Humanities & Social Sciences Communications

ARTICLE

https://doi.org/10.1057/s41599-024-03039-9 OPEN

Men resist men: streamer-consumer gender match for advertising the functional benefits of heterogeneously priced utilitarian products

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Within the emerging live-streaming commerce context, streamer-consumer gender match has been considered an important topic in studies on advertising hedonic products. However, it is still under-explored how streamer-consumer gender match affects the mapping from functional benefits to advertising effectiveness when advertising utilitarian products and how the mechanism is contingent on heterogeneous price signals. To somewhat address the research gaps, we develop a number of hypotheses based on the elaboration likelihood model together with the price signaling mechanism and examine the research model drawing on a 28-day panel on 685 smartphones sold on Douyin Live Shopping. The empirical results indicate that (1) functional benefit performance has a positive effect on advertising effectiveness for utilitarian products with a middle-price signal, and the effect is stronger when the products are sold by male rather than female streamers; (2) also for advertising utilitarian products with a middle-price signal, male consumers resist male streamers when streamers leverage utilitarian information to stimulate consumers' purchase intention; and (3) functional benefit performance contributes little to advertising effectiveness for utilitarian products with a high-price or low-price signal. The evidence uncovers that gender match mainly makes a difference to appending extra hedonic cues rather than amplifying the conversion of utilitarian information in the sense of advertising utilitarian products. The findings also highlight the risk of neglecting within-category heterogeneities in the by-product-category research on live-streaming advertising.

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Introduction

As a business model that facilitated about $500 billion transactions worldwide in 2022, live-streaming commerce has become a prominent context for studying today's online advertising (Influencer Marketing Hub 2022). By endowing persuasion with unprecedented authenticity, visualization, and interactivity, live-streaming commerce accentuates the role of streamer-consumer interactions in shaping consumers' purchase intention (Xu et al. 2020; Zheng et al. 2023). Many researchers and practitioners have recognized the importance of harmonizing streamer and consumer characteristics for improving consumers' perceptions of values (e.g., Lu and Chen 2021; Wang et al. 2022; Wongkitrungrueng and Assarut 2020).

When discussing the compatibility between streamers and consumers in live-streaming commerce, streamer-consumer gender match is an emerging topic that is attracting people's attention with its intriguing stories. For example, Austin Li's (a famous male Chinese streamer) success in selling millions of cosmetics to female consumers has piqued intensive discussions in the mass media and academic environment (Guo et al. 2022). Previous researchers carried out some studies on this topic in the context of advertising hedonic products (e.g., apparel and cosmetics), and the evidence emphasizes that gender-based perceived similarity (e.g., the similarity between a male streamer who exhibits an affinity with women, like Austin Li, and female consumers) is a notable driver of persuasion efficacy in live-streaming commerce (Hudders and De Jans 2022; Jin and Ryu 2020; Liu et al. 2022).

Notwithstanding the findings drawn from the hedonic product context, little attention has been given to the role of streamer-consumer gender match in advertising utilitarian products (e.g., consumer electronics). As a branch of products that account for non-negligible trading value on live-streaming commerce platforms (Arora et al. 2021; Becdach et al. 2022), utilitarian products per se differ from hedonic products when discussing streamer-consumer gender match for advertising. Focusing on hedonic products, researchers usually posit that streamers can leverage their gender identities to directly generate hedonic value to consumers through interactions (e.g., Hudders and De Jans 2022; Jin and Ryu 2020; Yang et al. 2023). However, in the sense of advertising utilitarian products, functional benefit—which refers to the core function or needs a product meets (e.g., the operating performance of a smartphone)—is the foundation of consumers' value perception (Moran and Bagchi 2019).[1] This raises a particular need to consider streamer and consumer gender characteristics as amplifiers to or subtractors from the process that functional benefits drive consumers' purchase intention (Fang et al. 2016). In other words, within the utilitarian product context, researchers are required to investigate the question: "*How does streamer-consumer gender match affect the mapping from functional benefits to advertising effectiveness?*" (RQ1).

Furthermore, the utilitarian product is a broad product branch with various internal heterogeneities, and price dispersion is one of the most essential (Goldfarb and Tucker 2019). According to market signaling theory, different prices give consumers heterogeneous signals about the property of a product (Alpert et al. 1993; Spence 1974). Importantly, some price signals may imbue utilitarian products with non-utilitarian attributes (Gerstner 1985) and consequently change the advertising persuasion environment in which streamers interact with consumers (Suri et al. 2007; Wongkitrungrueng et al. 2020). For example, when the price of a utilitarian product is higher than a certain bar, consumers may regard the product as a luxury good (Kapferer and Laurent 2016), and the advertising for it would be strongly different from that of a normal utilitarian product (Hansen and Wänke 2011; Vigneron and Johnson 1999). Given the existence of price dispersion in most utilitarian product categories that are available on live-streaming commerce platforms (Wang et al. 2021), it is also necessary to inquire "*How is the role of streamer-consumer gender match in advertising utilitarian products contingent on heterogeneous price signals?*" (RQ2).

In this paper, we rely on the elaboration likelihood model (ELM) (Kitchen et al. 2014) together with the price signaling mechanism (Alpert et al. 1993; Spence 1974) to specify the theoretical framework and develop the research model. Drawing on a 28-day panel on 685 smartphones sold on the platform Douyin Live Shopping (i.e., the domestic version of TikTok Live Shopping), we examine the hypotheses with evidence and derive three key findings. First, functional benefit performance has a positive effect on advertising effectiveness when advertising utilitarian products with a middle-price signal, and the effect is stronger when male streamers, rather than female streamers, promote the products.[2] Second, also in the context of advertising utilitarian products with a middle-price signal, the role of male gender identities in strengthening functional benefit performance's positive effect on advertising effectiveness becomes weaker as the proportion of male consumers increases. Third, functional benefit performance has a weak effect on advertising effectiveness when advertising utilitarian products with a high-price or low-price signal, and streamer-consumer gender match has no significant effect on the relation between functional benefit performance and advertising effectiveness.

This paper contributes to the research in two aspects. First, the paper adds knowledge to the literature on gender in live-streaming advertising (e.g., Hou et al. 2020; Hudders and De Jans 2022; Jin and Ryu 2020; Liu et al. 2022; Yang et al. 2023). The findings reveal the fact that men (consumers) resist men (streamers) when streamers leverage utilitarian information to stimulate consumers' purchase intention in advertising utilitarian products. This somewhat implies that the role of gender match between streamers and consumers in advertising utilitarian products highly depends on what hedonic cues it appends rather than how it affects the credibility or value of utilitarian information. This may raise concerns regarding the abuse of sex appeal in live-streaming commerce. The paper also highlights the risk of neglecting within-category heterogeneities in the by-product-category research on live-streaming advertising (e.g., He and Jin 2022; Park and Lin 2020; Yang et al. 2023). Our empirical results indicate that, within a widely recognized utilitarian product category, items with high-price and low-price signals may be significantly distinct from normal items in terms of the conversion of utilitarian information in advertising. Consumers may not regard such long-tail items as normal utilitarian products when encountering advertising in live-streaming commerce.

The reminder of this paper is organized as follows. Section "Theoretical Background" clarifies how the ELM and price signaling mechanism work together in explaining the advertising persuasion of utilitarian products' functional benefits in live-streaming commerce, and Section "Hypotheses Development" hypothesizes based on the specified theoretical framework. Section "Data and Identification Framework" illustrates the methodology for the empirical analysis. Section "Empirical Results and Analysis" presents the results of the empirical analysis. Finally, Section "Discussion and Conclusion" discusses the implications of the findings and concludes.

Theoretical background

Elaboration likelihood model and the conversion of functional benefits in live-streaming advertising. The elaboration likelihood model (ELM) is a perspective to understand consumers'

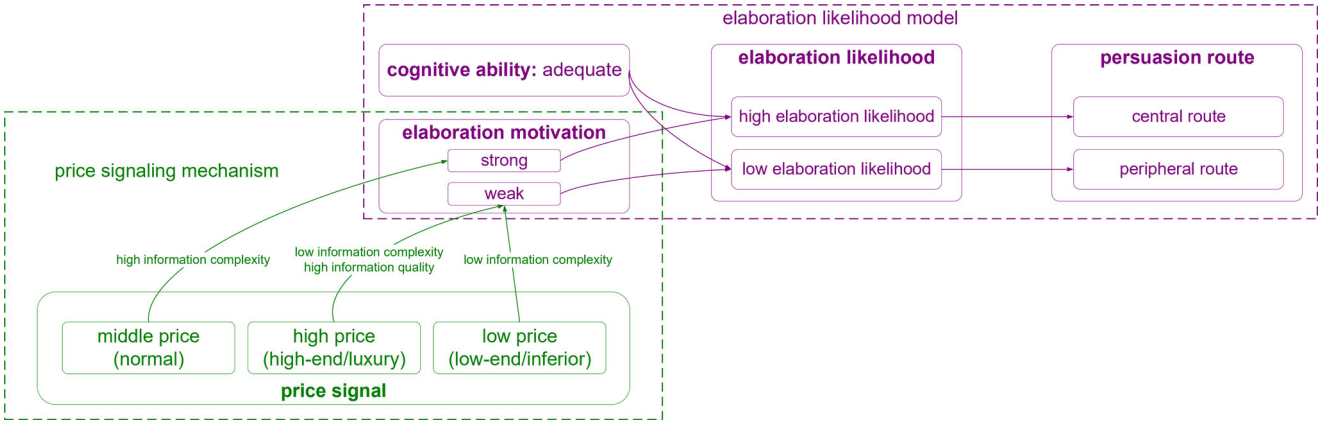


Fig. 1 Theoretical framework for understanding the advertising persuasion of the functional benefits of heterogeneously priced utilitarian products.

information processing in relation to advertising (Petty and Cacioppo 1983; Petty and Cacioppo 1986). The ELM states that there are two routes for advertising persuasion: the central route and the peripheral route. When consumers' elaboration likelihood is high, they may mainly process advertisements under the central route and attach seriousness to the evaluation of detailed arguments (e.g., quality information and the pattern(s) through which the information is presented). Conversely, when consumers' elaboration likelihood is low, the peripheral route may become significant, and consumers' attitudes toward advertisements are shaped based on their perception of positive or negative heuristic cues (e.g., product-irrelevant memes) (Kitchen et al. 2014; Moradi and Badrinarayanan 2021; Petty and Cacioppo 1983; Petty and Cacioppo 1986; Tam and Ho 2005).

Consumers' elaboration likelihood is subject to their elaboration motivation and cognitive ability, and the lack of either of them may result in low elaboration likelihood (Kitchen et al. 2014). When shopping for utilitarian products, consumers are usually able to deliberate about concrete functions (Chen and Lee 2008). Also, in the context of live-streaming advertising, authenticity and visualization make it easy for consumers to observe and cognitively evaluate product-centered information (Chang et al. 2020). Therefore, as we discuss the conversion of utilitarian products' functional benefits in live-streaming advertising, it is reasonable to posit that consumers have adequate cognitive ability, and elaboration motivation is the core factor determining consumers' elaboration likelihood. Specifically, as illustrated in Fig. 1, the central route dominates persuasion when consumers' elaboration motivation is high, while the peripheral route dominates persuasion when consumers' elaboration motivation is low.

It should be noted that the adopted framework does not imply the routes are mutually exclusive (c.f., Kitchen et al. 2014; Lord et al. 1995). Interactivity in live-streaming advertising allows the peripheral route to take effect simultaneously when the central route occupies a salient position in persuasion. In this case, streamer gender may constitute a type of heuristic cue that conveys independent hedonic value to consumers, besides its role as product-centered information that affects the conversion of functional benefits (Chang et al. 2020). Nevertheless, according to the research questions of this paper, we focus on the latter role of streamer gender in our theoretical development.

Heterogeneous price signals and elaboration likelihood levels in advertising utilitarian products. According to market signaling theory, sellers in a market with information asymmetry can provide certain signals to create incentive compatibility that motivates consumers to distinguish their products from those of other sellers (Spence 1974). In marketing, prices are widely regarded as signals of product properties like quality (Alpert et al. 1993; Wolinsky 1983).

For a utilitarian product, its price may particularly signify the product's class (e.g., high end or low end). The utilitarian value of a utilitarian product could not be infinitely high owing to the physical constraints on technology improvement in the short term (Davidse 1983; Gerstner 1985; Ronnen 1991), and the production cost of a utilitarian product could not be too low because it is necessary to spend a certain amount to achieve the basic functions required (Rao 2005; Shiv et al. 2005). Hence, within a utilitarian product category, items with a price higher than a conventional upper bar (i.e., a high-price signal) may feature the properties of high-end or luxury goods in consumers' eyes (Dubois and Duquesne 1993; Grossman and Shapiro 1988; Kapferer and Laurent 2016); items with a price lower than a conventional lower bar (i.e., a low-price signal) may be regarded as low-end or inferior goods that have only incomplete functions (Deneckere and Preston McAfee 1996); and items with a price in the middle (i.e., a middle-price signal) can be considered as normal utilitarian products.

Similar to other market signals, utilitarian products' price signals may affect consumers' motivation to process detailed arguments, thereby determining their elaboration likelihood. Given that fruitful information is available within the live-streaming commerce context, a high-price signal may reflect high information quality (DiRusso et al. 2011), and offering a high-price signal is a feasible strategy to emancipate consumers from information overload (Baylis and Perloff 2002). A low-price signal may imply that a utilitarian product has poor quality in most aspects (Deneckere and Preston McAfee 1996). To some extent, this feature can reduce the difficulty of making a trade-off between the information about one functional benefit and that about another functional benefit. Therefore, when trying to perceive the value of a utilitarian product with a high-price or low-price signal, consumers may have an incentive to rely on simple cues rather than detailed arguments about the product when encountering advertisements. In contrast, the advertising of utilitarian products with a middle-price signal may involve complicated information. As normal items in a category, the overall performance of these products should be similar, but each brand or even each product may have its specific functional strength (Jiang et al. 2021). In this case, to perceive shopping value, consumers are required to cognitively consider detailed information when encountering advertising.

In general, according to the relation between consumers' elaboration motivation and elaboration likelihood (Petty and Cacioppo 1986), it is reasonable to propose that consumers'

elaboration likelihood would be low when they are exposed to advertising for utilitarian products with a high-price or low-price signal, while their elaboration likelihood would be high when they are exposed to advertising for utilitarian products with a middle-price signal. This mechanism is also presented in Fig. 1.

Hypotheses development

Streamer-consumer gender match for promoting the functional benefit of utilitarian products with a middle-price signal. As per the theoretical framework illustrated in Fig. 1, utilitarian products with a middle-price signal can be regarded as normal utilitarian products, and the advertising of these products is mainly processed by consumers under the central route. When buying normal utilitarian products, consumers mainly aim to seek utilitarian value, which is accrued through the perception of functional benefits (Dhar and Wertenbroch 2000; Holbrook and Hirschman 1982). It is evident that detailed information about a normal utilitarian product's functional benefits forms a positive driver of consumers' motivation to buy the product in both online and offline retailing circumstances (Garrido-Morgado et al. 2021; Lin et al. 2018; Schulze et al. 2014). Hence, we propose hypothesis 1 as follows.

H1: *For utilitarian products with a middle-price signal, functional benefit performance has a positive effect on advertising effectiveness in live-streaming commerce.*

Revolving around the conversion of utilitarian products' functional benefits in live-streaming advertising, consumers may regard streamer gender information as an important factor that affects the credibility and attractiveness of persuasion (Yang et al. 2023). According to the gender stereotypes in advertising, female cues are usually associated with brand warmth and attention-drawing tactics, while male cues are mostly associated with functional competence and problem-solving involvement (Aaker et al. 2012; Chang 2007). In particular, high-tech consumer electronics are the most popular utilitarian products sold in live-streaming commerce (Arora et al. 2021). Male salespeople and endorsers are conventionally portrayed as deep thinkers who can better convey the utilitarian value of high-tech products to target consumers (Dilevko and Harris 1997; Persaud et al. 2018). Hence, without the consideration of consumers' gender identities, male streamers, rather than female streamers, should be more appropriate for leveraging functional benefits to persuade consumers to buy utilitarian products. Here, we propose hypothesis 2 as follows.

H2: *When male streamers, rather than female streamers, advertise utilitarian products with a middle-price signal, the positive effect of functional benefit performance on advertising effectiveness is stronger.*

Furthermore, the match between streamer gender and consumer gender particularly shapes consumers' attitudes toward utilitarian information conveyed by streamers with certain gender identities (Hou et al. 2020; Liu et al. 2022; Yang et al. 2023). There might exist two competing channels through which the match can take effect. On the one hand, belonging to the same gender may foster the efficacy of streamers conveying in-group messages to consumers because the source similarity can reinforce in-group trustworthiness (Hudders and De Jans 2022; Schouten et al. 2020). In this sense, because male streamers' cues of being specialized in conveying functional information fit male consumers' preference for functional information, male streamers may be more capable of leveraging functional benefits to incur the purchase intention of male consumers rather than female consumers (Liu et al. 2022; Yang and Lee 2010). On the other hand, the visualized presence of streamers' gender identities may equip message conversion with extra hedonic values such as sex appeal (Guo et al. 2022; Prendergast et al. 2014). This may imply that male (female) consumers always prefer persuasion from female (male) streamers. This channel coincides with the evidence that male consumers think they have neither similarity with nor preference for male influencers in social marketing (Hudders and De Jans 2022). In this case, male streamers may be less capable of leveraging functional benefits to motivate male consumers' rather than female consumers' purchase intention. Because it is uncertain which one of the two channels should dominate the explanation, we leave competing hypotheses 3a and 3b for examination.

H3a: *When advertising utilitarian products with a middle-price signal, as the proportion of male consumers increases, the role of male gender identities in strengthening functional benefit performance's positive effect on advertising effectiveness strengthens.*

H3b: *When advertising utilitarian products with a middle-price signal, as the proportion of male consumers increases, the role of male gender identities in strengthening functional benefit performance's positive effect on advertising effectiveness weakens.*

Deviation of utilitarian products with a high-price or low-price signal from normal utilitarian products. Different from the advertising of utilitarian products with a middle-price signal, the peripheral route dominates persuasion when advertising utilitarian products with a high-price or low-price signal (see also Fig. 1). In this case, consumers rely on simple cues to perceive value when they encounter advertisements. At the same time, as a high-price signal may indicate luxuriousness and a low-price signal may imply low-end properties, the information revolving around functional benefits may not be at the core of these simple cues.

Specifically, utilitarian products with a high-price signal may have the properties of luxury goods. Although it is not difficult for consumers to identify and grasp utilitarian information in live-streaming advertising, functional motivation is just marginally important in luxury consumption (Amatulli et al. 2020; Vickers and Renand 2003). According to the traditional literature like Grossman and Shapiro (1988), mere use (i.e., the sign of few functional benefits) is an essential attribute of luxury goods. In other words, the emphasis of functional benefits may constitute a meaningless or even negative sign for a luxury good's value in consumers' eyes. This coincides with the failure to present the iPhone SE (the initial version) to Apple's conventional consumers based on the product's cost-performance advantages (Elmer-Dewitt 2016). Of course, some researchers may argue that the mere-use proposition is too strong, and consumers still care about functional benefits when buying luxury goods (e.g., Husic and Cicic 2009; Nwankwo et al. 2014). However, the argument cannot properly apply to the case of purchasing luxury items in a utilitarian product category. In such a category, emphasizing the functional benefits of an item may weaken consumers' perception of the product's uniqueness, which is at the core of the motivations for luxury consumption (Amatulli et al. 2020; Husic and Cicic 2009; Nwankwo et al. 2014; Grossman and Shapiro 1988). Hence, we propose hypothesis 4 as follows.

H4: *For utilitarian products with a high-price signal, functional benefit performance has no significant effect on advertising effectiveness in live-streaming commerce.*

Utilitarian products with a low-price signal can be regarded as low-end or inferior goods, which target consumers with no sufficient budget to afford a better option (Deneckere and Preston McAfee 1996). In this case, functional benefits may weigh little in the consumers' shopping motivation because it is difficult to discriminate among the low-quality options, and the best one among them is not satisfactory enough. Even if some of the consumers still take account of the products' functional benefits, the

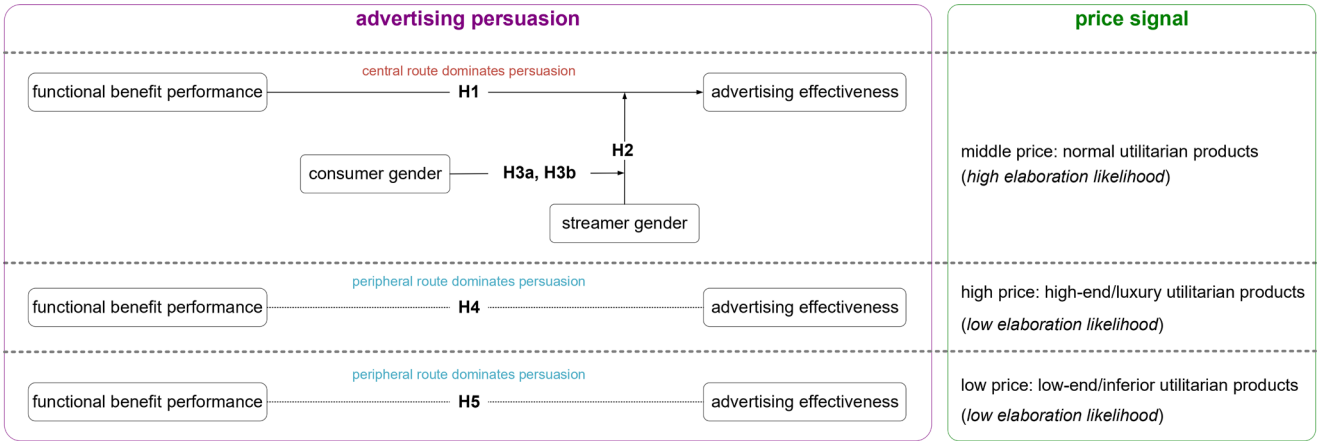


Fig. 2 Research model adopted in the empirical analysis.

shopping motivation specific to this attribute would be less important compared with the motivations oriented to other factors like affordability (Arunachalam et al. 2020) and self-verification (Stuppy et al. 2020). In fact, fast-fashion brands like SHEIN has frankly admitted the pretty poor quality of their products and succeeded in attracting consumers who care little about the quality issue through social media advertising (Donnelly and Chakrabarti 2023). Hence, we propose hypothesis 5 as follows.

H5: *For utilitarian products with a low-price signal, functional benefit performance has no significant effect on advertising effectiveness in live-streaming commerce.*

Hypotheses 4 and 5 also imply that, when advertising utilitarian products with a high-price or low-price signal, streamer gender identities cannot impact advertising effectiveness by affecting the conversion of functional benefits.

As a summary, the hypotheses above can be illustrated with the research model shown in Fig. 2.

Data and identification framework

Data sources. To test the hypotheses, we collect a sample of 685 smartphones advertised by 129 professional live streamers on the live-streaming commerce platform Douyin Live Shopping from September 13th, 2021 to October 10th, 2021 (i.e., 4 weeks) using Python together with the smartphone performance dataset supported by 3DMark®. After excluding the observations lacking browsing records or smartphone performance data, 10,994 observations remain in the sample.

Among utilitarian products sold on live-streaming commerce platforms, the smartphone is a representative that features transparent prices and commensurable functional performance benchmarks (Arora et al. 2021; Jiang et al. 2021). In 2022, the category took up four spaces among the top 20 brands on the platform Taobao Live (i.e., one of the largest live-streaming commerce platforms in the world) (iResearch, Taobao Live ON MAP 2022). The smartphone market has become mature in China, and the price distribution has approached a normal distribution (Hou 2021). With such a price distribution, it is reasonable to propose that the items falling at each of the two ends may have different properties from the items in the middle (Goldfarb and Tucker 2019). The time interval of the sample does not involve any influential promotional activities (e.g., Singles' Day). Taken together, the sample is appropriate for examining our research model (c.f., Lu and Chen 2021).

Variables. The variables and their direct measures are listed in Table 1. The dependent variable *advertising effectiveness* is measured by the watch-to-click conversion rate (abbr., *conversion rate*) of advertising for a smartphone. For advertising a certain product in a live-streaming show, the proportion of consumers that finally click the product link is an intuitive proxy of the streamer's product-specific advertising effectiveness.

The main-effect independent variable *functional benefit performance* is measured by the ratio of 3DMark® Wild Life benchmark to price (abbr., *cost-performance ratio*) of a smartphone. For a utilitarian product, its functional benefit performance may consist of many aspects (e.g., hardware, software, screen, camera, etc., for a smartphone). The messages about these aspects may have mutually complementary or mutually exclusive roles in affecting advertising effectiveness (Hou et al. 2020; Krey et al. 2019). The interest of concern of this paper boils down to the role of streamer-consumer gender match in the mapping from functional benefits to advertising effectiveness instead of the mapping itself. Accordingly, it is necessary to control the confounding effects of the complicated interactions between different functional benefits. In this case, using a synthesized functional benefit performance measure is a feasible strategy. 3DMark® is a well-known benchmarking platform that provides commensurable performance scores for smartphones worldwide. The 3DMark® Wild Life benchmark is one of the mainstream measures. It indicates the comprehensive graphics performance based on the major hardware elements in a smartphone (3DMark 2021). Hence, the computed cost-performance ratio would be an appropriate measure for our analysis. At the same time, we are able to avoid consumers' subjective bias as we adopt an objective measure.

Price is the variable used for grouping. As reported in Table 2, we divide the sample into five price-based subsamples. Specifically, smartphones with a price belonging to $[0, 1000)$ or $[1000, 2000)$ are designated as utilitarian products with a low-price signal; smartphones with a price in $[2000, 3000)$ or $[3000, 4000)$ are designated as utilitarian products with a middle-price signal; smartphones with a price in $[4000, 5000)$ or $[5000, 20000)$ are designated as utilitarian products with a high-price signal.[3] In China, e-commerce platforms usually cluster the prices of smartphones by thousand-yuan intervals, and smartphones priced below 2000 yuan and above 4000 yuan are conventionally regarded as low-end and high-end items, respectively (ZDC 2020; Zeng 2023). Hence, the grouping rule we adopt in this paper makes sense because the sample smartphones are sold in the China market. Also, given that odd-even pricing is very popular in the emerging-market smartphone industry (Dubey 2018; Zeng 2023), we set the price intervals as left-open and right-closed intervals. The validity of the grouping rule is further analyzed in the robustness checks.

Table 1 Description of the variables used in the analysis.

Variable		Type	Description
Conversion rate (Dependent variable)	CVR_{itcbe}	Scale	The watch-to-click conversion rate of streamer *c* advertising smartphone *i* with brand *b* in live-streaming show *e* at date *t*.
Cost-performance ratio (Main-effect independent variable)	CPR_{itcbe}	Scale	The ratio of 3DMark® Wild Life benchmark to price of smartphone *i* with brand *b* advertised by streamer *c* in live-streaming show *e* at date *t*.
Streamer gender (Moderating variable)	$GenderS_c$	Dummy	Streamer *c*'s gender (female = 0, male = 1).
Consumer gender (Moderating variable)	$GenderV_c$	Scale	The proportion of men in the group of consumers following streamer *c* (the average over the sample interval).
Price (Variable used for grouping)	$Price_{itcbe}$	Scale	The price (in yuan) of smartphone *i* with brand *b* advertised by streamer *c* in live-streaming show *e* at date *t*.

Table 2 Descriptive statistics of the variables.

Price-based (sub)sample		Variable	Obs.	Mean	S.D.	Min	Max
Price (signal) group	**Range ($Price_{itcbe}$)**						
Low price	[0, 1000)	CVR_{itcbe}	663	0.209	0.262	0	2.81
		CPR_{itcbe}	660	0.667	0.439	0.239	5.612
		$GenderS_c$	663	0.032	0.175	0	1
		$GenderV_c$	663	82.753	9.723	0	93.67
	[1000, 2000)	CVR_{itcbe}	2438	0.501	1.536	0	49.93
		CPR_{itcbe}	2438	1.069	0.685	0.141	3.054
		$GenderS_c$	2438	0.021	0.143	0	1
		$GenderV_c$	2438	81.419	13.133	0	94.14
Middle price	[2000, 3000)	CVR_{itcbe}	2962	1.079	2.128	0	39.13
		CPR_{itcbe}	2962	1.401	0.426	0.532	2.606
		$GenderS_c$	2962	0.035	0.185	0	1
		$GenderV_c$	2962	80.134	16.786	0	95.84
	[3000, 4000)	CVR_{itcbe}	1884	0.947	1.721	0	31.91
		CPR_{itcbe}	1884	1.242	0.331	0.574	1.898
		$GenderS_c$	1884	0.061	0.238	0	1
		$GenderV_c$	1884	80.64	15.667	0	95.84
High price	[4000, 5000)	CVR_{itcbe}	1031	1.421	4.876	0	77.32
		CPR_{itcbe}	1031	1.137	0.252	0.6	1.815
		$GenderS_c$	1031	0.109	0.311	0	1
		$GenderV_c$	1031	81.145	13.318	0	95.84
	[5000, 20000)	CVR_{itcbe}	2016	1.71	5.57	0	100
		CPR_{itcbe}	2016	0.93	0.368	0.309	1.735
		$GenderS_c$	2016	0.133	0.34	0	1
		$GenderV_c$	2016	72.583	22.666	0	95.58
Overall	[0, 20000)	CVR_{itcbe}	10994	1.023	3.221	0	100
		CPR_{itcbe}	10991	1.145	0.507	0.141	5.612
		$GenderS_c$	10994	0.061	0.24	0	1
		$GenderV_c$	10994	79.374	16.836	0	95.84

Note: We do not present the correlation matrix here because it provides little information as the fixed effects are employed in regression.

Streamer gender and *consumer gender* are the two moderating variables. The details about the measures are presented in Table 1.

Basic econometric models. To identify the effects of concern, the following econometric model is employed for regressions with the subsamples:

$$\begin{aligned} CVR_{itcbe} = {} & \alpha + \beta_1 CPR_{itcbe} + \boldsymbol{W_i} + \boldsymbol{X_t} + \boldsymbol{Y_c} \\ & + \boldsymbol{Z_b} + \varepsilon_{itcbe} + \beta_2 \left(CPR_{itcbe} \times GenderS_c\right) \\ & + \beta_3 \left(CPR_{itcbe} \times GenderV_c\right) \\ & + \beta_4 \left(CPR_{itcbe} \times GenderS_c \times GenderV_c\right). \end{aligned} \quad (1)$$

In Eq. (1), $\boldsymbol{W_i}$, $\boldsymbol{X_t}$, $\boldsymbol{Y_c}$, and $\boldsymbol{Z_b}$ are vectors of the coefficients of product, date, streamer, and brand dummies that account for the product, date, streamer, and brand fixed effects, respectively. Hence, $GenderS_c$ and $GenderV_c$ are not included in the models because they are completely linear-correlated to $\boldsymbol{Y_c}$. ε_{itcbe} is the error term. In the estimation, all standard errors are clustered at the live-streaming-show level to control for the within-show correlations. For the coefficients, β_1 and β_2 capture the effects of cost-performance ratio on the effectiveness of advertising a consumer electronic product by female and male streamers, respectively. β_3 and β_4 evaluate how the proportion of men in the group of consumers following a streamer affects the by-streamer-gender effects captured by β_1 and β_2, respectively.

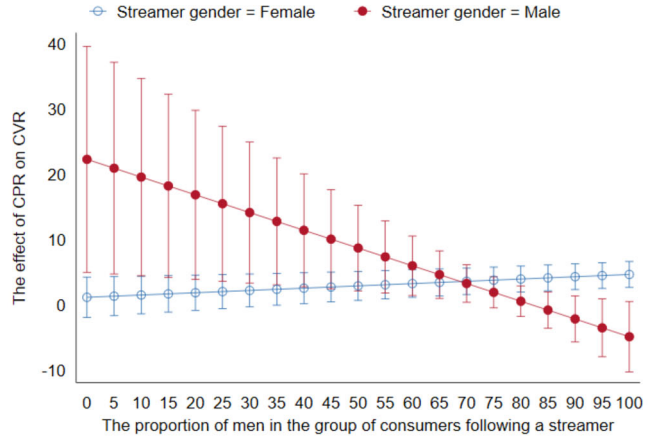
Empirical results and analysis

Descriptive statistics. The descriptive statistics of the variables used in the empirical analysis are presented in Table 2. The results roughly indicate a bell-shaped price distribution and a bell-shaped relation between cost-performance ratio and price level. This implies that smartphones with heterogeneous price signals may have different features. This lends credibility to the idea of developing the hypotheses by price signal.

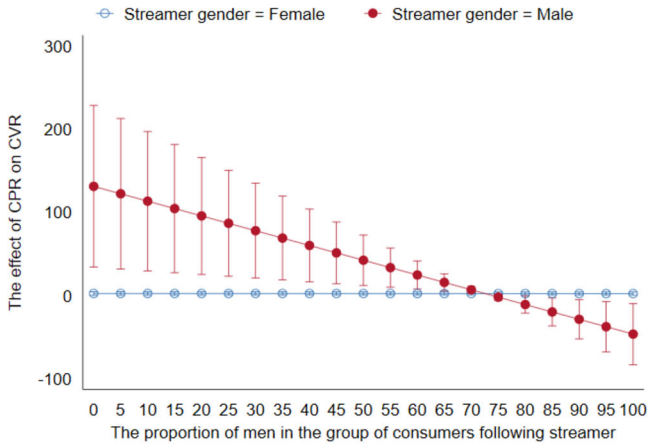
Table 3 Main results.

Dependent variable: CVR_{itcbe}	(1)	(2)	(3)	(4)	(5)
Subsample (by $Price_{itcbe}$):	[0, 2000)	[2000, 3000)	[3000, 4000)	[4000, 5000)	[5000, 20000)
CPR_{itcbe}	−0.929	1.100	2.332**	−66.587	−19.212*
	(8.084)	(1.578)	(1.121)	(68.103)	(10.808)
$CPR_{itcbe} \times GenderS_c$	3.834	21.145**	128.822***	−22.485	17.671
	(7.868)	(8.351)	(49.854)	(159.002)	(18.290)
$CPR_{itcbe} \times GenderV_c$	0.014	0.035**	−0.002	0.910	0.196
	(0.094)	(0.014)	(0.007)	(0.887)	(0.127)
$CPR_{itcbe} \times GenderS_c \times GenderV_c$	−0.079	−0.307***	−1.775***	0.573	−0.140
	(0.089)	(0.111)	(0.685)	(1.929)	(0.254)
Coefficient	0.240	−4.437***	−0.975	−10.189	5.549**
	(0.276)	(1.416)	(1.289)	(7.999)	(2.764)
Product fixed effects	Yes	Yes	Yes	Yes	Yes
Date fixed effects	Yes	Yes	Yes	Yes	Yes
Channel fixed effects	Yes	Yes	Yes	Yes	Yes
Brand fixed effects	Yes	Yes	Yes	Yes	Yes
Obs.	3090	2947	1870	1013	1941
Adjusted R^2	0.282	0.346	0.228	0.172	0.350

Note: 100 singleton observations are dropped because the fixed effects are controlled. The first two price levels are combined to guarantee a large enough degree of freedom in estimation.
* Significant at p<0.10 level; ** significant at p<0.05 level; *** significant at p<0.01 level. Standard errors, clustered at the live-streaming show level, are in parentheses.



(a) $2000 \le Price_{itcbe} < 3000$



(b) $3000 \le Price_{itcbe} < 4000$

Fig. 3 Gender-match-contingent effects of cost-performance ratio on conversion rate for smartphones with a middle-price signal. a Marginal effect plot for smartphones priced greater than or equal to 2000 yuan and below 3000 yuan. **b** Marginal effect plot for smartphones priced greater than or equal to 3000 yuan and below 4000 yuan.

Main results. The results of using Eq. (1) in regressions with different subsamples are presented in Table 3. In the regressions, 100 singleton observations are further dropped because the fixed effects are controlled.

For utilitarian products with a middle-price signal (columns (2) and (3)), the results regarding the overall relation of functional benefit performance and advertising effectiveness indicate that cost-performance ratio probably has a positive effect on conversion rate for smartphones with a middle-price signal ($\beta_1 = 1.100$, p>0.10 and $\beta^{overall} = 3.786$, p<0.01 for $2000 \le Price_{itcbe}$<3000; $\beta_1 = 2.332$, p<0.05 and $\beta^{overall} = 1.222$, p<0.10 for $3000 \le Price_{itcbe}$<4000).[4] This provides evidence to support hypothesis 1.

Regarding the role of streamer-consumer gender match in shaping the relation between functional benefit performance and advertising effectiveness, male streamers can better leverage the information about cost-performance ratio to generate conversion rate compared with female streamers ($\beta_2 = 21.145$, p<0.05 for $2000 \le Price_{itcbe}$<3000; $\beta_2 = 128.822$, p<0.01 for $3000 \le Price_{itcbe}$<4000). At the same time, this streamer-gender-based difference is negatively correlated to the proportion of men in the group of consumers following a streamer ($\beta_4 = -0.307$, p<0.01 for $2000 \le Price_{itcbe}$<3000; $\beta_4 - 1.775$, p<0.01 for $3000 \le Price_{itcbe}$<4000). Figure 3 illustrates the moderating effect of streamer gender on the influence of cost-performance ratio on conversion rate and the contingency of the moderating effect on consumer gender. For smartphones priced within both intervals, the effect of cost-performance ratio on conversion rate regarding general consumers (i.e., $GenderV_c = 50$) is higher when a product is advertised by male streamers rather than female streamers. However, this streamer-gender-based difference weakens as the proportion of male consumers increases. In general, the results support hypotheses 2 and 3b but not hypothesis 3a.

The results in columns (1), (4), and (5) support hypotheses 4 and 5 by indicating that cost-performance ratio generally has no significant effect on conversion rate for smartphones with a high-price or low-price signal ($\beta_1 = -0.929$, p>0.10 and $\beta^{overall} = 0.143$, p>0.10 for $0 \le Price_{itcbe}$<2000; $\beta_1 = -66.587$, p>0.10 and $\beta^{overall} = 9.872$, p>0.10 for $4000 \le Price_{itcbe}$<5000; $\beta_1 = -19.212$, p<0.10 and $\beta^{overall} = -3.987$, p>0.10 for $5000 \le Price_{itcbe}$<20000). In addition, the insignificant estimators of β_2, β_3, and β_4 add evidence to the proposed price signaling

Table 4 Validity of the price signal specification.

Pair of price-based subsamples		Wald test for systematic difference (χ^2)	Significant direction change		
			β_1	β_2	β_4
Across price (signal) groups	[0, 2000) vs. [2000, 4000)	23.559***	-		
	[2000, 4000) vs. [4000, 20000)	10.860**	-		
Within a price (signal) group	[2000, 3000) vs. [3000, 4000)	13.581***	No	No	No
	[4000, 5000) vs. [5000, 20000)	0.149	No	No	No

Note: The Wald tests are conducted based on the joint parameter vectors and variance–covariance matrices for coefficients, which are derived by using SUR estimation. The across-price group direction changes regarding individual coefficients are not taken into account because we do not regard each price group as uniform when presenting the main results. A direction change in a coefficient across a pair of subsamples is considered as significant as long as one of the following conditions is satisfied: (1) across the subsamples, the significance of the coefficient changes from insignificant or marginally significant (i.e., p<0.10) to significant (i.e., p<0.05), or vice versa; (2) in each subsample, the coefficient is significant.
* Significant at p<0.10 level; ** significant at p<0.05 level; *** significant at p<0.01 level.

Table 5 Comparison between the main results and the estimation results with the control for the inverse causality.

Dependent variable: CVR_{itcbe}	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Subsample (by $Price_{itcbe}$):	[0, 2000)		[2000, 3000)		[3000, 4000)		[4000, 5000)		[5000, 20000)	
CPR_{itcbe}	−0.929	−0.666	1.100	4.878***	2.332**	4.503***	−66.587	−57.184	−19.212*	−21.404**
	(8.084)	(7.869)	(1.578)	(1.504)	(1.121)	(1.071)	(68.103)	(64.274)	(10.808)	(10.132)
$CPR_{itcbe} \times GenderS_c$	3.834	3.830	21.145**	20.869***	128.822***	128.056***	−22.485	−22.396	17.671	17.663
	(7.868)	(7.659)	(8.351)	(7.958)	(49.854)	(47.784)	(159.002)	(150.185)	(18.290)	(17.147)
$CPR_{itcbe} \times GenderV_c$	0.014	0.014	0.035**	0.035***	−0.002	−0.002	0.910	0.906	0.196	0.196*
	(0.094)	(0.091)	(0.014)	(0.013)	(0.007)	(0.007)	(0.887)	(0.837)	(0.127)	(0.119)
$CPR_{itcbe} \times GenderS_c \times GenderV_c$	−0.079	−0.079	−0.307***	−0.303***	−1.775***	−1.765***	0.573	0.571	−0.140	−0.140
	(0.089)	(0.086)	(0.111)	(0.106)	(0.685)	(0.656)	(1.929)	(1.822)	(0.254)	(0.238)
Product fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Date fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Channel fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Brand fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control for the inverse causality using SUR	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes

Note: * Significant at p<0.10 level; ** significant at p<0.05 level; *** significant at p<0.01 level. Standard errors, clustered at the live-streaming show level, are in parentheses.

mechanism (see Fig. 1), and the weak negative effect of cost-performance ratio on conversion rate for smartphones priced within the highest interval coincides with the argument that mere use is essential for consumers' perception of a luxury good's value. These results also support the rationality of the hypothesizing.

Robustness checks

Validity of the specification of price signals. To further check the validity of the price-based grouping rule, we rely on the seemingly unrelated regression (SUR) approach to test whether there are systematic differences across the three price groups. Specifically, we first conduct a Wald test for systematic difference between each pair of price groups based on the joint parameter vectors and variance–covariance matrices for the coefficients of concern in the main results (viz. β_1, β_2, and β_4). Then, within each price group, we conduct a Wald test for systematic difference and differences concerning individual coefficients between each pair of price-based subsamples.[5]

As shown in Table 4, the results indicate that there is a significant systematic difference between each pair of price groups. Furthermore, for the high-price group, there is no within-group systematic difference between the price-based subsamples included. For the middle-price group, although there is a significant systematic difference between the price-based subsamples included, there is no significant direction change regarding each coefficient. Combined with the specific estimation results reported in Table 3, we find that the effects of concern mostly exhibit the same properties for smartphones priced within [2000, 3000) and [3000, 4000), while the properties are stronger for the latter. In general, these results support the validity of the price-based grouping rule.

Inverse causality between functional benefit performance and advertising effectiveness. In the theory development and empirical analysis, we take functional benefit performance as a driver of advertising effectiveness by default. However, there may exist an inverse causality problem because streamers who have better advertising effectiveness may actively choose to promote utilitarian products with higher functional benefit performance (Chen et al. 2023). To check whether the involvement of this inverse causality can affect the validity of the main results, we rely on the SUR approach to jointly estimate Eq. (1) and Eq. (2) (c.f., De Jong et al. 2006) using the subsamples separately.

$$CPR_{itcbe} = \alpha + \delta CVR_{itcbe} + \boldsymbol{W_i} + \boldsymbol{X_t} + \boldsymbol{Y_c} + \boldsymbol{Z_b} + \varepsilon_{itcbe}. \quad (2)$$

As shown in Table 5, there is no remarkable difference between the main results and the estimation results with the control for the inverse causality, especially for the effects concerned with streamer gender. This implies that the main results are robust to the potential inverse causality of advertising effectiveness to functional benefit performance, and the role of streamer-consumer gender match in conveying functional benefits is close to an extra adjunct rather than an amplifier to functional benefit information.

Disturbance from the covariates of streamer gender. As a dummy variable, streamer gender may be correlated to a variety of streamer-specific factors. It is possible that the differences in the effects with respect to streamer gender (or gender-centered

Table 6 Streamer-specific variables used in the propensity score matching.

	Streamer-specific variable
1	The proportion of consumers aged below 18.
2	The proportion of consumers aged 18–24.
3	The proportion of consumers aged 25–30.
4	The proportion of consumers aged 31–35.
5	The proportion of consumers aged 36–40.
6	The proportion of consumers from the first-tier cities in China.
7	The proportion of consumers from the second-tier cities in China.
8	The proportion of consumers from the third-tier cities in China.
9	The proportion of consumers from the fourth-tier cities in China.
10	The proportion of consumers from the fifth-tier cities in China.
11	The proportion of consumers who mainly buy products priced 1–10 yuan on the platform.
12	The proportion of consumers who mainly buy products priced 11–20 yuan on the platform.
13	The proportion of consumers who mainly buy products priced 21–50 yuan on the platform.
14	The proportion of consumers who mainly buy products priced 51–100 yuan on the platform.
15	The proportion of consumers who mainly buy products priced 101–300 yuan on the platform.
16	The proportion of consumers who mainly buy products priced 301–500 yuan on the platform.
17	The proportion of consumers who mainly buy products priced 501–1000 yuan on the platform.

Note: With the consideration of collinearity issues, the proportion of consumers aged above 40, the proportion of consumers from cities lower than the fifth-tier cities in China, and the proportion of consumers who mainly buy products priced above 1000 yuan on the platform are not included.

attributes) are a superficial reflection of the gaps rooted in other streamer characteristics. To address this concern, we reassess the main results with a sample solely covering streamers whose characteristics other than gender are balanced with respect to gender.

The propensity score matching (PSM) approach is used to obtain the sample. Specifically, focusing on the 120 streamers involved in the sample, we first predict a gender score for each streamer based on the logit regression of gender on the potential streamer-specific covariates shown in Table 6. Then, given the small number of involved streamers, we carry out a one-to-one with-replacement nearest neighbor matching using a 0.5 caliper. After the matching, we exclude the observations which are specific to the unmatched streamers (i.e., the 54 streamers marked "off support" in Fig. 4) from the sample used for estimating the main results.

Based on the remained sample, we reconduct the by-subsample regressions and present the results in Table 7. By using this sample, the potential disturbance from the streamer-specific covariates is somewhat ruled out. The results show that the gender-related effects stay generally consistent with the main results. This implies that the identified differences in the effects with respect to streamer gender are more likely rooted in gender-centered attributes rather than other streamer-specific characteristics.

Discussion and conclusion

Key findings and contributions to the research

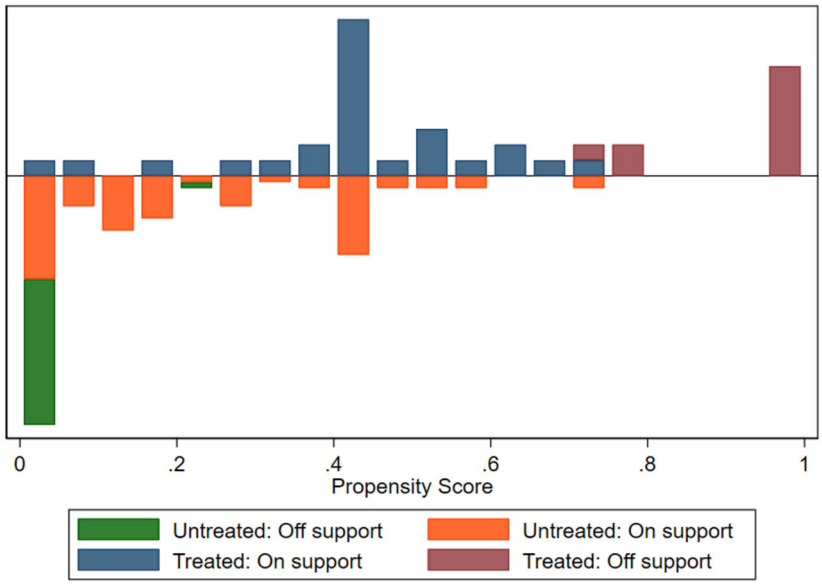
Streamer gender for conveying hedonic and utilitarian cues. Regarding the effects of streamer gender and streamer-consumer gender match on leveraging functional benefits to improve advertising effectiveness, the empirical results indicate that male streamers, rather than female streamers, can better promote the functional benefit performance of normal utilitarian products to general consumers. However, this moderating effect is relatively weak when the proportion of men in the group of consumers following a streamer is relatively high. The robustness check using the balanced sample additionally confirms that these effects are independent of other streamer-specific attributes. These findings imply that, although streamers' male identities are positive signals in promoting functional benefits to consumers who seek utilitarian value, male consumers may always resist male streamers due to hedonic reasons, such as the lack of sex appeal.

The findings help in understanding the role of streamer-consumer gender match in live-streaming advertising (e.g., Hou et al. 2020; Hudders and De Jans 2022; Jin and Ryu 2020; Liu et al. 2022; Yang et al. 2023). In the past, researchers usually took both hedonic and utilitarian values as the grounds for explaining the influence of streamer-consumer gender match on promoting functional benefits in advertising (e.g., Chang et al. 2020; Liu et al. 2022). This paper unveils that streamer-consumer gender match hardly works for improving or weakening the credibility or value of utilitarian information. Instead, it mainly give extra hedonic cues, such as sex appeal, to consumers when promoting utilitarian products' functional benefits in the interactive shopping environment shaped by live-streaming commerce. This mechanism also coincides with the fact that the majority of the consumers in the employed sample are male, while most streamers in the sample are female.

The findings can supplement evidence to the body of literature on gender-based perceived similarity in live-streaming advertising (e.g., Hudders and De Jans 2022; Jin and Ryu 2020; Liu et al. 2022). The empirical results imply that male consumers hardly regard male streamers as in-group members with similar interests. Instead, male consumers may believe that they are in a group with female streamers because of the similarity between male consumers' hedonic needs and female streamers' hedonic value creation.

Heterogeneity within a utilitarian product category. According to the empirical results, we find that functional benefit performance can contribute to advertising effectiveness only in the context of advertising utilitarian products with a middle-price signal. At the same time, the results show that streamer gender can make a difference to leveraging functional benefits to improve advertising effectiveness only for utilitarian products with a middle-price signal. With respect to the price distribution in a utilitarian product category, the long-tail items may significantly differ from the middle items in terms of consumers' shopping motivation and information processing.

In general, the findings contribute to the research on advertising persuasion within the live-streaming commerce context (e.g., He and Jin 2022; Park and Lin 2020; Yang et al. 2023) by revealing the risk of conventionally taking a concrete product category (e.g., smartphones) as a conceptual product category (e.g., utilitarian products or search products). According to a certain criterion, the long-tail and normal items within a utilitarian product category may have different features. The live-streaming commerce environment can strengthen the exposure of the heterogeneities to consumers (Goldfarb and Tucker 2019; Zhou and Duan 2012). This paper empirically confirms that the amplified heterogeneities (e.g., heterogeneous price signals) may diversify advertising persuasion by signifying different mechanisms for the long-tail and normal items within a concrete product category (e.g., smartphone). This may support the conjectures for some counter-intuitive results found in by-product-category studies on live-streaming advertising (e.g., Cui et al. 2012; Schulze et al. 2014; Yang et al. 2023).



Note: In the propensity score matching, we regard gender as the treatment variable and generate a match dummy, which is designated 1 when a streamer's propensity score is greater than 0.5. We make a comparison between the match dummy and gender. The matched and unmatched streamers are marked "on support" and "off support", respectively. The unmatched streamers are mostly those extremely distributed over the distributions with respect to the streamer-specific covariates.

Fig. 4 Result of the propensity score matching.

Managerial implications. This paper reminds brands of the presence of streamer-centered hedonic cues when advertising utilitarian products in live-streaming commerce. In this context, the influence of streamers' gender identities on the efficacy of conveying functional information highly depends on how they equip function-centered advertising with extra hedonic value. When selecting streamers to advertise utilitarian products, brands should pay more attention to whether a streamer is able to convey product information to consumers in a fun and entertaining way rather than whether a streamer is suitable for illustrating product functions in detail.

This paper directly points out the role of male gender identities in leveraging functional benefits to improve advertising effectiveness and the fact that men resist men in the sense of persuasion with functional information. However, instead of a suggestion for brands to select streamers based on gender match, these findings may signify a reminder for live-streaming regulators to investigate the ethics related to the use of gender identities in live-streaming advertising (Murphy 1998). If the role of streamers' sex appeal in generating sales is emphasized, the risks of sexual exploitation should be considered prior to the potential of leveraging streamers' gender identities to foster advertising persuasion (Blair et al. 2006).

Moreover, the presence of price-based product heterogeneities within a utilitarian product category is informative for streamers. This may urge streamers to discriminate between long-tail and normal utilitarian products and improve their persuasion strategies according to product-specific properties that relate to consumers' shopping motivation and information processing.

Conclusions and limitations. Drawing on the panel data on smartphones sold on Douyin Live Shopping, we investigate how streamer gender and streamer-consumer gender match affect the relation between functional benefit performance and advertising effectiveness when advertising utilitarian products with heterogeneous price signals. For normal utilitarian products, the results show that streamers' male identities strengthen the contribution of functional benefit performance to advertising effectiveness by equipping the persuasion process with extra hedonic value, but this moderating effect gets weaker as the proportion of male consumers increases. The results also imply that functional benefit performance may have no significant effect on advertising effectiveness in the case of advertising long-tail items in a utilitarian product category.

Although several lessons about stream-consumer gender match and within-category product heterogeneities in live-streaming advertising can be derived from this paper, we acknowledge that some important issues deserve further exploration. First, we adopt a synthesized functional benefit performance measure and omit analyzing the independent influence of gender identities on consumers' purchase intention to control for confounders. Although these strategies are appropriate for studying the research questions in this paper, some researchers may still find it interesting to depict a more complete picture about the role of gender identities in live-streaming advertising by comprehensively considering the mechanisms studied in this paper and those omitted. Second, this paper properly identifies the implications of streamers' gender identities, rather than other gender covariates, for live-streaming advertising. However, it is still under-examined what gender identities exactly dominate the mechanisms. Researchers can derive promising research by examining this issue together with the discussion on sexual ethics in live-streaming advertising. Third, this paper is devoted to utilitarian products' heterogeneous price signals in live-streaming advertising. It may be useful to extensively investigate the heterogeneities

Table 7 Comparison between the main results and the estimation results using the matched streamers.

Dependent variable: CVR_{itcbe}	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Subsample (by $Price_{itcbe}$):	[0, 2000)		[2000, 3000)		[3000, 4000)		[4000, 5000)		[5000, 20000)	
CPR_{itcbe}	−0.929	−4.680	1.100	2.233*	2.332**	2.639	−66.587	−171.162	−19.212*	−5.391
	(8.084)	(17.460)	(1.578)	(1.230)	(1.121)	(3.082)	(68.103)	(128.203)	(10.808)	(3.708)
$CPR_{itcbe} \times Gender S_c$	3.834	5.141	21.145**	17.271*	128.822***	131.394**	−22.485	86.282	17.671	4.151
	(7.868)	(19.037)	(8.351)	(9.247)	(49.854)	(53.135)	(159.002)	(189.401)	(18.290)	(14.994)
$CPR_{itcbe} \times Gender V_c$	0.014	0.068	0.035**	−0.002	−0.002	0.001	0.910	2.291	0.196	0.012
	(0.094)	(0.232)	(0.014)	(0.009)	(0.007)	(0.008)	(0.887)	(1.664)	(0.127)	(0.031)
$CPR_{itcbe} \times Gender S_c \times Gender V_c$	−0.079	−0.086	−0.307***	−0.244*	−1.775***	−1.815**	0.573	−0.774	−0.140	0.013
	(0.089)	(0.221)	(0.111)	(0.126)	(0.685)	(0.730)	(1.929)	(2.263)	(0.254)	(0.217)
Product fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Date fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Channel fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Brand fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Matched streamers	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Obs.	3090	1603	2947	1708	1870	1023	1013	557	1941	1442

Note: * Significant at $p<0.10$ level; ** significant at $p<0.05$ level; *** significant at $p<0.01$ level. Standard errors, clustered at the live-streaming show level, are in parentheses.

within each product category and derive more insights for live-streaming advertising practice.

Data availability

The disclosure of the materials analyzed during the current study is subject to the restrictions under an ongoing project. The corresponding authors are willing to share the datasets upon any reasonable request under necessary confidentiality agreements.

Received: 20 May 2023; Accepted: 12 April 2024;
Published online: 01 May 2024

Notes

1 In this paper, (objective) functional benefit is different from (perceived) utilitarian value. The latter accrues through the perception of the former (Lin and Swarna 2018).
2 Through the paper, we use the terms "low-price", "middle-price", and "high-price" in a relative sense. This issue is clarified in Section "Theoretical Background".
3 Technically, the upper bound 20,000 yuan is set to exclude the wrongly priced items (e.g., a smartphone priced at 999,999 yuan). With this upper bound, 11 observations are ruled out.
4 $\beta^{overall} = \beta_1 + \beta_2 \times \overline{Gender S_c} + \beta_3 \times \overline{Gender V_c} + \beta_4 \times \overline{Gender S_c} \times \overline{Gender V_c}$.
5 We do not apply the test to the low-price group.

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Acknowledgements

This work was supported by the National Natural Science Foundation of China [grant numbers 72272140, 72334006, and 72192843]. Sirui Li contributed to this work as a Research Fellow at the Fonds de la Recherche Scientifique – FNRS. Litao Duan would like to acknowledge the support from the CASS Laboratory for Economic Big Data and Policy Evaluation [project number 2024SYZH004].

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Conceptualization: SL, YL, JS, LD, HF; Investigation: LD, YL, HF; Methodology, Formal analysis: SL, JS, LD; Writing - Original Draft: SL, JS; Writing - Review & Editing: SL, LD; Project Administration: YL. In general, SL, YL, JS, LD contributed equally to this work.

Competing interests

The authors declare no competing interests.

Ethical approval

Ethics approval is not relevant because this article does not contain any studies with human participants performed by any of the authors.

Informed consent

Informed consent is not relevant because this article does not contain any studies with human participants performed by any of the authors.

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