capacity to predict new observations out-of-sample (Hair *et al.*, 2021). To assess the predictive power of the structural model, the

PLS$_{predict}$ procedure with k = 10 folds and 10 repetitions was employed. The assessment of prediction errors should focus on the model's key endogenous construct (Hair *et al.*, 2021), therefore, our attention centers on PI and its associated indicators. Examination of the prediction error distributions reveals their relative symmetry, justifying the use of the root-mean-square error (RMSE) for the assessment (Hair *et al.*, 2021). Results show that three out of four PI indicators in the PLS path model exhibit lower RMSE values compared to the Linear Modeling (LM) model benchmark: PI_2 (PLS, 1.615; LM, 1.621), PI_3 (PLS, 1.668; LM, 1.678), and PI_4 (PLS, 1.585; LM, 1.594). Therefore, this structural model exhibits a medium-to-high out-of-sample predictive power (Hair *et al.*, 2021).

Hypotheses testing results
Results reveal that eight out of nine proposed hypotheses are supported (see Figure 2). The significance and relevance of path coefficients were assessed using the bootstrapping (10,000 samples) procedure. All path coefficients in hypotheses, except for H6 (EA → OA), are significant, as the value zero lies outside the 95% confidence interval (Hair *et al.*, 2021).

Table 3 presents the detailed results of the hypotheses testing. Regarding the relevance of path coefficients, SA (0.58, $p < 0.001$, H2) exhibits a stronger influence on PI compared to OA (0.13, $p < 0.05$, H1). OA is most impacted by ADA (0.33, $p < 0.001$, H4), followed by ADO (0.30, $p < 0.001$, H5) and SA (0.17, $p < 0.05$, H3). SA is most influenced by ADO (0.35, $p < 0.001$, H8), followed by EA (0.25, $p < 0.001$, H9) and ADA (0.17, $p < 0.05$, H7).

Post hoc mediation analysis
We further conducted mediation analysis by using the bootstrapping (10,000 samples) procedure to examine and confirm the mediating role of OA and SA. Results show that OA mediates the relationship between ADA and PI ($t = 1.99$, $p < 0.05$) and the association between ADO and PI ($t = 1.79$, $p < 0.05$). Notably, SA demonstrates a significant mediating role in three relationships: ADA→SA→PI pathway ($t = 2.27$, $p < 0.05$), ADO→SA→PI pathway ($t = 3.89$, $p < 0.001$), and EA→SA→PI pathway ($t = 4.2$, $p < 0.001$).
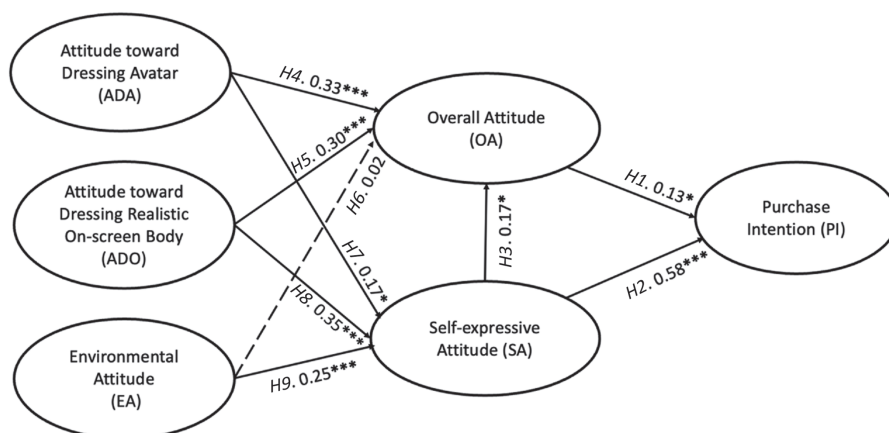
Note(s): *, $p < 0.05$; ***, $p < 0.001$; numbers, path coefficients; solid lines, supported hypotheses; dash line, rejected hypothesis
Source(s): Authors' own work

Figure 2.
Hypotheses testing
result overview

Hypotheses		O-Est	B-mean	B-SD	T-stat	2.50% CI	97.50% CI	Result
H1	OA → PI	0.130	0.129	0.059	2.215*	0.017	0.247	Supported
H2	SA → PI	0.581	0.581	0.054	10.681***	0.469	0.682	Supported
H3	SA → OA	0.174	0.175	0.068	2.560*	0.043	0.306	Supported
H4	ADA → OA	0.327	0.324	0.071	4.627***	0.182	0.459	Supported
H5	ADO → OA	0.302	0.302	0.074	4.079***	0.159	0.449	Supported
H6	EA → OA	0.021	0.023	0.056	0.387	−0.088	0.130	Not Supported
H7	ADA → SA	0.169	0.167	0.074	2.298*	0.021	0.311	Supported
H8	ADO → SA	0.346	0.347	0.076	4.555***	0.199	0.497	Supported
H9	EA → SA	0.254	0.257	0.059	4.313***	0.140	0.371	Supported

Table 3.
Results of hypotheses testing

Note(s): O-Est, original values of the path coefficients; B-Mean, Bootstrap mean; B-SD, Bootstrap standard deviation; *T*-stat, *t*-values; CI, Confidence Interval; ***, *p*-value <0.001; **, *p*-value <0.01, *, *p*-value <0.05
Source(s): Authors' own work

Discussions and implications

Discussions on testing results

This study confirms the positive relationship between the overall evaluative attitude and purchase intention in the context of consumer acceptance of digital-only fashion. This finding is consistent with observations in both physical and digital contexts, including digital fashion consumption (Park *et al.*, 2015; Spears & Singh, 2004; Zhang *et al.*, 2023). Our testing results highlight the substantial influence of the self-expressive attitude on the intention to purchase digital-only fashion. This suggests that consumers' adoption of digital-only fashion largely hinges on the extent to which their self-expression including social-adjustive and value-expressive needs can be satisfied. This outcome resonates with existing literature indicating that self-expression is the primary motivator for consumers to purchase fashion apparel whether in in physical or digital formats (Baek *et al.*, 2022; Casciani *et al.*, 2022; Schauman *et al.*, 2023).

Furthermore, this study reveals that three functional attitudes, including attitude toward adorning avatars, attitude toward dressing realistic on-screen bodies, and self-expressive attitude, collectively contribute to the formation of the overall evaluative attitude toward digital-only fashion. These results validate the propositions drawn from the Functional Theory of Attitudes within the emerging digital-only fashion domain, particularly consistent with the insight that consumer-perceived functions of attitudinal objects bridge the gap between specific attitudes and the overall evaluation in a given context (Cho *et al.*, 2022; Katz, 1960; Zhang *et al.*, 2023). Testing results also unveil that consumers' overall assessment of digital-only fashion is most impacted by their attitudes toward dressing avatars, followed by their evaluations of styling on-screen bodies. These findings may be attributed to consumers' greater familiarity with dressing avatars, which has a longer history compared to dressing realistic on-screen bodies (Chan *et al.*, 2024; Schauman *et al.*, 2023). Moreover, results indicate that consumers' environmental attitude toward digital-only fashion does not have a significant impact on their overall attitude toward it. This observation may be explained by consumers placing greater emphasis on fashionability rather than the environmental advantages of digital-only fashion.

Our study demonstrates that self-expressive attitude toward digital-only fashion is significantly influenced by three other functional attitudes: attitude toward adorning avatars, attitude toward dressing on-screen bodies, and environmental attitude. These findings highlight that while consumers may have varied motivations for how to use digital-only fashion products, their primary focus and ultimate goal lie in pursuing self-expression. These are consistent with previous research indicating that consumers value and prioritize the self-expression aspect of digital fashion (Baek *et al.*, 2022; Casciani *et al.*, 2022; Patruti *et al.*, 2023).

Mediation analysis results indicate that the overall evaluative attitude toward digital-only fashion serves as a mediator between the two functional attitudes (attitude toward adorning avatars and attitude toward dressing realistic on-screen bodies) and purchase intention. These discoveries underscore that embellishing avatars and donning realistic on-screen bodies are distinct yet complementary aspects of digital-only fashion consumption. They play crucial roles in shaping consumers' overall assessments of digital-only fashion and consequently influencing their purchase intentions. These findings align with recent research conducted in the context of digital fashion including virtual fashion items that can either be physically produced or exist solely in virtual environments (Zhang *et al.*, 2023). Furthermore, the self-expressive attitude toward digital-only fashion mediates the connections between three other functional attitudes and purchase intention. These results further emphasize the prominence of consumers' motivation and pursuit of self-expression in digital-only fashion consumption. Particularly, the mediation effect of self-expressive attitude on the relationship between environmental attitude and purchase intention is the most robust. This suggests that while consumers' positive environmental beliefs regarding digital-only fashion may be not directly translated into purchase behavior, consumers are concerned about how effectively digital-only fashion enables the expression of these beliefs.

Theoretical and managerial implications
This study serves as a seminal piece in the field of digital-only fashion. We distinguish digital-only fashion from general digital fashion, emphasizing that it exists solely in digital environments without any physical production or consumption. Our research identifies four key applications of digital-only fashion as end-products: adorning avatars, dressing people's realistic on-screen bodies, addressing environmental concerns associated with physical fashion, and enabling self-expression. We also clarified the difference between avatars and on-screen bodies within the context of wearing digital-only fashion. These set our research apart from previous studies on general digital fashion. Our study provides insights for future research on digital-only fashion, particularly how digital-only fashion consumption can effectively address environmental issues tied to physical fashion.

This study introduces an innovative application of the Functional Theory of Attitudes to the emerging field of digital-only fashion. Utilizing this theoretical framework, we identified four functional attitudes that consumers hold toward digital-only fashion and the underlying motivations associated with each attitude. Our findings confirm the importance of both the overall evaluative attitude and these functional attitudes in shaping consumer acceptance of digital-only fashion, particularly validating the predictive power of the identified functional attitudes. These results are consistent with existing research using the Functional Theory of Attitudes that emphasizes the role of motivational functions in influencing consumer attitudes and responses (Cho *et al.*, 2022; Grewal *et al.*, 2004; Katz, 1960; Song, Meng, Chang, Li, & Tan, 2021). Furthermore, our results reveal a dynamic hierarchical framework of attitudes in digital-only fashion consumption, in line with previous research demonstrating the coexistence and hierarchical relationships of multi-dimensional attitudes regarding the digital fashion context (Zhang *et al.*, 2023). These insights advance our understanding of both the Functional Theory of Attitudes and digital-only fashion consumption, contributing to the development of knowledge in attitude theories and fashion studies.

This study offers valuable practical insights for the entire digital-only fashion value chain and provides important guidance for key stakeholders involved in this domain. Specifically, in the design and production phases, designers could catch the opportunity to collaborate with consumers in developing highly customized digital-only fashion items that reflect individual personalities, fashion styles, and symbolic representations. This collaborative process allows consumers to gain a thorough understanding of the aesthetic value of digital-

only fashion and its various functional aspects such as value expression, social adjustment, hedonic, and utilitarian functions.

During the marketing and communication stage, marketers of digital-only fashion should prioritize delivering personalized messages to individual customers and assisting them in selecting suitable means of self-expression through digital-only fashion items. Marketing strategies may involve leveraging influencers and user-generated content to resonate with like-minded consumers. Establishing a digital brand ambassador who embodies the brand's image, strong personality, and unique fashion preferences might capture consumers' attention and foster their engagement. Furthermore, highlighting the environmental benefits of digital-only fashion and targeting consumers with a high environmental consciousness are essential strategies.

To cater to consumers' varied needs and preferences, practitioners should provide a comprehensive digital-only fashion product line, including dressing both avatars and on-screen bodies, along with enhanced services during the consumption stage. Collaboration with the gaming industry and other Metaverse-related platforms can yield immersive and visually appealing digital-only fashion items for dressing avatars, enhancing users' hedonic experiences. Many fashion brands have already embarked on such partnerships, resulting in significant achievements (Casciani *et al.*, 2022; Chan *et al.*, 2024; Mogaji *et al.*, 2023). Fashion brands could leverage advanced technologies, such as AR-based fashion filters and Generative AI-powered image generation systems, to facilitate consumers dressing their realistic on-screen bodies, bolstering consumers' real-world identities and meeting their diverse social needs. Moreover, fashion brands can consider curating avant-garde digital-only fashion editorial pieces, encompassing both photography and videography, to showcase consumers' uniqueness, fashion tastes, and vision. Sharing such editorials on social media platforms may generate significant attention, foster viral spread, and spark fashion trends.

Exploring the resale market of digital-only fashion has the potential to foster a circular digital business model, simultaneously enhancing environmental sustainability and economic feasibility. Importantly, this suggestion benefits both producers and consumers of digital-only fashion. To achieve this, practitioners could use Blockchain-based NTF technologies or other approaches like digital passports for physical products to track comprehensive information, including design copyrights, product features, ownership, and transactions, ensuring transparency and security (Schauman *et al.*, 2023).

Our study identified self-expression and environmental protection as key functional drivers for consumers selecting and utilizing digital-only fashion. Consequently, industry professionals in this field should focus on creating and collectively promoting content highlighting these two aspects, capturing public interest while encouraging a shift from physical to digital-only consumption. Such efforts may foster the public's more positive attitudes and increased purchase intentions regarding digital-only fashion. In turn, this shift could contribute to improving the overall quality of life by mitigating the environmental impact of the textile and apparel industry. In addition, policymakers should work closely with relevant stakeholders to establish a legal, robust, and sustainable environment that supports the growth of digital-only fashion.

Conclusion, limitations, and future research directions

Drawing from the Functional Theory of Attitudes, our study highlights that consumers' acceptance of digital-only fashion is influenced by both their overall evaluations and distinctive functional attitudes. Self-expression emerges as a crucial factor within digital-only fashion consumption. The practices of adorning avatars and dressing realistic on-screen bodies are distinct yet complementary aspects of shaping consumers' experiences with

digital-only fashion. Consumers who hold favorable environmental views regarding digital-only fashion prioritize how effectively digital-only fashion enables them to express these environmental values.

This research contributes to existing knowledge and offers practical insights for practitioners in the digital-only fashion realm. However, two key limitations of our study existed. First, the study utilized a correlational research strategy via an online survey, which limits the ability to investigate causal relationships among the key factors. Future research could employ experimental designs to explore these influencing factors and establish causality in digital-only fashion consumption. Furthermore, incorporating both quantitative and qualitative methods could offer a more comprehensive understanding of digital-only fashion and enhance generalizability. Second, our sample exhibited an imbalance in demographics, with a bias toward females and young individuals, potentially affecting the generalizability of results. Future research should aim for a more representative sample.

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