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Trend of owning the intangible: the mediating role of psychological ownership in cultural consumption within blockchain ecosystems

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In the digital age, driven by technological advancements, blockchain technology has transformed arts and culture, particularly in heritage preservation, collections, and copyright management. While existing research extensively examines blockchain's technical aspects and its impact on industries and society, there remains a significant gap in understanding its influence on consumer behavior, especially from a psychological perspective. This study investigates how blockchain influences psychological ownership and cultural identity in cultural consumption, using the cognition–affect–conation (CAC) model and structural equation modeling with a sample of 1153 blockchain platform users. The study explores how blockchain affects purchase intentions for cultural collectibles through factors such as cultural knowledge, authenticity, innovation, traceability, and scarcity, emphasizing the crucial roles of traceability and cultural authenticity in shaping consumer behavior. Notably, both psychological ownership and cultural identity mediate purchase intentions, but they play distinct roles in the blockchain-driven pathways leading to digital collectible purchases. This finding contributes to existing research by revealing a novel aspect of how technologically innovative products mediate purchase intentions. It reflects the emerging role of blockchain technology in cultural and artistic consumption, as well as its transformative impact on consumer psychology and behavior.

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Introduction

Technological advancements have long driven societal transformation, reshaping consumption patterns, behaviors, and economic structures. Although blockchain technology is not entirely new, it has become a transformative force in the cultural sector, particularly in heritage preservation, intellectual property, and digital rights management (Vacchio and Bifulco, 2022). By enabling secure, verifiable ownership of digital assets, blockchain has fundamentally transformed cultural consumption, redefined the relationship between individuals and art, and expanded ownership possibilities in virtual spaces (Chohan and Paschen, 2023). While extensive research has examined blockchain's economic, technological, and artistic dimensions (Dempsey et al. 2022; Whitaker, 2019; Tang et al. 2022a), significant gaps remain in understanding its psychological and cultural impact on consumer behavior. Addressing this gap is crucial as blockchain continues to reshape consumer interactions with cultural products in an increasingly digital world.

While recent studies have started examining the psychological foundations of blockchain adoption, especially its link to psychological ownership (Fritze et al. 2020; Morewedge et al. 2021), research remains limited on how psychological ownership shapes consumer engagement with blockchain-based assets, particularly in cultural consumption. Psychological ownership refers to the deep sense of possession and attachment individuals feel toward an object (Pierce et al. 2001). It extends beyond legal ownership to encompass a cognitive–affective connection (Morewedge et al. 2021; Shu and Peck, 2011). In blockchain contexts, where ownership is abstract and digital, psychological ownership becomes even more salient, shaping consumers' perceptions of value and emotional attachment to digital assets.

The psychological dynamics of consumer behavior toward blockchain-based cultural assets remain underexplored, limiting our understanding of how consumers perceive and engage with virtual art and collectibles. This lack of insight poses a challenge for developers and marketers aiming to effectively engage with consumers in this emerging market, hindering the development of strategies to foster deeper consumer engagement with blockchain products. This study addresses this gap by investigating how psychological ownership and cultural identity influence the consumption of blockchain-based cultural assets, particularly digital collectibles. Employing the cognition–affect–conation (CAC) model, we examine how psychological ownership and cultural identity shape consumers' purchase intentions and the factors influencing this relationship. Specifically, this study addresses the following research questions:

RQ1: How does psychological ownership influence consumer intentions to purchase cultural blockchain assets, and what role does cultural identity play in this dynamic?

RQ2: Which attributes of cultural blockchain assets most effectively foster psychological ownership among consumers, and how do these attributes interact with cultural identity?

This study makes three key contributions. First, it pioneers empirical research on the cultural and psychological dimensions of blockchain consumption, examining how blockchain-based assets shape consumer behavior in digital art and collectibles. Second, this study extends the CAC model by integrating cultural knowledge, authenticity, traceability, and scarcity alongside the traditional emphasis on perceived value. This expanded framework offers deeper insights into the psychological and cultural factors driving consumer decisions in the blockchain space. Third, this research incorporates "independent self-construal" as a variable to refine the analysis of individual decision-making, particularly regarding consumer attachment to cultural assets. By identifying key attributes that foster psychological ownership, this study offers actionable insights for developers and marketers

aiming to design culturally resonant products that enhance consumer engagement. In summary, this research advances theoretical knowledge on the psychological effects of blockchain in cultural consumption while providing practical strategies for positioning blockchain-based cultural products in a dynamic market. By examining the interaction between psychological ownership and cultural identity, this study enhances our understanding of consumer behavior in the digital age and identifies new directions for future research in technology, culture, and consumer psychology.

Literature review and theoretical framework

Blockchain and cultural consumption. Blockchain technology has become a transformative force in cultural consumption, extending beyond its financial origins to redefine digital ownership and interaction (Nadini et al. 2021). Its decentralized and transparent mechanisms have reshaped trust and value creation in digital ecosystems, establishing blockchain as a powerful tool for cultural engagement (Król and Zdonek, 2023). The rise of crypto collectibles, leveraging these attributes, represents a major shift from cryptocurrency origins by introducing unique, authenticated digital assets tailored to diverse consumer preferences (Mazieri et al. 2022; Bertacchini et al. 2012).

Blockchain influences consumer behavior through its unique attributes, including immutability, traceability, and decentralization. These attributes not only enhance the economic value of cultural assets but also redefine consumer engagement (Chen et al. 2024). Unlike traditional cultural products, blockchain-based assets foster emotional connections by allowing consumers to authenticate ownership and personalize their engagement with cultural content. For example, traceability and provenance assure the authenticity of cultural artifacts, which is essential for building trust and strengthening consumer attachment (Valeonti et al. 2021). Blockchain further amplifies this emotional engagement by facilitating community-building, where collectors and enthusiasts create shared spaces to exchange and reinforce cultural identities and values (Albayati et al. 2023; Zheng and Bensebaa, 2022).

The rise of crypto collectibles marks a significant shift in cultural consumption by connecting cultural creators and audiences. Blockchain technology's ability to generate unique digital artifacts has created a new paradigm of psychological ownership, where consumers perceive these digital assets as extensions of their identity (Pierce et al. 2001; Shu and Peck, 2011). This ownership extends beyond possession, embedding emotional and symbolic significance into the consumer experience (Belk, 1988). By enabling personalized and meaningful interactions with cultural goods, blockchain shapes consumer attitudes, lifestyles, and cultural identities in ways that traditional engagement cannot achieve (Chen et al. 2024; Albayati et al. 2023). Furthermore, blockchain's ability to verify authenticity and provenance strengthens trust and emotional attachment, embedding these assets more deeply into consumers' sense of self and cultural heritage (Nadini et al. 2021; Valeonti et al. 2021).

In addition, blockchain's cultural impact extends beyond market dynamics to address broader societal needs, including the preservation of marginalized narratives and the revitalization of cultural heritage. Leveraging its decentralized infrastructure, blockchain enables underrepresented cultures to share their stories and traditions with global audiences, ensuring these narratives are both preserved and celebrated (Zheng et al. 2018; Król and Zdonek, 2023). This interaction strengthens cultural identity by fostering a sense of belonging and pride among consumers engaging with these narratives through digital platforms (Wang, 2022; Tang et al. 2022b; Wang and Lau,

2023). For instance, digital cultural assets can help re-establish connections to heritage, particularly for younger, digitally native generations who might otherwise feel detached from traditional cultural practices (Valeonti et al. 2021; Bertacchini et al. 2012).

Cognition–affect–conation (CAC) model. The cognition–affect–conation (CAC) model, proposed by Mischel and Shoda (1995), offers a comprehensive framework for understanding psychological processes in decision-making. The model posits that cognition, affect, and conation operate sequentially and interdependently, where cognitive appraisals of a stimulus elicit affective responses, which in turn drive conative behaviors (Neyrinck et al. 2006). This framework has been extensively applied in consumer behavior research to explain how product attributes trigger psychological responses and shape decision-making outcomes (Park and Joyner Armstrong, 2019).

This study employs the CAC model to examine the psychological mechanisms by which the unique attributes of blockchain-based cultural products influence consumer behavior. Specifically, this study explores how cognitive perceptions of blockchain assets—such as perceived traceability, scarcity, innovation, cultural authenticity, and cultural knowledge—elicit affective responses, including psychological ownership and cultural identity, which subsequently shape behavioral intentions, such as purchasing cultural crypto collectibles.

Cognition refers to the mental processes by which consumers assess product features. In cultural blockchain assets, attributes like traceability and innovation are key in shaping consumers' cognitive appraisals. These attributes form the basis for consumers to evaluate a product's uniqueness, authenticity, and cultural significance (Rogers et al. 2019; Venkatesh and Davis, 2000). For example, perceived cultural knowledge enables consumers to engage with the asset's historical and cultural context, deepening their understanding of its origins and significance (Chhabra, 2005; Kolar and Zabkar, 2010). Similarly, perceived scarcity enhances a product's value by highlighting its exclusivity and uniqueness, leveraging the psychological effects of limited availability to heighten desirability (Lynn, 1991).

Cognitive appraisals of these attributes elicit affective responses, conceptualized in this study as psychological ownership and cultural identity. Psychological ownership describes the sense of attachment and control consumers feel toward a product, even without legal ownership (Pierce and Jussila, 2011). Blockchain technology's ability to ensure verifiable ownership and provenance strengthens this emotional connection, fostering a deep sense of personal investment in the product (He et al. 2022a). On the other hand, cultural identity captures the extent to which consumers perceive the product as aligned with their cultural heritage and self-concept. This alignment is especially salient in cultural blockchain assets, where attributes such as cultural authenticity and knowledge evoke feelings of pride, belonging, and loyalty to one's cultural roots (Holliday, 2010; Williams and Liu, 2023).

Finally, these affective responses shape conative behaviors, particularly consumers' intentions to purchase cultural crypto collectibles. Psychological ownership increases a product's perceived value by instilling a sense of exclusivity and personal significance, fostering stronger consumer engagement and loyalty (Pierce et al. 2003; Shu and Peck, 2011). Similarly, cultural identity drives consumers to engage with products that align with their cultural values, serving as extensions of their self-concept and reinforcing feelings of belonging and pride (Chhabra, 2005; Usborne and de la Sablonnière, 2014). The conative stage of the CAC model illustrates how emotional connections translate into actionable behaviors, underscoring the importance of cognition,

affect, and conation in driving consumer engagement with blockchain-based cultural products (Neyrinck et al. 2006; Mischel and Shoda, 1995).

Hypothesis development

Perceived traceability. Perceived traceability, facilitated by blockchain technology, plays a crucial role in building trust and verifying the authenticity of digital and cultural assets. Blockchain's capacity to maintain immutable records of provenance and transaction history guarantees the authenticity of artworks, particularly in the metaverse, thereby shaping consumers' purchase intentions (Menozzi et al. 2015). Traceability enhances psychological ownership by providing consumers with a stronger sense of control and connection to the digital artifact. Psychological ownership emerges when individuals perceive an object as uniquely theirs. Traceability reinforces this connection by validating the asset's legitimacy and exclusivity (Shu and Peck, 2011; Kamleitner and Feuchtl, 2015).

Additionally, research has indicated that perceived traceability can increase the cultural value of blockchain assets by promoting transparency and enhancing understanding of the cultural narratives embedded in these products. For example, when detailed information about an asset's origin and historical significance is available, consumers are more likely to appreciate its cultural connotations, even in contexts where public awareness of a particular culture is limited (Huang et al. 2009; Mishra and Malhotra, 2021). This appreciation fosters deeper engagement with blockchain assets, cultivating positive attitudes toward the cultural identity represented in these digital artifacts. Therefore, we hypothesize that:

H1: Perceived traceability positively influences psychological ownership.

H2: Perceived traceability positively influences cultural identity.

Perceived scarcity. Perceived scarcity, an inherent characteristic of blockchain-based crypto collectibles, plays a crucial role in shaping their appeal and value as digital cultural assets. The uniqueness and irreplicability of each crypto collectible reinforce the exclusivity of digital collections while imbuing them with a sense of rarity that enhances consumer desirability (Wu et al. 2012; Valeonti et al. 2021). Perceived scarcity enhances psychological ownership by fostering a personal connection, as individuals tend to place higher value on scarce items due to their limited availability and uniqueness (Shu and Peck, 2011; Lynn, 1991).

Psychologically, scarce items often symbolize distinction and exclusivity, strengthening consumers' self-concept and self-image (Belk, 1988). Owning a scarce crypto collectible enables individuals to signal their identity and social status, reinforcing their cultural identity by connecting them to the cultural meanings embedded in these digital artifacts (Gupta, 2023; Morewedge et al. 2021). This aligns with symbolic consumption theories, which propose that scarce items act as cultural markers, strengthening the connection between individuals and the cultural narratives embedded in the assets they own (McCracken, 1986). These dynamics illustrate how scarcity serves as a key driver in the consumption of cultural crypto collectibles (Chen et al. 2024), fostering deeper emotional and cultural engagement with digital assets. Therefore, we hypothesize that:

H3: Perceived scarcity positively influences psychological ownership.

H4: Perceived scarcity positively influences cultural identity.

Perceived innovation. Perceived innovation is a key factor driving the adoption of new technologies and consumer engagement,

particularly among younger demographics. In cultural crypto collectibles, perceived innovation is essential for enhancing consumer experience (Baker et al. 2022). Integrating advanced multimedia elements, such as 3D models, with blockchain platforms creates an immersive experience that satisfies consumers' psychological desire for novelty and technological engagement. This immersion enhances user experience while fostering emotional involvement by aligning with consumers' desire for innovative and unique content (Venkatesh and Bala, 2008; Rogers et al. 2019).

Beyond its psychological appeal, perceived innovation in cultural crypto collectibles is strengthened by the integration of traditional cultural elements with contemporary digital technologies. This fusion of innovation and tradition produces novel forms of cultural expression that resonate with younger audiences' cultural identities (Hsu and Lin, 2015; Tang et al. 2022b). By presenting cultural artifacts through innovative digital media, these collectibles bridge tradition and modernity, offering new perspectives on cultural narratives in the digital era (Han and Hawken, 2018). This process supports cultural heritage preservation while enhancing cultural identification, fostering a deeper understanding of cultural values among digital natives (Fırat and Dholakia, 2017). Therefore, it is hypothesized that:

H5: Perceived innovation positively influences psychological ownership.

H6: Perceived innovation positively influences cultural identity.

Perceived cultural authenticity. Authenticity is the extent to which a cultural product is perceived as true to its origins, traditions, or cultural context, significantly influencing its appeal to consumers (Beverland, 2006). Perceived cultural authenticity is fundamental to consumer engagement with cultural products, particularly in the blockchain ecosystem, where it preserves historical integrity and enhances the emotional resonance of cultural content (Su, 2021). Cultural authenticity has long been associated with psychological connection in various contexts, including tourism and heritage studies (Kolar and Zabkar, 2010). Similarly, in the blockchain space, authenticity strengthens psychological ownership by allowing consumers to develop a deeper attachment to cultural products. When consumers perceive cultural products as authentic, they are more likely to develop a personal connection and take pride in ownership, as these products reflect their values and cultural identity (Kim and Kim, 2020; Pierce et al. 2001). Blockchain's ability to preserve and convey authentic characteristics reinforces this emotional bond.

Moreover, perceived cultural authenticity is crucial in shaping cultural identity by anchoring consumers to the values and traditions embedded in cultural blockchain assets. Authentic cultural products act as a medium for individuals to connect with and express their cultural heritage, fostering a sense of belonging and identity (Chhabra, 2005). Blockchain's ability to present culture as "living" and "active" further strengthens this connection, enabling consumers to experience and engage with cultural narratives dynamically and immersively (Santagata et al. 2011). Based on these insights, we hypothesize the following:

H7: Perceived cultural authenticity positively influences psychological ownership.

H8: Perceived cultural authenticity positively influences cultural identity.

Perceived cultural knowledge. Perceived cultural knowledge encompasses a consumer's understanding of an artifact's historical context, the artist's background, and the intricacies of its craftsmanship. This knowledge is crucial in shaping consumer engagement with virtual arts and cultural crypto collectibles. Acquiring cultural knowledge enhances consumers' appreciation of the artifact while fulfilling their desire for a deeper connection to cultural content, thereby fostering psychological ownership. Psychological ownership emerges when individuals perceive an object as personally meaningful or integral to their identity, even in the absence of legal ownership (Pierce et al. 2001). In cultural blockchain assets, access to detailed cultural knowledge reinforces this connection by increasing the perceived value and significance of the artifact (Peck et al. 2021; Holdack et al. 2022).

Cultural knowledge further shapes cultural identity by providing individuals with a framework to relate to and integrate cultural elements into their self-concept. Familiarity with and assimilation of cultural narratives enable consumers to view these artifacts as symbols of heritage and belonging, reinforcing their cultural identity (Chhabra, 2005; Mishra and Malhotra, 2021). This dynamic is particularly relevant to cultural blockchain assets, as these virtual artifacts often embody unique cultural traditions and histories. Associating with the values and narratives embedded in these assets fosters a deeper sense of belonging and commitment to the cultural product. Based on these insights, we hypothesize the following:

H9: Perceived cultural knowledge positively influences psychological ownership.

H10: Perceived cultural knowledge positively influences cultural identity.

Psychological ownership and cultural identity as mediators. Psychological ownership and cultural identity serve as key mediators in explaining consumer behavior toward cultural blockchain assets. These mediators independently and interactively influence the relationship between the perceived benefits of blockchain assets and consumers' engagement intentions.

Psychological ownership as a mediator. Psychological ownership, as defined by Shu and Peck (2011), extends beyond emotional attachment to encompass a profound sense of personal connection and control over an object. In blockchain-based cultural artifacts, this concept is particularly salient due to the unique affordances of virtual assets. Blockchain technology allows consumers to interact with digital cultural artifacts in novel ways—through interactivity, personalization, and ownership verification—fostering exclusivity and deeper attachment (Morewedge et al. 2021; Liang et al. 2024). These characteristics establish a new paradigm for value perception and ownership in the digital marketplace.

The personalization and permanence of blockchain assets enhance consumers' sense of control and attachment, reinforcing psychological ownership. This attachment shapes purchase intentions by increasing the perceived value of the asset. For example, verifying the provenance and uniqueness of a cultural crypto collectible enhances its desirability and perceived significance, motivating consumers to engage with such assets (Thomson et al. 2005; Kim et al. 2024).

Cultural identity as a mediator. Cultural identity represents a deep, multi-dimensional connection between individuals and their cultural heritage, integrating cognitive, emotional, and social dimensions (Holliday, 2010; Usborne and de la Sablonnière, 2014). In cultural blockchain consumption, cultural identity acts as a mediator, driving consumers toward products that resonate with their heritage, values, and traditions. The alignment between blockchain assets' narratives and aesthetics and a consumer's cultural identity fosters a sense of belonging and pride (McGowan et al. 2017; McIntosh and Prentice, 1999). Consumers with strong cultural ties gravitate toward digital assets that reflect their cultural narratives and aesthetics. This cultural proximity enhances

the perceived value and appeal of these assets, reinforcing cultural identity and driving purchase intentions. Blockchain technology strengthens this connection by preserving and showcasing the heritage embedded in these virtual artifacts, making them especially appealing to culturally affiliated consumers.

Parallel mediation framework. The proposed parallel mediation framework highlights the interrelated and culturally contextualized effects of psychological ownership and cultural identity on consumer behavior. Psychological ownership influences consumer behavior through a sense of control, attachment, and exclusivity, whereas cultural identity operates by aligning cultural values and narratives with the consumer's self-concept. Together, these mediators offer a comprehensive framework for understanding consumer engagement with cultural crypto collectibles. This framework underscores the dual pathways through which the perceived benefits of blockchain assets—traceability, scarcity, innovation, cultural authenticity, and cultural knowledge—shape purchase intentions:

H11: Psychological ownership mediates the relationship between perceived benefits of cultural blockchain assets—(a) perceived traceability, (b) perceived scarcity, (c) perceived innovation, (d) perceived cultural authenticity, and (e) perceived cultural knowledge—and purchase intentions.

H12: Cultural identity mediates the relationship between perceived benefits of cultural blockchain assets—(a) perceived traceability, (b) perceived scarcity, (c) perceived innovation, (d) perceived cultural authenticity, and (e) perceived cultural knowledge—and purchase intentions.

Independent self-construal as moderator. Self-construal, introduced by Markus and Kitayama (2014), describes how individuals perceive their relationship with the social environment and interpersonal dynamics. Independent self-construal emphasizes an autonomous and distinct self-concept, prioritizing personal beliefs, values, and self-reliance over external norms and group affiliations (Singelis, 1994). This perspective significantly influences how individuals engage with cultural crypto collectibles, particularly regarding their perceptions of cultural knowledge and authenticity, which are inherently subjective and shaped by personal value judgments rather than objective evaluation criteria.

Consumers with a strong independent self-construal shape their cultural identity primarily through internalized personal values and beliefs rather than external societal expectations. This individualistic orientation shapes their engagement with cultural blockchain assets, where attributes like perceived cultural knowledge and authenticity are particularly salient. Cultural crypto collectibles that offer detailed, accurate cultural knowledge or authentically represent cultural heritage resonate more deeply with these consumers, as such attributes align with their intrinsic values and identity formation processes (Chen et al. 2022; Kwan et al. 1997).

Independent self-construal moderates the relationship between perceived cultural authenticity, perceived cultural knowledge, and cultural identity by heightening the relevance of these attributes in identity construction. For individuals with high independent self-construal, culturally authentic and knowledge-rich blockchain assets function as tools for personal expression and self-definition, reinforcing their cultural identity. These consumers are more likely to derive a sense of connection and pride from cultural crypto collectibles that reflect their internalized cultural values and beliefs, as such attributes closely align with their personal frameworks for identity formation (Gudykunst et al. 1988). Conversely, individuals with lower independent self-construal may place less emphasis on perceived cultural

authenticity and knowledge in shaping their cultural identity, as their self-concept is more intertwined with external norms and group affiliations. Thus, the moderating effect of independent self-construal underscores the interplay between individualistic values and cultural perceptions in blockchain-based cultural products. Accordingly, we propose the following hypotheses:

H13: Independent self-construal positively moderates the relationship between perceived cultural authenticity and cultural identity.

H14: Independent self-construal positively moderates the relationship between perceived cultural knowledge and cultural identity.

The conceptual model illustrating these relationships is presented in Fig. 1.

Methods
This study employed the CB-SEM approach, collecting primary data from blockchain platform users to assess how cultural and technical features influence cultural identity and psychological ownership, while also examining their impact on purchase intention.

Sample and data collection. We collected data from November 24, 2022, to December 26, 2023. Considering the diversity of cultural crypto collectibles and their varying psychological impacts, we focused on intangible cultural heritage (ICH) digital collectibles, a prominent category of blockchain assets in China. Statistics show that 44.11% of cultural heritage assets, including both physical relics and intangible cultural heritage, have been tokenized in China, with 67.82% of these tokenized assets considered highly valuable (People's Daily, 2022).

This study examines the Chinese blockchain ecosystem, focusing on how the market emphasizes the cultural over the financial aspects of NFTs. In China, NFTs are primarily valued for their cultural and artistic significance, with transactions typically conducted in fiat currency (RMB), highlighting the cultural engagement aspect rather than financial speculation (He et al. 2022b). This context allows unique cultural assets to be transformed into digital collectibles, reinforcing their cultural value (Kampakis, 2022). The structure of the Chinese NFT market, supported by permissioned blockchain networks that ensure transparency and verifiable authenticity, is particularly conducive to exploring psychological ownership and cultural identity, reinforcing the market's cultural focus. By examining this unique environment, the study offers insights into how blockchain technology can be leveraged to promote cultural engagement, providing implications for other markets seeking to integrate culture into the digital asset space.

We established inclusion criteria for survey respondents, requiring prior experience in browsing ICH crypto collectibles. To ensure this criterion was met, we included a screening question in the questionnaire: "Have you ever browsed intangible cultural heritage crypto collectibles on domestic blockchain platforms?" Only respondents who answered "yes" to this question were permitted to proceed with the survey. To enhance contextual clarity for participants, the survey featured a first-person perspective video demonstrating interaction with an ICH NFT. In the video, the user rotated, zoomed in on, and moved the 3D model. The video also depicted a scrolling action to display detailed information about the NFT artwork and its creator. After viewing this video, participants were able to answer the survey questions.

Given the relatively small population of crypto collectible consumers in China, we employed convenience sampling, supplemented by snowball sampling to reach additional eligible
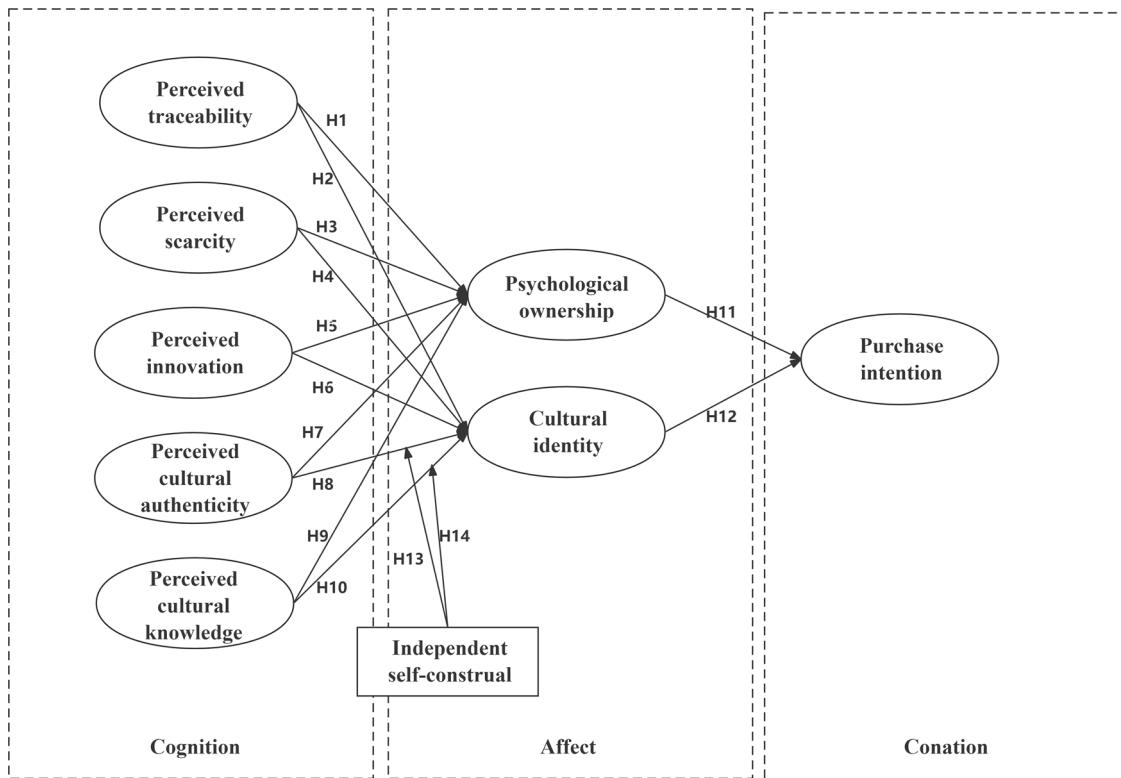
Fig. 1 Conceptual framework.

Table 1 Demographic information.				
Categories	**Frequency**	**Percentage**	**_M_**	**SD**
Gender				
1. Female	474	41.1	1.41	0.492
2. Male	679	58.9		
Age range				
1. 18–25 years old	460	39.9	2.01	1.009
2. 26–35 years old	340	29.5		
3. 36–45 years old	233	20.2		
4. 46–55 years old	120	10.4		
Educational level				
1. Junior high school completed	95	8.2	2.64	0.752
2. High school completed	319	27.7		
3. Bachelor degree completed	640	55.5		
4. Master degree and above completed	99	8.6		
$N = 1153$.				

participants. We disseminated a digital survey link through blockchain platform user groups, social media communities, and online forums related to NFTs and digital collectibles. Potential participants were informed of the study's academic purpose and its significance in advancing research on consumer behavior and cultural engagement with blockchain-based products, particularly ICH digital collectibles. Participation was entirely voluntary, and respondents were assured of the anonymity and confidentiality of their responses. To encourage participation, we highlighted the importance of their insights in enhancing the understanding of emerging trends in digital cultural consumption. A pilot study with 100 respondents was conducted to assess the reliability of the measurement items using Cronbach's alpha.

To ensure the robustness of our analysis, we referred to similar studies on NFT consumption from a cultural perspective and included gender, age, and education level as control variables and demographic factors (Yilmaz et al. 2023; Koles et al. 2024; Antsipava et al. 2024). After removing questionnaires that did not meet the criteria or failed the attention check, a total of 1153 usable responses were used to analyze the data. Of these, 58.9% were male, 39.9% were between 18 and 25 years old, and 55.5% completed their bachelor's degree. Respondents' profiles are presented in Table 1.

Instrument. To test our hypotheses, we developed a questionnaire that included 14 questions divided into two parts, with the first part consisting of questions related to the demographic profiles of the respondents and the second part consisting of measurement items of our nine constructs. Some of the measurement items were adapted from existing literature originally written in Chinese. To ensure the accuracy and cultural relevance of these items, we followed a back-translation procedure. The original Chinese items were first translated into English by a bilingual researcher. The English translations were then back-translated into Chinese by a second bilingual researcher, and the original and back-translated versions were compared to confirm that they conveyed the same meaning. Any discrepancies identified during this process were resolved through discussions among the researchers to achieve consensus.

Responses were collected on a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree). For the five dimensions of cognition, the items for perceived cultural knowledge are derived from Xue and Lu, (2020), the items for perceived cultural authenticity are derived from Lu et al. (2015), and the items of perceived innovation are reframed based on the research by Wells et al. (2010). The items for perceived scarcity are derived from Wu et al. (2012), and the items for perceived traceability are derived from Wu et al. (2021). As for mediators,

the items of psychological ownership are derived from Lee and Chen (2011), and the items for ICH cultural identity are derived from Gazis et al. (2010). For the moderator, the items of independent self-construal are derived from Pan and Lv (2013). The dependent variable, purchase intention, was measured by three items from Dodds et al. (1991).

Statistical analysis approach. Statistical analyses were performed in three steps. First, descriptive statistics and confirmatory factor analysis (CFA) were performed to examine the reliability and validity of the measurement model. Second, covariance-based structural equation modeling (CB-SEM) using AMOS 27 was adopted to develop the measurement model and test the base structural model. Finally, PROCESS v 4.1 was used to examine the hypotheses pertaining to mediation and moderation analyses (Hayes, 2018). PROCESS Models 4 and 1 were used for mediation and moderation analyses. As differences in customers' assessments may exist according to their gender, age, and educational level, these variables were included as covariates in the two models. The indirect effects were computed using a bias-corrected using 5000 bootstrapped samples, in which the 95% confidence interval (CI) did not include 0, indicating that the mediation effects were significant. For the moderation analysis, the independent self-construal was conditioned at a high (mean +1 standard deviation) and low (mean −1 standard deviation) level.

Results
Measurement model validation. A two-stage approach was followed to check the reliability and validity of the data. First, we considered reliability and validity (convergent and discriminant) for each reflective construct. All factor loadings were between 0.699 and 0.927 and deemed significant ($p < 0.05$), thus supporting their reliability. Further, Cronbach's alpha values ranged from 0.875 to 0.918, which exceeded the minimum required value of 0.7 (Hair et al. 2014). Next, composite reliability (CR) values ranged from 0.877 to 0.919, which exceeded the critical value of 0.6 (Nunnally and Bernstein, 1994). Based on this, the model constructs were of acceptable and consistent internal reliability. To evaluate validity, we calculated the average variance extracted (AVE). All AVE values were >0.6, which indicated convergent validity. According to Fornell and Larcker (1981), the square root of the AVE for each construct should exceed all correlations of the construct with other reflective latent variables. All AVE values met this requirement, which indicated discriminant validity. Given these results, we did not need to eliminate any items. See Tables 2 and 3 for more details on the measurement model including model fit information.

Both procedural and statistical measures were implemented to mitigate common method bias. To encourage candid responses and reduce common method bias, the participant information page emphasized that there were no right or wrong answers, responses were anonymous, and privacy was protected. The variance inflation factor (VIF) was well below the accepted threshold of 5 (Islam and Muhamad, 2021). VIF values were employed to assess multicollinearity. The results showed that VIF values ranged from 1.025 to 1.302, all below the 5.0 threshold (Hair et al. 2014), confirming that multicollinearity was not a concern. To assess common method bias (CMB), we performed Harman's one-factor test using principal components analysis (PCA), which revealed that a single factor accounted for only 26.532% (<50%) of the total variance, thereby ruling out the risk of common method variance (Harman, 1976).

Hypothesis testing results. The SEM results presented in Table 4 shows an excellent model fit (CMIN/df = 2.525, CFI = 0.977, GFI = 0.950, NFI = 0.962, TLI = 0.972, RMSEA = 0.036) (Hair et al. 2014). We checked the direct effects of the constructs (perceived knowledge, perceived cultural authenticity, perceived innovation, perceived traceability, perceived scarcity, psychological ownership, and ICH cultural identity) using SEM. Perceived traceability showed significant positive effects on psychological ownership and ICH cultural identity ($\beta = 0.205$, $p < 0.001$; $\beta = 0.103$, $p < 0.01$), supporting H1 and H2. Perceived scarcity showed significant positive effects on psychological ownership and ICH cultural identity ($\beta = 0.074$, $p < 0.05$; $\beta = 0.121$, $p < 0.001$), supporting H3 and H4. Perceived innovation showed significant positive effects on psychological ownership and ICH cultural identity ($\beta = 0.096$, $p < 0.01$; $\beta = 0.148$, $p < 0.001$), supporting H5 and H6. Perceived cultural authenticity showed significant positive effects on psychological ownership and ICH cultural identity ($\beta = 0.084$, $p < 0.01$; $\beta = 0.206$, $p < 0.001$), supporting H7 and H8. The perceived cultural knowledge of the ICH crypto collectibles positively affects the psychological ownership and the cultural identity of ICH ($\beta = 0.119$, $p < 0.001$; $\beta = 0.094$, $p < 0.01$), supporting H9 and H10.

In addition to the hypothesized relationships, we examined the effects of control variables (gender, age, and education level) on the dependent variable, purchase intentions (P). The results indicated that gender had a significant positive effect on purchase intentions ($\beta = 0.086$, $p < 0.01$), suggesting that females (coded as 2) tend to exhibit higher purchase intentions compared to males (coded as 1). Age had a significant negative effect on purchase intentions ($\beta = -0.062$, $p < 0.5$), implying that younger participants tend to demonstrate stronger purchase intentions compared to older participants. Education, however, did not have a significant effect on purchase intentions ($\beta = -0.005$, $p = 0.871$), indicating that levels of formal education do not substantially influence purchase intentions in this context. These findings highlight the relevance of demographic factors, particularly gender and age, in shaping purchase intentions and emphasize the need to account for such variables in future research. Table 4 presents a summary of our hypotheses testing and the control variable analysis.

Next, The mediation effect was tested using simple mediation model 4 in PROCESS (Hayes, 2018). The number of bootstrapped samples was 5000 with 95% confidence intervals (Hayes, 2018). The results of the simple mediation analysis with bootstrapped confidence intervals (CI) are presented in Table 5. The analysis revealed a significant and positive indirect effect of PT, PS, PI, PA, and PK on P via PO and ICHCI, controlling for covariates (gender, age, and educational level). Also, the direct effects of all benefits on purchase intention were significant. Hence, in support of H11 and H12, psychological ownership and cultural identity were found to mediate the relationship between the benefits of cultural blockchain assets and purchase intention.

After testing simple mediation effects, PROCESS Model 7 (Hayes, 2018) was used to examine the moderating effects of independent self-construal (IS). Model 7 provides evidence for both simple moderation and conditional indirect effects. The results (PROCESS Model 7; see Table 6) indicated a significant interactive effect of PA and independent self-construal (IS) (effect = 0.057, $t = 2.676$, $p = 0.008$, 95% CI = 0.015, 0.098) on cultural identity, where the IS positively moderated PA's effect on ICHCI. Meanwhile, the interactive effect of PK and IS (effect = −0.002, $t = -0.077$, $p = 0.939$, 95% CI = −0.053, 0.049) on ICHCI is not significant, indicating the independent self-construal does not affect the relationship between perceived knowledge and cultural identity. Hence, while H13 is supported, H14 is not supported.

Table 2 Results of the measurement model.

Construct	M	SD	α	Standardized loading
Perceived traceability (PT)	**4.956**	**1.593**	**0.907**	
PT1. I can access the historical transaction data of the NFTs on NFT platforms.				0.856***
PT2. I can find comprehensive information about an NFT on an NFT platform.				0.899***
PT3. I think the NFT platform provides objective information about NFTs (e.g., issuers, collection codes, blockchain addresses, circulation information, etc.)				0.872***
Perceived scarcity (PS)	**4.920**	**1.599**	**0.897**	
PS1. I think that the current supply of ICH NFTs is small.				0.832***
PS2. I think that ICH NFTs are selling out soon.				0.891***
PS3. I think that many people will buy ICH NFTs once they are released.				0.867***
Perceived innovation (PI)	**5.006**	**1.591**	**0.907**	
PI1. I think browsing intangible cultural heritage NFTs on NFT platforms is a new experience.				0.876***
PI2. I think using the ICH NFT platform is new and refreshing.				0.886***
PI3. I think that the NFT platforms present intangible cultural heritage works in a novel way.				0.864***
Perceived cultural authenticity (PA)	**4.960**	**1.594**	**0.909**	
PA1. I think intangible cultural heritage NFTs are a true display of related life and customs.				0.856***
PA2. I think intangible cultural heritage NFTs have well represented the history and culture associated with it.				0.905***
PA3. I think intangible cultural heritage NFTs can give me the original experience of the history and culture associated with it.				0.873***
Perceived cultural knowledge (PK)	**5.183**	**1.200**	**0.875**	
PK1. Through the presentation of ICH NFTs on the NFT platforms, I can accurately understand the intangible cultural heritage.				0.816***
PK2. Through the presentation of ICH NFTs on the NFT platforms, I can fully understand the characteristics, cultural connotations and performance of intangible cultural heritage.				0.846***
PK3. Through the presentation of ICH NFTs on the NFT platforms, I can understand how intangible cultural heritage keeps pace with time and is constantly renewed.				0.836***
PK4. Through the presentation of ICH NFTs on the NFT platforms, I can understand how intangible cultural heritage is transmitted.				0.699***
Psychological ownership (PO)	**5.005**	**1.618**	**0.911**	
PO1. I consider that the intangible cultural heritage NFTs that I have acquired on NFT platforms belong to my virtual assets.				0.870***
PO2. Having acquired intangible cultural heritage NFTs on NFT platforms, I consider that I am the owner of the acquired collections.				0.900***
PO3. After acquiring intangible cultural heritage NFTs on NFT platforms, I will feel that this virtual asset belongs to me				0.870***
ICH cultural identity (ICHCI)	**5.061**	**1.666**	**0.918**	
ICHCI1. I am proud of intangible cultural heritage.				0.859***
ICHCI2. I agree with the value of intangible cultural heritage.				0.920***
ICHCI3. I recognize and appreciate the value of intangible cultural heritage.				0.889***
Independent self-construction (IS)	**5.137**	**1.224**	**0.911**	
IS1. For me it is important that my personality traits are independent of others.				0.785***
IS2. I like to be different in many ways.				0.804***
IS3. I also feel comfortable when I am individually praised or rewarded.				0.835***
IS4. It is important for me to have an independent and vivid imagination.				0.856***
IS5. I prefer to speak my mind directly rather than be misunderstood.				0.817***
Purchase intention (P)	**5.023**	**1.596**	**0.918**	
P1. I prefer to speak my mind directly rather than be misunderstood.				0.877***
P2. In all likelihood, I will consider purchasing NFTs of intangible cultural heritage.				0.927***
P3. I have a strong desire to buy NFTs of intangible cultural heritage.				0.863***

***p < 0.001.

Table 3 Validity and reliability for constructs.

	CR	AVE	PK	PI	PS	PT	PA	PO	ICHCI	IS	P
Perceived cultural knowledge (PK)	0.877	0.642	**0.801**								
Perceived innovation (PI)	0.908	0.767	0.341	**0.875**							
Perceived scarcity (PS)	0.898	0.747	0.328	0.253	**0.864**						
Perceived traceability (PT)	0.908	0.767	0.28	0.310	0.271	**0.876**					
Perceived cultural authenticity (PA)	0.910	0.772	0.296	0.195	0.262	0.237	**0.878**				
Psychological ownership (PO)	0.912	0.775	0.246	0.219	0.206	0.286	0.197	**0.880**			
ICH cultural identity (ICHCI)	0.919	0.792	0.264	0.268	0.262	0.253	0.306	0.279	**0.890**		
Independent self-construction (IS)	0.911	0.673	0.339	0.335	0.279	0.254	0.259	0.291	0.329	**0.820**	
Purchase intention (P)	0.919	0.791	0.263	0.246	0.258	0.256	0.221	0.252	0.255	0.233	**0.889**

The diagonal values (in bold) represent the square root of the average variance extracted (AVE).

Table 4 Structural estimates.

Hypothesis	Effect of	Effect on	β	p-value	Results
H1	PT	PO	0.205	***	Supported
H2	PT	ICHCI	0.103	**	Supported
H3	PS	PO	0.074	*	Supported
H4	PS	ICHCI	0.121	***	Supported
H5	PI	PO	0.096	**	Supported
H6	PI	ICHCI	0.148	***	Supported
H7	PA	PO	0.084	**	Supported
H8	PA	ICHCI	0.206	***	Supported
H9	PK	PO	0.119	***	Supported
H10	PK	ICHCI	0.094	**	Supported
	PO	P	0.223	***	
	ICHCI	P	0.212	***	
	gender	P	0.086	**	
	age	P	−0.062	*	
	education	P	−0.005	0.871	

Significance codes—***0.001, **0.01, *0.05.

Figure 2 presents PA's effect on ICHCI at high and low levels of independent self-construal. In the case of the interaction between PA and the independent self-construal PA has a higher positive effect on ICHCI when the independent self-construal is high in comparison to when the independent self-construal is low. Thus, the result indicates that PA's positive influence on ICHCI increases as the independent self-construal. To probe the moderation effects, moderator levels of the independent self-construal were conditioned at high (mean + 1 std. deviation) and low (mean −1 std. deviation).

Discussion

This study enhances our understanding of cultural consumption in virtual environments, particularly through the perspective of blockchain assets. By examining the psychological foundations of consumer engagement with cultural crypto collectibles, this study identifies five key factors—traceability, scarcity, innovation, cultural knowledge, and cultural authenticity—that influence consumer behavior. The findings provide strong support for H1–H13, confirming that these factors positively affect psychological ownership and cultural identity, as well as their subsequent impact on purchase intention. Traceability, cultural knowledge, and innovation are the most influential attributes in fostering psychological ownership, highlighting their roles in strengthening trust, emotional connection, and engagement with digital cultural assets. Conversely, cultural authenticity, innovation, and scarcity are the primary drivers of cultural identity, emphasizing the significance of authentic cultural representations, creative approaches, and exclusivity in shaping cultural resonance. However, H14, which proposed that independent self-construal positively moderates the relationship between perceived cultural knowledge and cultural identity, was not supported. This finding suggests that although cultural knowledge enhances understanding, it lacks the emotional and symbolic depth necessary to deeply engage consumers with an independent self-construal. Previous research indicates that individuals with an independent self-construal tend to prioritize personal alignment and intrinsic values over factual or informational content when engaging with cultural products (Markus and Kitayama, 2014; Singelis, 1994). These individuals are more responsive to cultural authenticity, which aligns with their preference for symbolic and authentic cultural representations rather than knowledge-driven engagement (Sugimura et al. 2015; Chen et al. 2022). This divergence underscores the complex interplay of attributes in digital cultural consumption, where experiential and symbolic

dimensions increasingly surpass purely informational content in shaping consumer identity. The increasing significance of symbolic and aesthetic values in cultural artifacts reflects a broader trend in digital consumption, where immersive and personalized experiences are central to consumer engagement (Cook, 2007).

This study contributes to understanding virtual-asset engagement by spotlighting psychological ownership as a central mechanism through which blockchain attributes influence consumer purchase intentions. Diverging from prior research focused on aspects such as security and exclusivity (Gupta, 2023), this study highlights the profound psychological connection consumers form with virtual assets. Among the attributes influencing psychological ownership, perceived traceability emerges as the most impactful, as blockchain's ability to ensure provenance and history fosters trust, authenticity, and a deeper connection to digital cultural artifacts (Hogg and Jackson, 2009). Beyond traceability, cultural knowledge enriches consumers' understanding of cultural heritage, suggesting that blockchain platforms emphasizing educational content can strengthen attachment to digital cultural assets. Similarly, innovation captivates consumers with novel and immersive technological experiences that foster personal connections and psychological ownership. Cultural authenticity, while slightly less influential, assures consumers of the genuineness and historical accuracy of blockchain assets, fostering emotional connections and a sense of belonging. Notably, scarcity plays the least significant role, as its traditional function in driving desirability appears diminished in the digital realm. Instead, blockchain redefines scarcity through attributes such as uniqueness and provenance, prioritizing cultural resonance over quantitative limitations (O'Dwyer, 2020; Warde, 2014). This shift reflects evolving consumer engagement within the digital cultural market.

The results also highlight distinct patterns in how cultural identity is influenced by blockchain assets. Unlike psychological ownership, which is primarily driven by traceability and cultural knowledge, cultural identity is most influenced by cultural authenticity, followed by innovation, scarcity, traceability, and cultural knowledge. This divergence highlights the multifaceted nature of virtual cultural consumption, where different attributes resonate uniquely depending on the psychological or cultural construct under examination. Cultural authenticity is the strongest determinant of cultural identity, emphasizing consumers' deep-seated desire for authentic cultural representations in blockchain assets. This desire for authenticity reflects a broader aspiration to preserve the integrity of traditional culture in the digital realm, aligning with Bedford's (2001) emphasis on the immersive experiences enabled by authentically represented cultural virtual assets. In contrast, cultural knowledge has a relatively weak influence on cultural identity, suggesting that while knowledge enhances understanding and appreciation, it does not substantially deepen consumers' cultural identification with the collectibles. This finding aligns with Xue and Lu's (2020) research, which observed that consumers of virtual cultural goods prefer interactive and gamified experiences over straightforward knowledge acquisition.

Theoretical contributions. This study provides a significant contribution to understanding psychological ownership and cultural identity in the digital realm, particularly within the blockchain ecosystem. Using the Cognition–Affect–Conation (CAC) model, this study examines the intricate dynamics of consumer psychological bonding with virtual assets, emphasizing both psychological ownership and cultural identity. Specifically, this study proposes a three-stage model in which independent variables represent the integration of technology and culture,

Table 5 Mediation analysis.

Hypothesis	Regression path	Effect	Boot SE	t	p	Bootstrapped 95% CI	Results
H11(a)	PT → PO (path a)	0.274	0.029	9.548	0.000	[0.218-0.331]	Supported
	PO → PI (path b)	0.157	0.029	5.371	0.000	[0.100-0.214]	
	PT → P (Direct effect, path c')	0.169	0.029	5.754	0.000	[0.111-0.226]	
	PT → P (Total effect, path c)	0.249	0.029	8.699	0.000	[0.0.193-0.305]	
	PT → PO → P (Indirect effect)	0.043	0.011	3.995	0.000	[0.024-0.065]	
H11(b)	PS → PO (path a)	0.195	0.029	6.712	0.000	[0.138-0.252]	Supported
	PO → P (path b)	0.170	0.029	5.921	0.000	[0.113-0.226]	
	PS → P (Direct effect, path c')	0.178	0.029	6.188	0.000	[0.121-0.234]	
	PS → P (Total effect, path c)	0.248	0.028	8.713	0.000	[0.192-0.304]	
	PS → PO → P (Indirect effect)	0.033	0.008	3.904	0.000	[0.018-0.051]	
H11(c)	PI → PO (path a)	0.202	0.029	6.886	0.000	[0.145-0.260]	Supported
	PO → P (path b)	0.171	0.029	5.942	0.000	[0.114-0.227]	
	PI → P (Direct effect, path c')	0.164	0.029	5.633	0.000	[0.107-0.221]	
	PI → P (Total effect, path c)	0.237	0.029	8.199	0.000	[0.180-0.293]	
	PI → PO → P (Indirect effect)	0.035	0.009	3.879	0.000	[0.019-0.054]	
H11(d)	PA → PO (path a)	0.184	0.029	6.260	0.000	[0.126-0.241]	Supported
	PO → P (path b)	0.179	0.029	6.227	0.000	[0.123-0.236]	
	PA → P (Direct effect, path c')	0.133	0.029	4.525	0.000	[0.075-0.190]	
	PA → P (Total effect, path c)	0.210	0.029	7.271	0.000	[0.153-0.267]	
	PA → PO → P (Indirect effect)	0.033	0.009	3.897	0.000	[0.018-0.051]	
H11(e)	PK → PO (path a)	0.325	0.038	8.456	0.000	[0.249-0.400]	Supported
	PO → P (path b)	0.161	0.029	5.574	0.000	[0.104-0.218]	
	PK → P (Direct effect, path c')	0.235	0.039	6.060	0.000	[0.159-0.310]	
	PK → P (Total effect, path c)	0.338	0.038	8.912	0.000	[0.263-0.412]	
	PK → PO → P (Indirect effect)	0.052	0.013	5.365	0.000	[0.029-0.080]	
H12(a)	PT → ICHCI (path a)	0.245	0.030	8.234	0.000	[0.186-0.303]	Supported
	ICHCI → P (path b)	0.153	0.028	5.402	0.000	[0.097-0.208]	
	PT → P (Direct effect, path c')	0.169	0.029	5.754	0.000	[0.111-0.226]	
	PT → P (Total effect, path c)	0.249	0.029	8.699	0.000	[0.193-0.305]	
	PT → ICHCI → P (Indirect effect)	0.037	0.009	3.970	0.000	[0.020-0.057]	
H12(b)	PS → ICHCI (path a)	0.255	0.029	8.691	0.000	[0.198-0.313]	Supported
	ICHCI → P (path b)	0.145	0.028	5.109	0.000	[0.089-0.201]	
	PS → P (Direct effect, path c')	0.178	0.029	6.188	0.000	[0.121-0.234]	
	PS → P (Total effect, path c)	0.248	0.028	8.713	0.000	[0.192-0.304]	
	PS → ICHCI → P (Indirect effect)	0.037	0.010	3.801	0.000	[0.019-0.058]	
H12(c)	PI → ICHCI (path a)	0.256	0.030	8.607	0.000	[0.198-0.314]	Supported
	ICHCI → P (path b)	0.149	0.028	5.232	0.000	[0.093-0.204]	
	PI → P (Direct effect, path c')	0.164	0.029	5.633	0.000	[0.107-0.221]	
	PI → P (Total effect, path c)	0.237	0.029	8.199	0.000	[0.180-0.293]	
	PI → ICHCI → P (Indirect effect)	0.038	0.010	3.903	0.000	[0.020-0.059]	
H12(d)	PA → ICHCI (path a)	0.299	0.029	10.216	0.000	[0.241-0.356]	Supported
	ICHCI → P (path b)	0.148	0.029	5.133	0.000	[0.092-0.205]	
	PA → P (Direct effect, path c')	0.133	0.029	4.525	0.000	[0.075-0.190]	
	PA → P (Total effect, path c)	0.210	0.029	7.271	0.000	[0.153-0.267]	
	PA → ICHCI → P (Indirect effect)	0.044	0.012	3.883	0.000	[0.023-0.070]	
H12(e)	PK → ICHCI (path a)	0.347	0.039	8.850	0.000	[0.270-0.424]	Supported
	ICHCI → P (path b)	0.147	0.028	5.179	0.000	[0.091-0.202]	
	PK → P (Direct effect, path c')	0.235	0.039	6.060	0.000	[0.159-0.310]	
	PK → P (Total effect, path c)	0.338	0.038	8.912	0.000	[0.263-0.412]	
	PK → ICHCI → P (Indirect effect)	0.051	0.013	5.258	0.000	[0.027-0.078]	

Mediation analysis is based on PROCESS Model 4; Number of bootstrapped samples for percentile bootstrap confidence intervals: 5000; Covariates: gender, age, and educational level.
PK perceived cultural knowledge, *PA* perceived cultural authenticity, *PI* perceived innovation, *PS* perceived scarcity, *PT* perceived traceability, *ICHCI* ICH cultural identity, *P* purchase intention.

mediators encompass psychological processes, and outcomes reflect behavioral actions. This framework enables an investigation of the psychological efficacy arising from the impact of technology on cultural products and its ultimate influence on consumer behavior.

First, psychological ownership, traditionally linked to tangible assets, manifests uniquely in the digital domain through virtual assets. This study expands the application of psychological ownership to digital cultural assets, illustrating how this construct shapes consumer engagement and purchase intentions within the blockchain marketplace. By emphasizing attributes such as traceability, authenticity, and cultural resonance, this study illustrates how blockchain technology cultivates a sense of belonging and personal connection, enriching consumers' experiences and attachment to digital cultural heritage. This finding aligns with recent research on the evolving nature of ownership in the digital age, where blockchain assets such as NFTs introduce new forms of ownership and personal connection (Belk et al. 2022; Hadi et al. 2024).

Second, the analysis highlights the mediating role of cultural identity, illustrating how psychological ownership and cultural identity collectively shape consumer behavior toward virtual assets. The distinct effects of these factors on cultural identity and psychological ownership elucidate the multifaceted nature of consumer engagement

Table 6 Moderation and conditional process analysis.

	IV: PA (H13)			IV: PK (H14)		
Predictors	Effect	SE	95% CI	Effect	SE	95% CI
PA	0.239***	0.029	[0.182, 0.296]			
IS	0.359***	0.038	[0.283, 0.434]	0.341***	0.040	[0.262, 0.420]
PA × IS	0.057**	0.021	[0.015, 0.098]			
PK				0.231***	0.041	[0.151, 0.311]
PK × IS				−0.002ns	0.026	[−0.053, 0.049]
Gender	0.086ns	0.092	[−0.094, 0.267]	0.029ns	0.094	[−0.155, 0.213]
Age	−0.161***	0.046	[−0.251, −0.071]	−0.207***	0.046	[−0.298, −0.116]
Educational Level	0.125*	0.059	[0.008, 0.241]	0.116ns	0.061	[−0.002, 0.235]
R^2	0.180			0.153		
F	41.966***			34.461***		

$N = 1153$. Moderation analysis is based on PROCESS Model 7; Each column is a regression model that predicts the criterion at the top of the column. Covariates: gender, age, and educational level.
PK perceived knowledge, PA perceived authenticity, PI perceived innovation, PS perceived scarcity, PT perceived traceability, ICHCI ICH cultural identity, P Purchase intention.
$*p < 0.05$; $**p < 0.01$; $***p < 0.001$; ns, not significant.
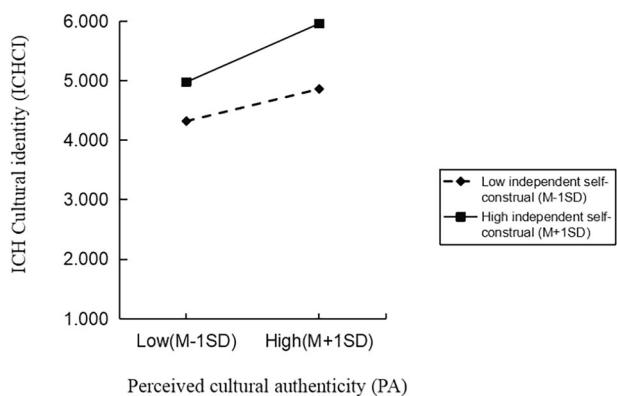
Fig. 2 Interaction effect of independent self-construal and cultural authenticity on cultural identity.

with cultural blockchain assets. The findings suggest that while traceability and knowledge contribute to a sense of ownership, authenticity and the innovative presentation of cultural content play a more crucial role in resonating with consumers' cultural identities. This insight aligns with Hofstetter et al. (2024) and Bao et al. (2024), who demonstrate that cultural resonance and authenticity are central to consumer engagement with NFTs, particularly in the domains of luxury and cultural goods. Similarly, innovation plays a pivotal role by offering consumers novel and interactive experiences that traditional cultural artifacts cannot replicate. This finding is consistent with recent research indicating that innovation, particularly in the form of digital interactivity, is crucial for enhancing consumer engagement in the metaverse and beyond (Hadi et al. 2024).

Lastly, this study makes a significant theoretical contribution to understanding consumer behavior in the digital cultural marketplace by emphasizing the role of independent self-construal. Although independent self-construal did not moderate the relationship between perceived cultural knowledge and cultural identity, this unexpected finding provides valuable insight into how consumers with an independent self-construal prioritize authenticity over informational content. This finding advances the literature on self-construal and consumer psychology in digital contexts (Chen et al. 2022; Sugimura et al. 2015). It bridges the gap between tangible and intangible asset ownership, providing a refined framework for examining consumer behavior in the rapidly expanding domain of digital cultural goods. These insights lay the foundation for future research on the role of psychological ownership in the digital economy, particularly within the expanding realm of NFTs and blockchain-based cultural assets.

Practical implications. The practical implications of this study underscore the importance of fostering psychological ownership among consumers in the digital cultural asset market, particularly within blockchain platforms. As psychological ownership plays a central role in enhancing engagement and investment in digital cultural assets, platforms, and marketers should implement targeted strategies to strengthen this sense of ownership.

First, platforms should focus on enhancing traceability and authenticity to build trust and foster a deeper emotional connection with consumers. Transparent verification mechanisms that provide detailed provenance and cultural significance of virtual assets can enhance perceptions of authenticity and ownership. This aligns with recent research indicating that blockchain's unique ability to ensure provenance is crucial in shaping consumer trust and psychological attachment (Hadi et al. 2024). Additionally, storytelling initiatives can enhance the emotional and cultural value associated with virtual assets. By integrating compelling narratives about cultural heritage and aligning them with consumers' identities, blockchain platforms can foster deeper consumer engagement (Harun and Rokonuzzaman, 2021). Collaborations with cultural institutions and artists can further reinforce these narratives, ensuring that cultural assets are both valuable and meaningful to consumers.

Second, exclusivity remains a powerful driver of consumer engagement, and our findings highlight the importance of providing personalized experiences. Platforms can increase the perceived value of digital assets by introducing limited-edition releases or exclusive offers tied to specific cultural themes, enhancing their uniqueness and desirability. This aligns with research emphasizing the role of exclusivity in strengthening consumer attachment and perceived value (Belk et al. 2022). Furthermore, personalized recommendations derived from past interactions can enhance consumers' sense of uniqueness, thereby increasing both engagement and attachment. Establishing dynamic online communities where users share their collections and experiences further reinforces psychological ownership. These communities function as platforms for cultural affirmation, reinforcing consumers' identities and deepening their connection to digital assets (Hofstetter et al. 2024). Platforms should actively cultivate these spaces, enabling users to connect with others who share similar cultural values.

Third, this study demonstrates that cultural knowledge is pivotal in strengthening psychological ownership. Therefore, educational initiatives that enhance consumers' understanding of the cultural significance of NFTs and other digital assets are essential. Platforms should invest in developing educational content featuring artist interviews, in-depth narratives about

cultural products, and insights into the creative process. This approach bridges the gap between consumers and the cultural heritage embedded in digital assets, aligning with research advocating for the integration of educational elements in digital consumption (Bao et al. 2024). Such initiatives not only enrich the consumer experience but also reinforce psychological ownership by fostering deeper cultural engagement. By connecting consumers more profoundly with the cultural narratives embedded in blockchain assets, platforms can fortify psychological ownership and enrich the market's cultural value.

Finally, while traditional notions of scarcity influence physical asset markets, this study suggests that scarcity in the digital realm requires redefinition. Platforms should prioritize the uniqueness and cultural significance of digital assets rather than relying solely on quantity or limited editions. Blockchain technology enables the creation of unique and verifiable assets, introducing a new form of digital scarcity that appeals to consumers' desire for cultural resonance and exclusivity (O'Dwyer, 2020; Warde, 2014). By highlighting the symbolic value of assets—such as their cultural heritage and historical provenance—platforms can distinguish themselves in a competitive digital marketplace and foster a more engaged and loyal consumer base.

Limitations and future directions

This research has several limitations that can be addressed by future studies. First, this study focuses on the Chinese NFT market, which is a unique ecosystem compared to other global NFT markets. Given that different NFT markets may operate under distinct rules and structures, future research could explore consumer behavior in markets with different cultural and technological contexts. This would provide a broader understanding of how cultural consumption patterns and blockchain adoption may vary across regions, and how local market dynamics influence consumer engagement with digital assets. Second, the data collected for this study is cross-sectional, which, while valid, limits the ability to examine changes over time. Future studies could consider longitudinal designs to track changes in consumer behavior and engagement with blockchain assets. Additionally, integrating data from blockchain platforms could enable a more comprehensive evaluation and provide real-time insights into consumer behavior. Finally, another limitation of the study is that only consumer responses were collected through the survey. Future research could examine responses from other blockchain stakeholders, such as platform developers or creators, to gain a more holistic view of the NFT market.

Data availability

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Author contributions
Ke Xue: Assisted with the design of the research; managed and coordinated responsibility for the research activity planning and execution; reviewed and edited the manuscript before submission. Xiaotian Lu: Assisted with the design of the methodology; contributed to the writing of the manuscript. Boyuan Wang: Collected the data; conceived and designed the analysis; analyzed and interpreted the data; wrote the paper.

Competing interests
The authors declare no competing interests.

Ethical approval
This study was conducted entirely online in the People's Republic of China between November 24, 2022 and December 26, 2023. All participants accessed the survey through a web link and were located in China at the time of participation.

Ethical review exemption
In accordance with China's *Measures for Ethical Review of Life Science and Medical Research Involving Human Subjects* (Document No. Guo Wei Ke Jiao Fa [2023] 4), Article 32(2) (https://www.gov.cn/zhengce/zhengceku/2023-02/28/content_5743658.htm), research that "uses anonymized informational data," causes no bodily harm, and does not involve sensitive personal information or commercial interests is exempt from ethical review. Because our protocol (1) collected only fully anonymized questionnaire responses, (2) involved no experimental interventions, and (3) posed no more than minimal risk to participants, this project is exempt from IRB oversight under Article 32(2).

Informed consent
All data were collected via an online survey administered between November 24, 2022, and December 26, 2023. Prior to accessing the questionnaire, participants first viewed an information page that detailed the study's objectives, voluntary nature, anonymity safeguards, and intended use of data for academic research only. This page explicitly stated that participation was entirely voluntary, that respondents could withdraw at any time without penalty, and that no personally identifiable information would be retained. Participants were then prompted to indicate their consent by clicking an "I Agree" button; only those who provided consent on that page were automatically routed to the screening question and subsequent survey items. The date and time of consent were logged electronically. This procedure ensured that informed consent was obtained before any screening or survey questions were presented and within the specified data-collection period.

Additional information
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