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01.

Background

Background

In-App-Purchases for Mobile Gaming

Offering a game for free and gaining income through voluntary purchases during gameplay have proven to be the most successful way to gain revenue. Due to the model, more people than ever before play games, and the economic significance of games as business has multiplied (Alha, 2020).

Metaverse

This evolution is further amplified by the emergence of the metaverse—a digital ecosystem where users interact through avatars, blurring the boundaries between virtual and physical identities (Ahn et al., 2024).

Players engage in complex social dynamics, curating their virtual personas through **ornamental items** (e.g., skins, costumes) or **functional upgrades** (e.g., weapons, power-ups).

What is the mechanism?



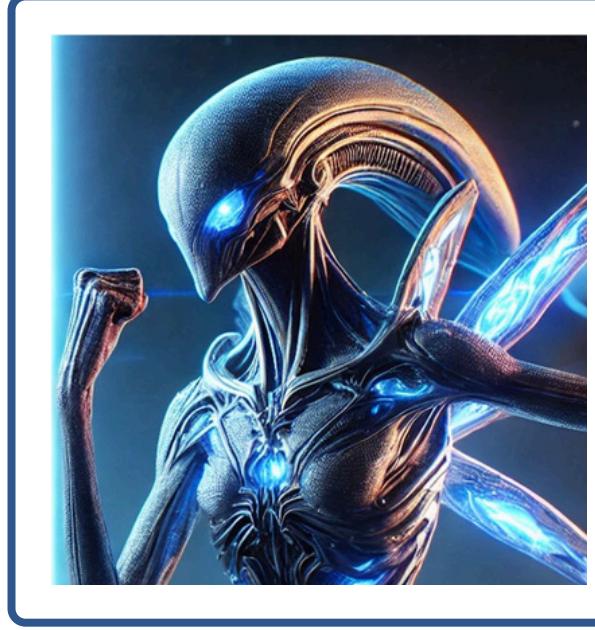
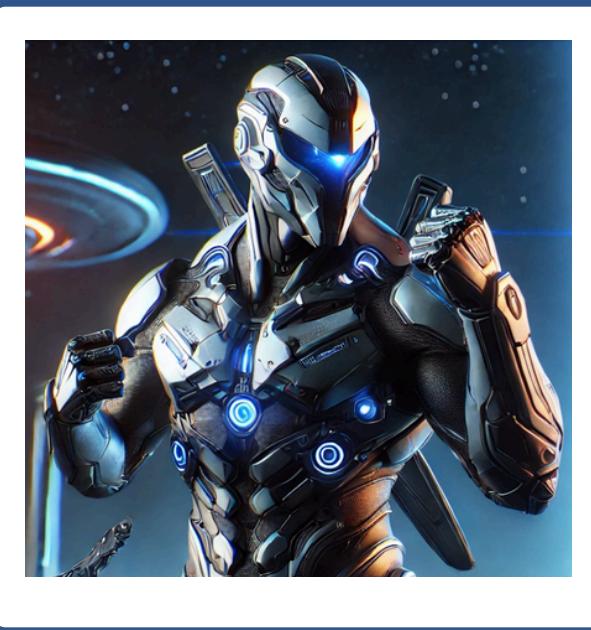
Variables

IV:

Character Type (Human vs. Non-human)

Human Character is a character in a game in which the player plays a human image or has human characteristics, which is easy to resonate and social recognition.

A non-human character is a character in a game that does not have a human image or human characteristics, including various non-human beings or beings such as animals, monsters, robots, elves, deities, etc., that may reduce a player's need for social comparison and popularity.



DV:

In-Game Purchase Intention

It usually refers to a **player's willingness or likelihood** to spend real money on virtual items within a game. Zhang et al. (2021) define in-game purchase intention as "the extent to which players express a desire to acquire virtual goods, driven by factors such as social influence, perceived value, and emotional attachment.



In-Game Purchase Types

Functional-based goods are in-game items that can enhance players' performance (numerical advantages) and functionality (new abilities and options).

Ornamental-based goods are aesthetic, non-functional in-game items in games enabling players to create and communicate social distinctions and bonds (Cai et al., 2022).

Variables

MEDIATOR:



Identification Theory

refers to the process through which individuals construct their social identities by internalizing and affiliating with particular social groups, categories, or cultural symbols.



Deindividualization Effect

phenomenon in which people engage in seemingly impulsive and sometimes violent acts in situations in which they cannot be personally identified.



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MODERATOR:



The Need for Popularity

Popularity is characterized by an individual's pursuit of validation and recognition from others, judgments often grounded in personal traits or their treatment by peers.

(Bukowski, 2011; Santor et al., 2000):



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02.

Hypothesis

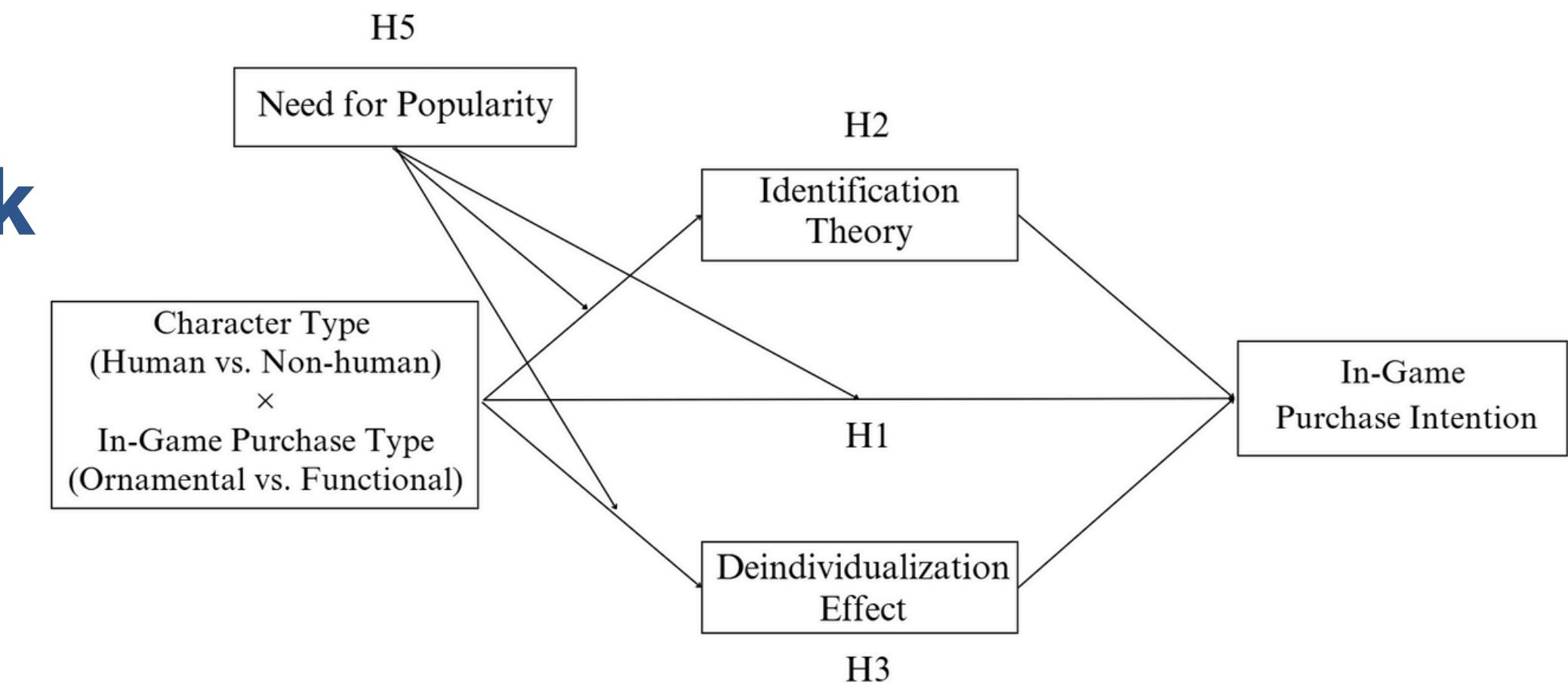
Hypothesis

H1: Human characters (vs. non-human characters) selection increases players' purchase intention toward in-game ornamental products. This effect attenuates when functional products are presented.

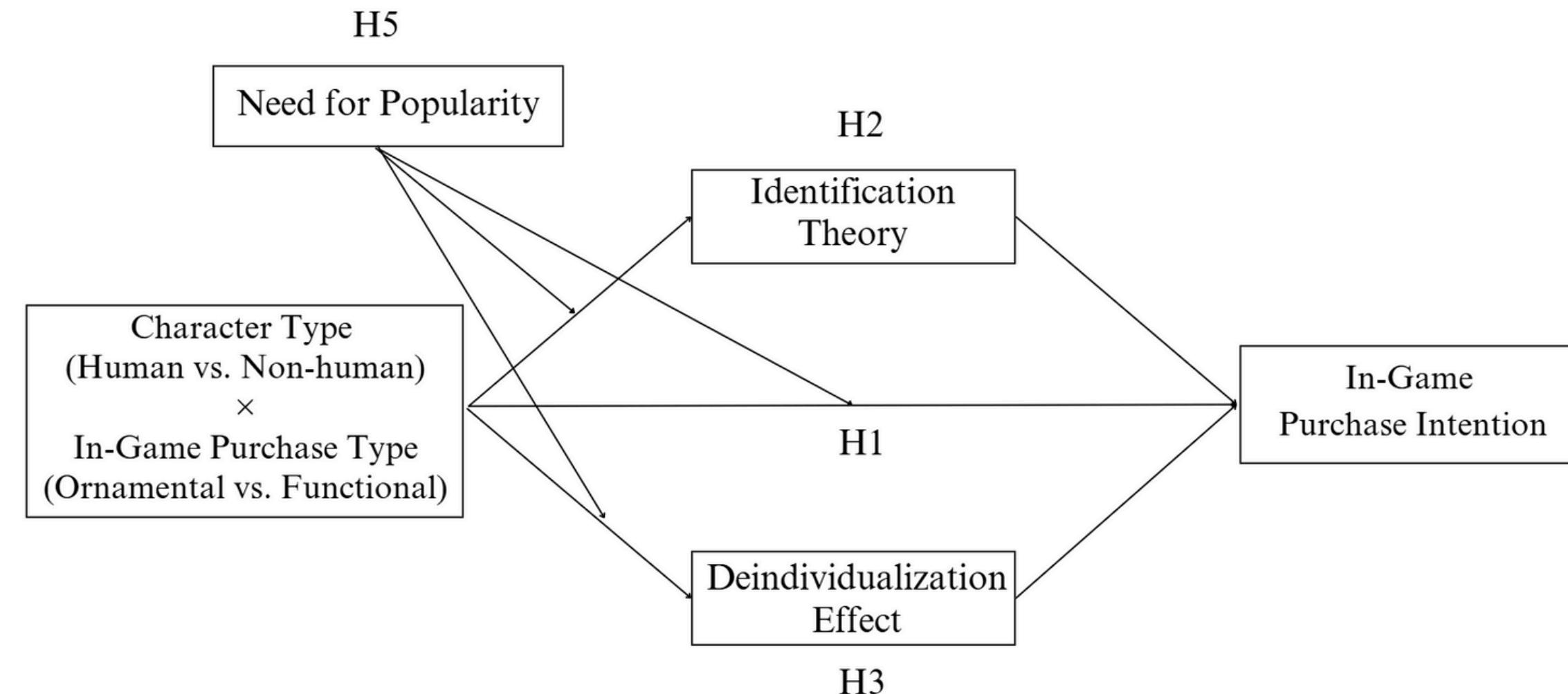
H1a: Consumers exhibits higher in-game purchase intention when ornamental products tied with human characters.

H1b: Consumers exhibits higher in-game purchase intention when functional products tied with non-human characters.

Theoretical Framework



Hypothesis



👤 **H2:** The **interactive effect** of role type selection (human characters vs. non-human characters) and in-game purchase types (ornamental vs. functional) on purchase intention **is mediated by identification theory**.

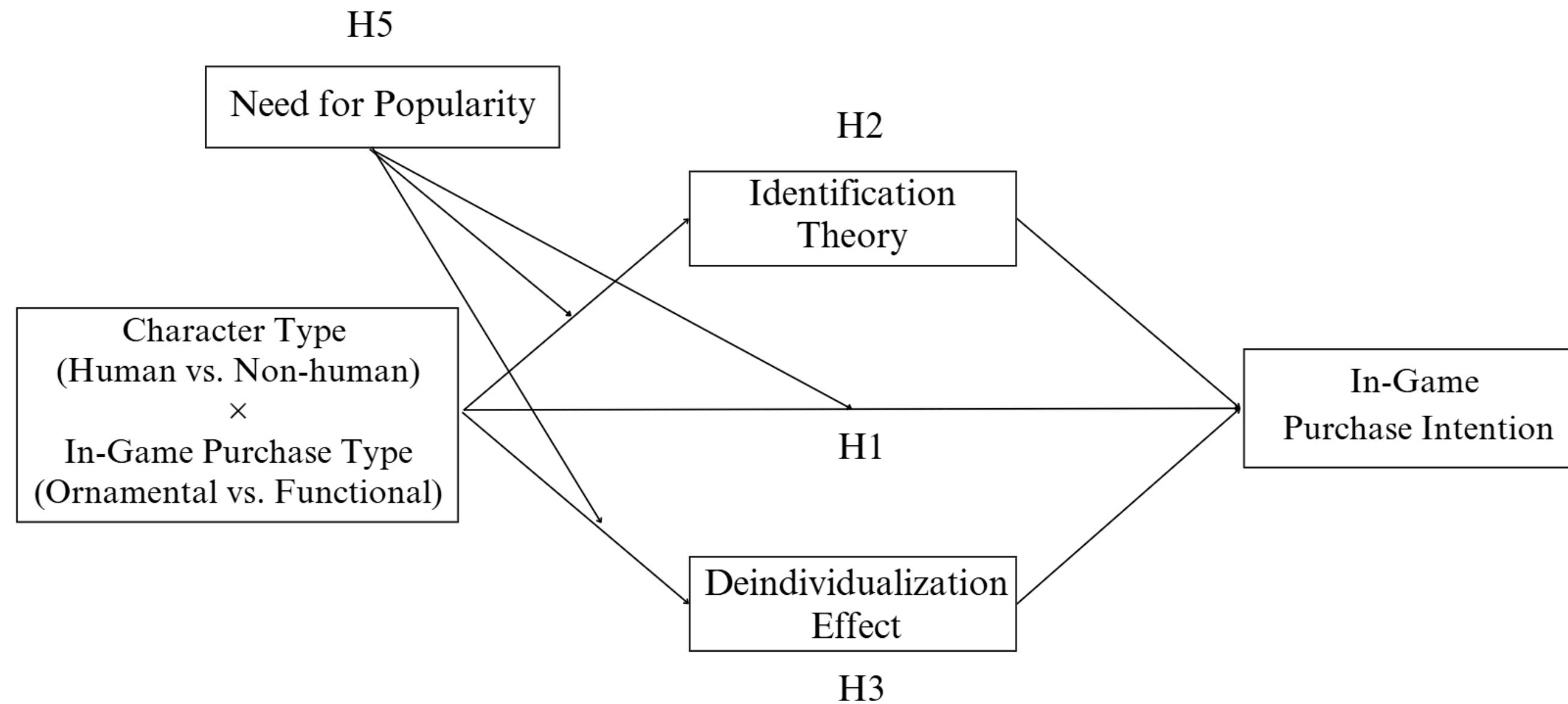
👤 **H3:** The **interactive effect** of role type selection (human characters vs. non-human characters) and in-game purchase types (ornamental vs. functional) on purchase intention **is mediated by deindividuation effect**.

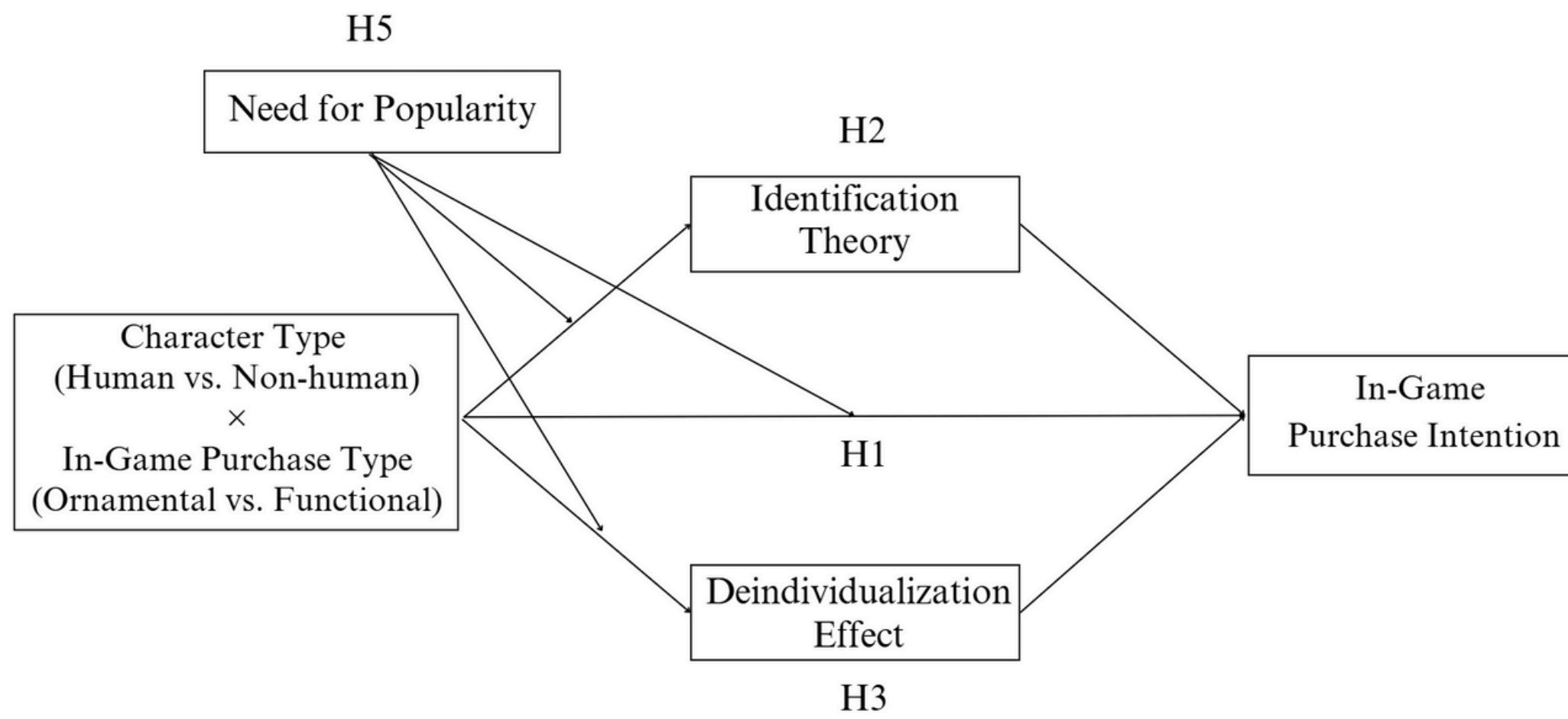


H4: When consumers **have high need for popularity**, consumers exhibit higher purchase intention of **ornamental products** than functional products, regardless of the character role type.



H5: The **interactive effect** of role type selection (human characters vs. non-human characters), in-game purchase types (ornamental vs. functional) on purchase intention, and the effect of consumers' social need is **mediated by identification theory and deindividualization effect**.





H5a: Consumers' need for popularity **moderates** the impact of identification (self-expansion) on the purchase intention of ornamental products. Specifically, a high **need for popularity** will strengthen the **positive impact of identification** on the purchase intention of ornamental products.

H5b: Consumers' need for popularity **moderates** the impact of the deindividuation effect on the purchase intention of ornamental products. Specifically, a high need for popularity will weaken the **negative impact of deindividuation** on the purchase intention of ornamental products.

H5c: Consumers' need for popularity **moderates** the direct effect of role type and product type on purchase intention.

03.

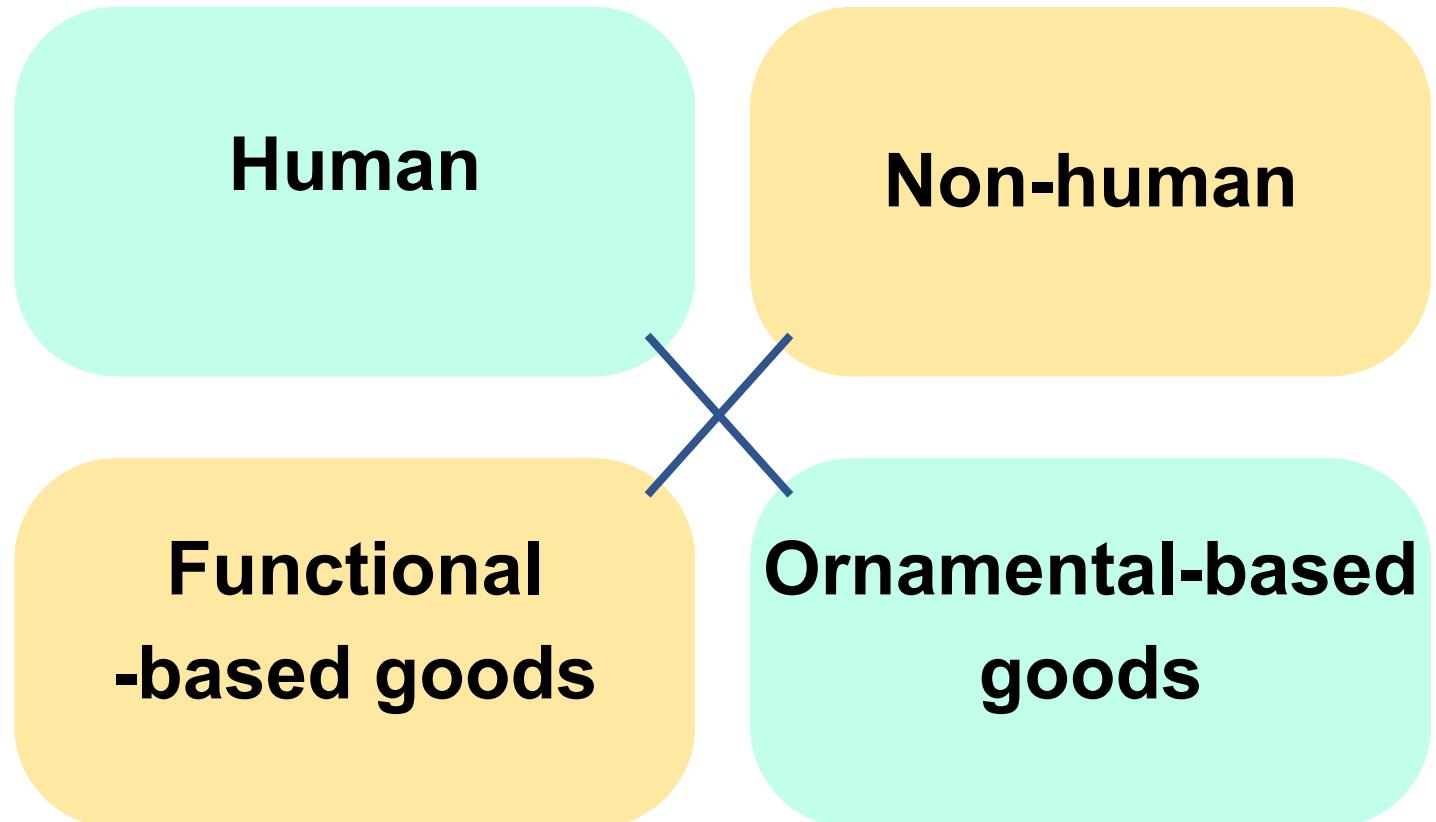
Designs

Vedio

Designs

2X2 between-subject design

Character Type



In-Game Purchase Types

Which character did you choose?



<http://gd.bullb.net>

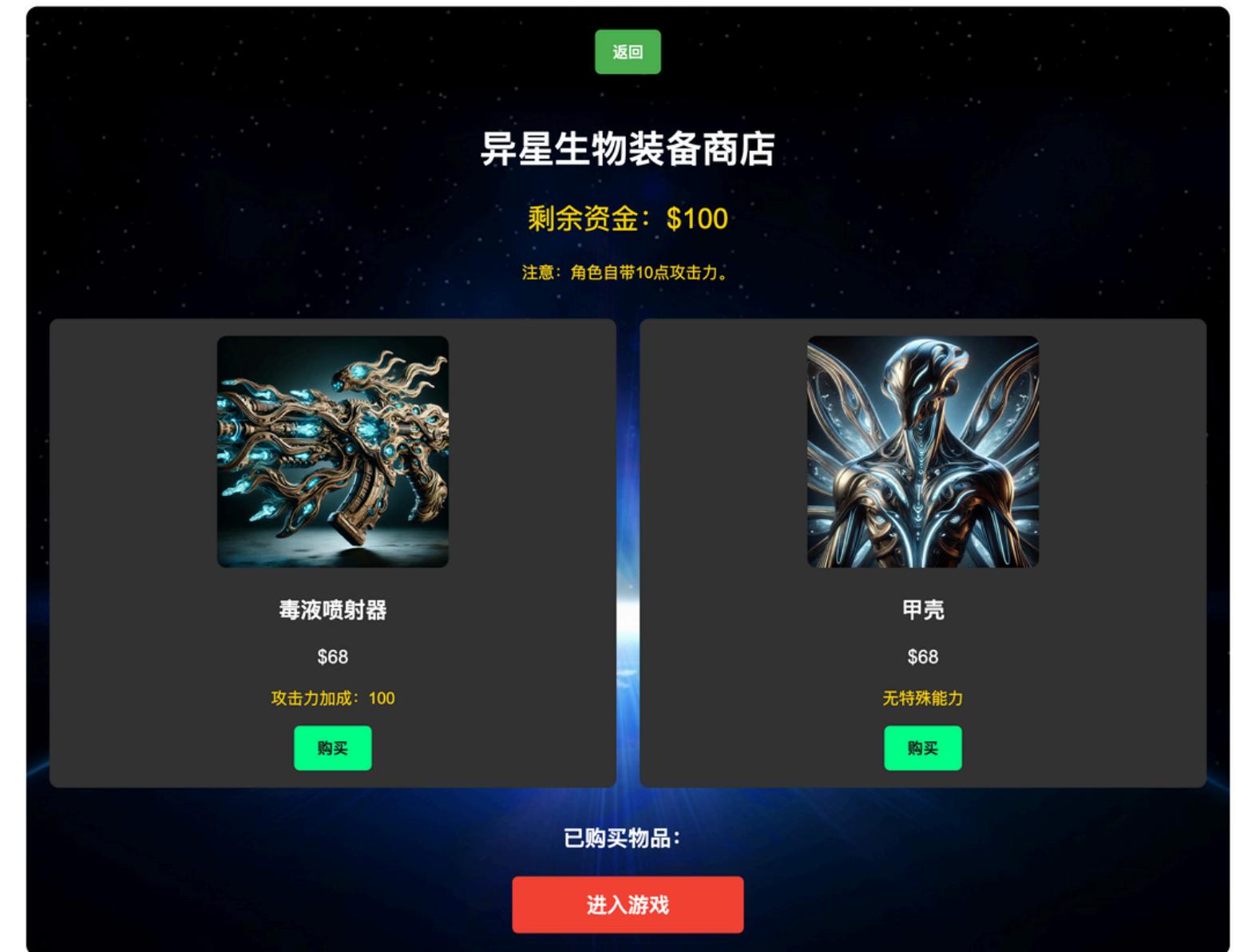
Designs

Which products did you choose?



Human

<http://gd.bullb.net>



Non-human

Designs

124
responses

After choosing characters and products, participants were asked to complete a 31-question questionnaire.

Player-Avatar Identification

Thank you for taking a few minutes to participate in this survey. Let's get started!

* 1. Which character did you choose?

Human Character
 Non-human Character

* 2. Which product did you choose?

Ornamental
 Functional

* 3. When someone criticizes my favourite online/mobile game character, it feels like a personal insult.

Strongly Disagree Strongly Agree

1 2 3 4 5

* 4. I am very interested in what others think about my favourite game character.

非常不满意 非常满意

1 2 3 4 5

* 5. When someone praises my favourite game character, it feels like a personal compliment.

非常不满意 非常满意

1 2 3 4 5

* 6. If a story in the media criticises my favourite character, I would feel embarrassed.

非常不满意 非常满意

1 2 3 4 5

verify the effectiveness



- identification
- deindividualization
- in-game purchase intention
- the need for popularity

*5-point Likert scale
(1=strongly disagree; 5= strongly agree)*

Designs

124
responses

Player-Avatar Identification

Thank you for taking a few minutes to participate in this survey. Let's get started!

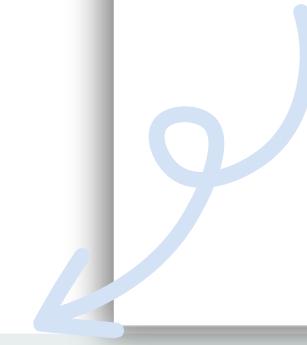
Purchase Intention

I would purchase a product from the online shopping apps/websites.

Bittner and Shipper, 2014

I intend to increase my online shopping activities in the future from this online shopping apps/websites.

I intend to continue purchasing a product from this online shopping apps/websites in the future



1 2 3 4 5

*5-point Likert scale
(1=strongly disagree; 5= strongly agree)*



- identification
- deindividualization
- in-game purchase intention
- the need for popularity

04.

Results

Results analysis

Manipulation-test

Three t-tests is to examine whether different categorical variables (e.g., product type, character type, and popularity need) can influence purchase intention.

1. t-test by Product Type:

- Ornament Products group: ($M = 3.69$, $SD = 1.15$)
- Functional Products group: ($M = 3.12$, $SD = 1.37$)

The mean difference between the two groups: $t(126) = 2.45$, $p = .008$ (one-tailed), Cohen's $d = 0.47$.

2. t-test by Character Type:

- Human characters group: ($M = 3.72$, $SD = 1.25$)
- Non-human characters group: ($M = 3.27$, $SD = 1.20$)

The mean difference between the two groups: $t(126) = -2.10$, $p = .019$ (one-tailed), Cohen's $d = 0.37$

3. t-test by Popularity Need (DumSN):

- Low Popularity Need group: ($M = 2.64$, $SD = 1.41$)
- High Popularity Need group: ($M = 4.21$, $SD = 0.36$)

The mean difference between the two groups: $t(126) = -9.07$, $p < 0.001$ (one-tailed), Cohen's $d = 1.63$

Results analysis

H1--Two-way ANOVA

H1: Human characters (vs. non-human characters) selection increases players' purchase intention toward in-game ornamental products. This effect attenuates when functional products are presented.

Main Effects:

Character Type (character~e):

- $F(1, 124) = 16.74, p = 0.0001$

The type of character (human vs. non-human) has a meaningful impact on purchase intentions.

Product Type (product_t~e):

- $F(1, 124) = 39.86, p = 0.0000$

The type of product (ornamental vs. functional) significantly affects purchase intentions.

Interaction Effects:

Character Type ×

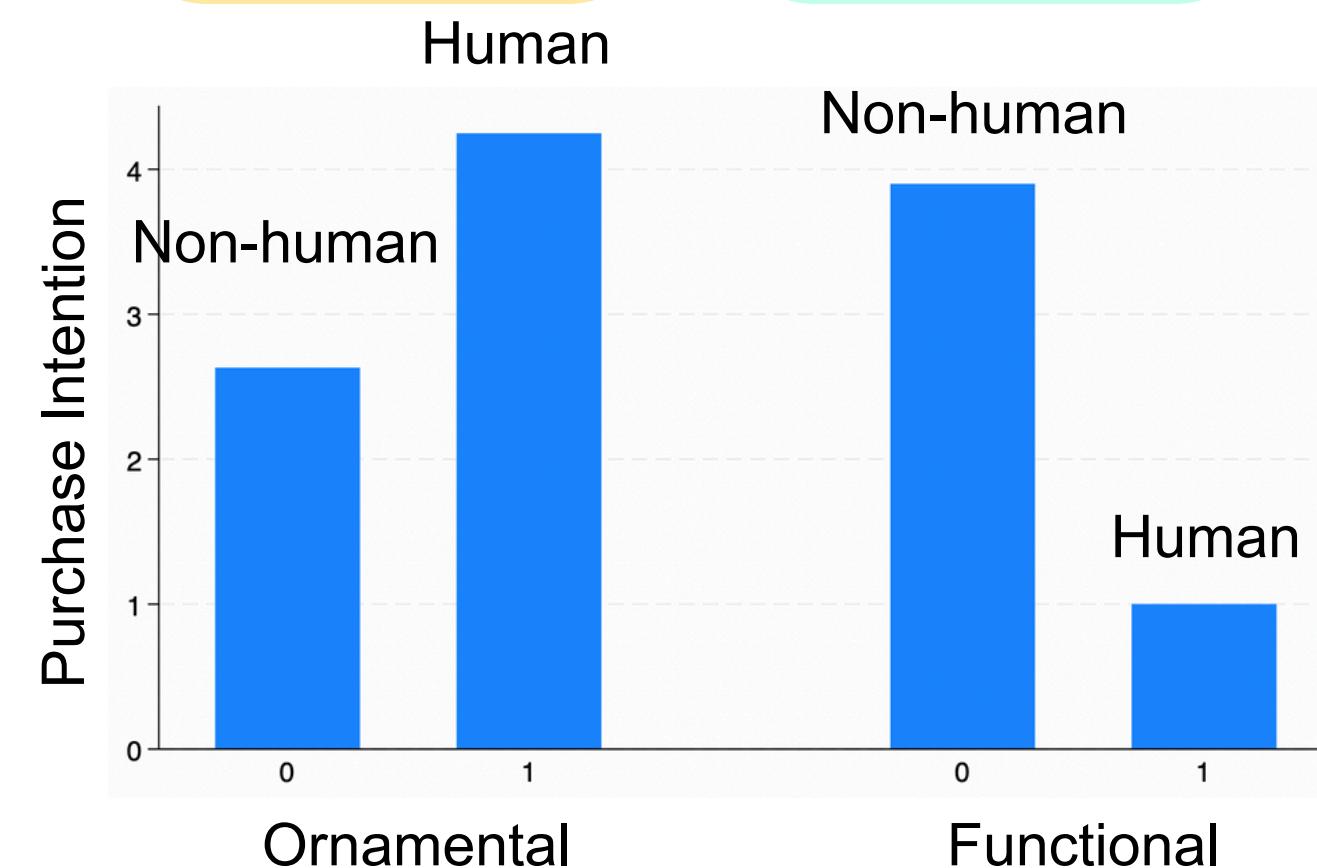
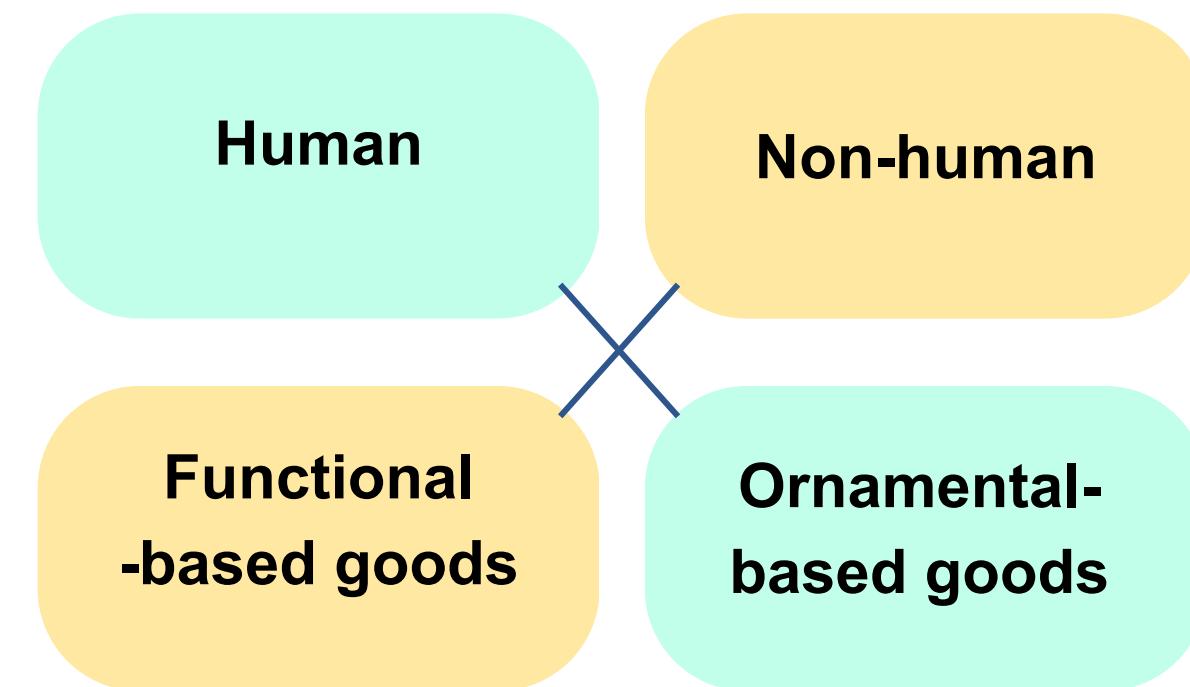
Product Type Interaction

(charactere#product_te):

- $F(1, 124) = 207.38, p = 0.000$

The impact of character type on purchase intention is different for ornamental versus functional products.

Number of obs = 128 Root MSE = .749525 R-squared = 0.6477 Adj R-squared = 0.6392						
Source	Partial SS	df	MS	F	Prob>F	
Model	128.09799	3	42.69933	76.01	0.0000	
character~e	9.4016448	1	9.4016448	16.74	0.0001	
product_t~e	22.391618	1	22.391618	39.86	0.0000	
character~e#product_t~e	116.50393	1	116.50393	207.38	0.0000	
Residual	69.6616	124	.5617871			
Total	197.75959	127	1.5571621			



Results analysis

H2&H3--mediation analysis

H2: Mediator1 — Identification theory (ID)



Indirect Effect of ID:

When the product was **ornamental (ProType = 1)**, the indirect effect was positive and significant, $b = 0.37$, $SE = 0.17$, $95\% CI [0.07, 0.75]$.

This supports the idea that human characters, when paired with items that enhance appearance and social signaling, can strengthen players' identification, leading to increased purchase intention.

However, when the product was **functional (ProType = 0)**, the indirect effect was negative and significant, $b = -0.23$, $SE = 0.15$, $95\% CI [-0.59, -0.02]$. This is because non-human characters may have lower identification with player himself, so led to purchase functional goods.

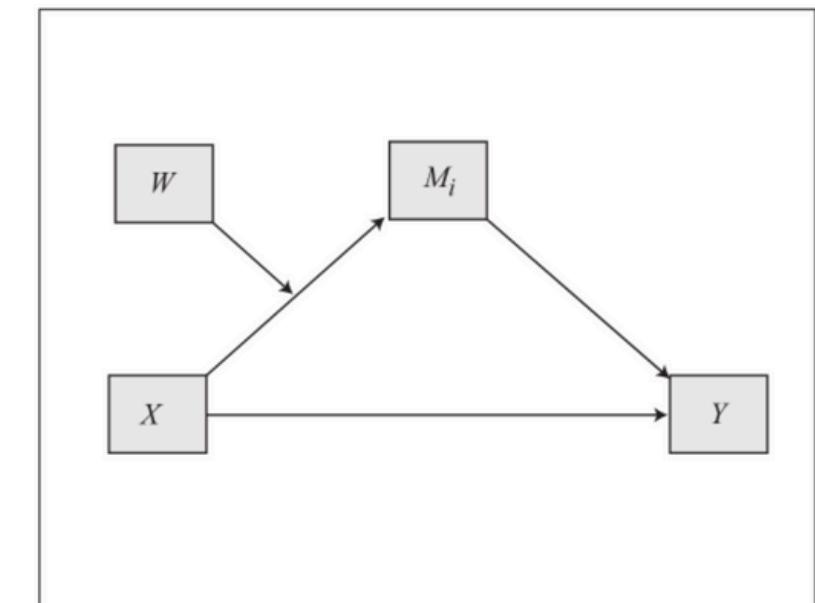
H3: Mediator2 — Deindividualization effect (DI)



the indirect effect of character type on purchase intention through deindividuation was **not significant** at either level of product type: functional ($b = 0.13$, $95\% CI [-0.13, 0.37]$) or ornamental ($b = 0.02$, $95\% CI [-0.04, 0.13]$).

Indicating that the indirect effect did not differ significantly between functional and ornamental products

Model 7



Process Model 7

Results analysis

H4--moderator analysis

H4: When consumers **have high need for popularity**, consumers exhibit higher purchase intention of **ornamental products** than functional products, regardless of the character role type.

Three-way ANOVA:

Character type (human vs. non-human)

Product type (ornamental vs. functional)

Need for popularity (DumSN=0 vs. DumSN=1)

Main Effects:

- Character Type × Product Type ($F = 22.65, p < 0.0001$)

Moderating Effects:

- Character Type × DumSN Interaction ($F = 9.33, p = 0.0031$)

The need for popularity moderates the effect of character type on purchase intention.

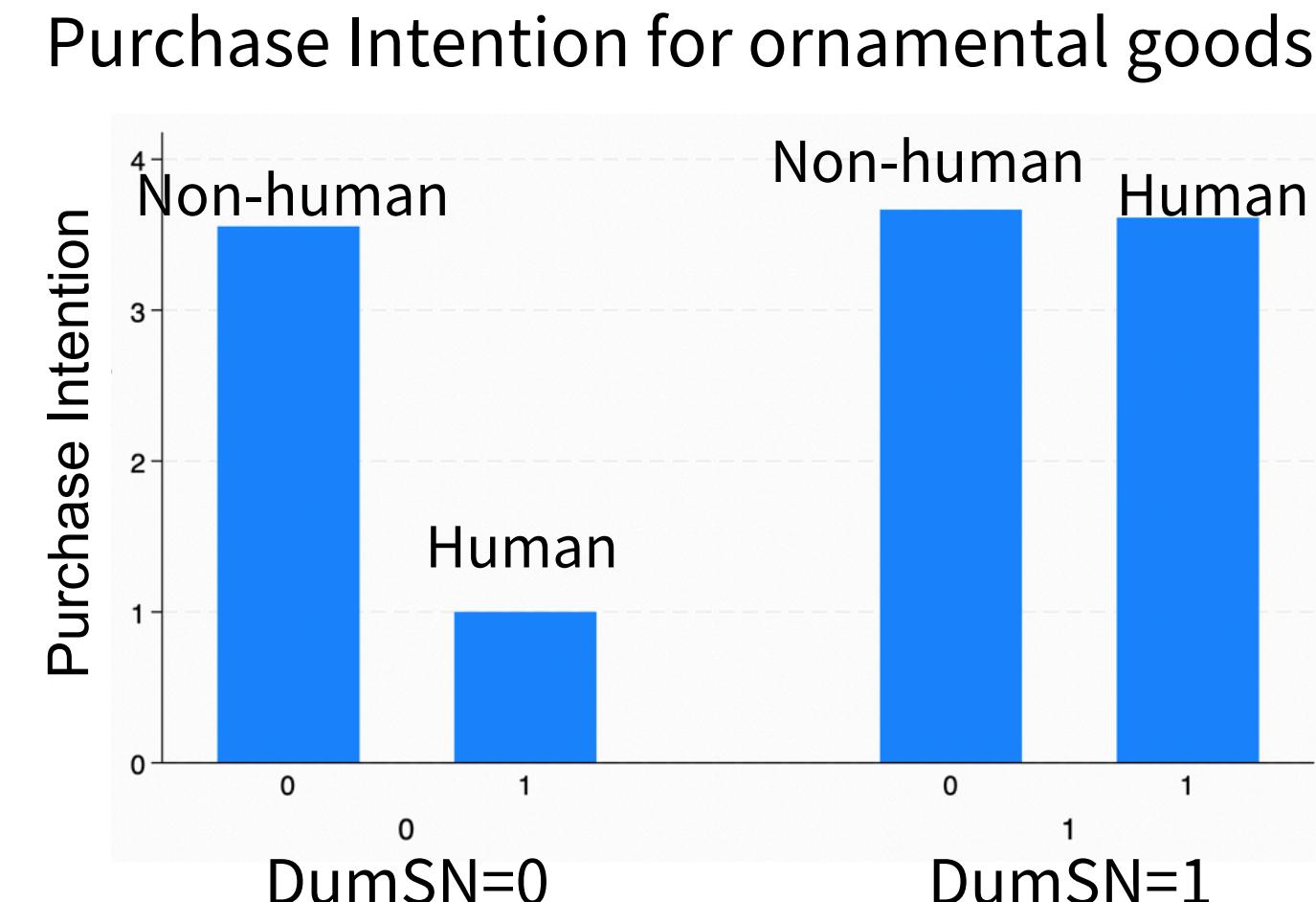
- Product Type × DumSN Interaction ($F = 10.87, p = 0.0015$)

The need for popularity moderates the effect of product type on purchase intention.

Conclusion:

The results support H4, which hypothesized that high need for popularity increases purchase intention for ornamental products compared to functional products, regardless of the character type.

This is evidenced by the significant interaction effects involving character type and product type with DumSN.



Results analysis

H5--moderated mediation analysis

H5: The **interactive effect** of role type selection (human characters vs. non-human characters), in-game purchase types (ornamental vs. functional) on purchase intention, and the effect of consumers' social need is **mediated by identification theory and deindividualization effect.**

Model 76

H5a

Moderated Mediation Effect:

INDIRECT EFFECT:

ChaType → IDavg → PLavg

ProType	SNavg	Effect	BootSE	BootLLCI	BootULCI
.0000	1.8333	-.1208	.0778	-.2937	.0149
.0000	3.1667	1.1823	.4394	.1503	1.8717

For functional products, when social need is low, there is no significant indirect effect of character type on purchase intention. However, when social need is moderate or high, choosing a human character is associated with increased purchase intention through increased identity.

1.0000	1.8333	4.5627	1.3845	1.2064	6.7814
1.0000	3.1667	1.4491	.2309	.9716	1.8802
1.0000	3.9167	.3509	.1086	.1530	.5817

For ornamental products, no matter what social need level they are at, choosing a human character is associated with increased purchase intention through increased identity.

H5c

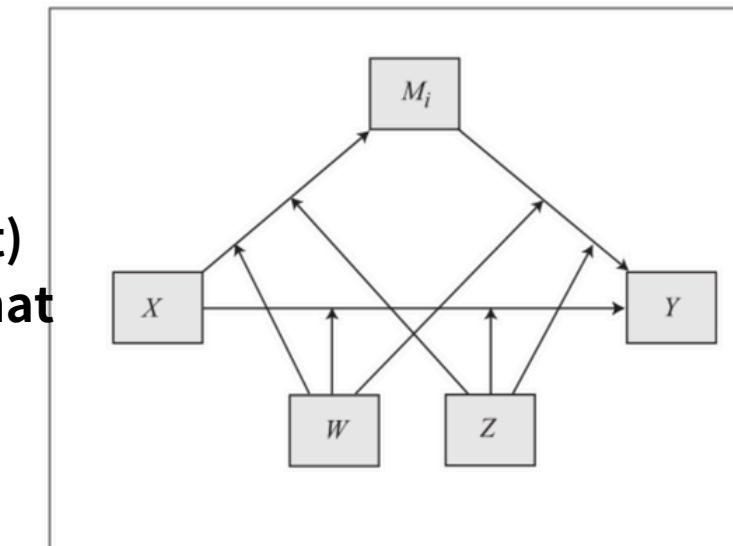
II

H4

Int_1 (ChaType x ProType): p = .0001
(Significant)

Int_3 (ChaType x SNavg): p < .0001 (Significant)

Conclusion: The output does show evidence that both ProType and SNavg moderate the direct effect of ChaType on PLavg.



OUTCOME VARIABLE:

PLavg

Model

	coeff	se	t	p	LLCI	ULCI
constant	3.8573	1.2110	3.1851	.0021	1.4458	6.2688
ChaType	-5.7221	.5040	-11.3531	.0000	-6.7257	-4.7185
IDavg	.1991	.3959	.5031	.6163	-.5891	.9874
ProType	-5.4328	.8763	-6.1994	.0000	-7.1779	-3.6878
Int_1	1.2073	.2878	4.1946	.0001	.6342	1.7804
Int_2	1.9147	.2448	7.8200	.0000	1.4272	2.4023
SNavg	.7017	.5919	1.1855	.2395	-.4769	1.8803
Int_3	1.0812	.1846	5.8579	.0000	.7137	1.4488
Int_4	-.3345	.1747	-1.9149	.0592	-.6823	.0133

Product terms key:

Int_1	:	ChaType	x	ProType
Int_2	:	IDavg	x	ProType
Int_3	:	ChaType	x	SNavg
Int_4	:	IDavg	x	SNavg

Int_1 tests if ProType moderates the direct effect.

Int_3 tests if SNavg moderates the direct effect.

05.

Discussion

Theoretical Contributions

Integration of Avatar Types and Consumption Motivations

Combine identity theory and deindividuation effect, revealing how human/non-human avatars influence in-game purchase intention through different psychological mechanisms (identity vs. anonymity).

Moderating Role of In-Game Item Functionality

This breaks through the traditional single-dimensional classification of in-game items (functional-based vs. ornamental-based) and reveals the interaction effect between item types and avatar types.



A photograph of a male gamer with a beard, wearing a purple hoodie and headphones, sitting in a red gaming chair. He is focused on a computer monitor displaying a video game. The background shows a large, dimly lit arena with other gaming stations and equipment.

Practical Contributions

Optimization Suggestions for Avatar and Item Design

- **Ornamental Item Marketing:** Game companies are advised to design more personalized skins/appearances for human avatars and strengthen identity through community interactions (e.g., avatar showcases, leaderboards).
- **Functional Item Promotion:** Non-human avatars (e.g., aliens, robots) are better suited for numerical upgrades (e.g., weapon packs), reducing social comparison pressure.

Player Segmentation and Precision Operations

- For players with a high need for popularity (identified through scales), limited-edition ornamental items can be promoted to leverage their social dissemination potential and increase payment rates.
- For players with low moral constraints (e.g., those preferring non-human avatars), anonymous social features (e.g., random teammate matching) can be designed to lower psychological barriers to payment.

Limitations

Insufficient Experimental Control

- Skin Appearance Interference
- Game Type Limitations

Sample Representativeness

- The study focuses on young Chinese players, overlooking male players or cross-cultural groups (e.g., Western players might have higher acceptance of non-human avatars).



Room for Improvement in Measurement Tools

- The identity scale directly borrows PAI (Player-Avatar Identification) without localization for ornamental item consumption scenarios.

Lack of Longitudinal Dynamics

- The cross-sectional design cannot capture changes in players' consumption psychology over time (e.g., shifting from identity to aesthetic fatigue).

Discussion and Future Research Directions

The Role of Emerging Technologies

- For example, VR environments may **heighten identity fusion** by providing more immersive and lifelike experiences, potentially amplifying the effects of human avatars on ornamental purchases.
- Future studies could explore how these technologies reshape player behavior and whether they introduce new mediating or moderating variables, such as presence or embodiment.

Virtual reality (VR) and augmented reality (AR) technologies become more integrated into gaming
(Shrivastava & Sharma, 2020)



Discussion and Future Research Directions

Cultural and Demographic Variations



For example, collectivist cultures might place greater emphasis on social signaling through ornamental purchases, while individualist cultures may prioritize functional upgrades for personal achievement (Lee et al., 2018).

Additionally, demographic factors such as age, gender, and gaming experience could moderate the effects of avatar type on purchase behavior. Future studies should incorporate diverse samples to validate the generalizability of our results.

06.

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