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# Can data-driven precision marketing promote user ad clicks? Evidence from advertising in WeChat moments

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## ABSTRACT

Data-driven precision marketing (e.g. personalized online ads based on big data analysis or optimal personalized recommendation algorithms) has been regarded as a crucial way for manufacturers to improve the marketing effect. However, the current studies leave much to be further explored. This study constructed a conceptual model based on cue utilization theory focusing on the effects of consumer perceptions to the personalized online ads on click-through intention. Empirical results based on data from a survey of 446 WeChat moments users in China showed that: (1) consumer's ad click-through intention increased as a result of employing a higher extent of product involvement, brand familiarity, visual attractiveness and information quality to consumer; (2) trust played a role of mediation in the processes of visual attractiveness and information quality affecting click-through intention; (3) the higher product involvement also stimulated the consumer's privacy concerns, which played negative moderating effects on the positive impacts of product involvement, brand familiarity and trust on click-through intention. The findings contributed to the precision marketing literature by enriching an understanding of psychological mechanism underlying consumers' perception and cognitive factors toward the personalized online ads.

## 1. Introduction

With the rapid development of big data and accelerated pace of economic globalization, market competition pressures have led manufacturers to face greater challenges in choosing the appropriate marketing strategies for selling their products to the right customers at the right time (Tsai, Wu, & Chang, 2012; You et al., 2015). Recently, precision marketing has been recognized as a key means of generating profit for manufacturers because it delivers more accurate product information to customers based on the understanding of customers' consumption behaviors and preferences, which can improve the purchase intention of consumers (Idemudia & Jones, 2015). Manufacturers can bring value into the market by promoting their deep understanding of industrial wisdom ranging from market data to new market opportunities (Lytras, Raghavan, & Damiani, 2017). In China, due to the rapid development of Mobile Internet and the increasing prevalence of social media, most manufacturers choose to carry out precision marketing on social platforms (Zhu & Chen, 2015). WeChat, which has over 1 billion MAU (Monthly Active Users), is the most widely used social networking

app in China. But its function is not limited to socializing. "It is a tool beyond anything in other countries. WeChat has personal data, similar to Facebook, company data, similar to LinkedIn, payment and consumption data, similar to PayPal, all in one, while also storing and using data that links people to all aspects of their lives" (Yanes & Berger, 2017, p. 14). Most manufacturers have delivered targeted ads in WeChat moments based on big data and consumer preference analysis to attract consumers' attention to their products. But when consumers are willing to click the targeted ads in their WeChat moments? This interesting research topic attracts much attention from both manufacturers and researchers (Lai & Ren, 2016).

WeChat moments ads are online ads, same as existing banner ads. Online ad businesses are currently facing the challenge of the decreasing click-through rate resulting from the following factors. The contents of existing banner ads are not highly relevant to the information required by consumers; consumers are overwhelmed by the quantity of information available online; a large amount of spam is flooding the Internet; and consumers exhibit negative attitudes toward this ad method. Lambrecht and Tucker's (2013) study reported that

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click-through rates were, on average,  $< 0.01\%$ . This situation increased the level of precision required by online ad businesses to perform precision marketing. Differentiating from banner ads in e-commerce era, WeChat moments ads can be more personalized in mobile internet era because manufacturers can integrate more dimensions of information about personal characteristics, behaviors and preferences. However, this may also cause some new problems. Compared to websites, WeChat moments are more private personal space. Advertising on WeChat moments may make consumers feel that their privacy has been violated. Little studies have focused on whether advertising on social network platforms such as WeChat moments can increase the customers' click-through intention effectively. This also leads us to explore the potential impact of privacy concerns in influencing the consumers' click-through intention to personalized ads.

In addition, based on the cue utilization theory (Kukar-Kinney & Xia, 2017; Richardson, Dick, & Jain, 1994; Szybillo & Jacoby, 1974), we proposed that the essence of ads is providing a series of cues about the product to potential consumers, and then to attract consumers' attention to the advertised products. At this point, we should distinguish between the cues about the product and the cues about the ad itself. Consumers' click-through intention to ad depends on the cues associated with the ad itself. Only if they click and watch the ads, they can get more cues about the advertised products. Therefore, the cues that can be perceived by consumers intuitively from ad banner have direct and most essential impact on consumers' click-through intention to banner ads. Based on the above analysis, this study sought to answer the following questions: Can precision marketing improve customers' click-through intention to ads? What factors have direct effects on customers' click-through intention to personalized ads? How do consumers' privacy concerns affect their click-through intention to personalized ads on social network platforms?

## 2. Theoretical background and hypotheses

### 2.1. Precision marketing and click-through intention

Delivering the business information accurately to the potential consumers has always been the main goal of ad and marketing (Lee & Ke, 2012; Yu, Yu, & Cheng, 2012). Ads could only be designed to target the entire market without any differentiation in the mass ad era, because manufactures lack the channel for obtaining the multidimensional information of each consumer and the computational ability to analyze such information. This led to the problems of low precision and high investment waste which reflected the classic dilemma of Lord Leverhulme and John Wanamaker: "half the money I spend on ad is wasted, and the trouble is I don't know which half" (Jones, 1990). Therefore, identifying the potential customers and delivering targeted ads to them became crucial topics in marketing research field. From the "corner shopkeeper" (Zabin & Brebach, 2004) to "direct-response marketing" (Mehta & Sivadas, 1995) to "database-driven marketing" (Schoenbachler & Gordon, 2002), in almost a century of advertising and marketing development, marketing professionals have never ceased their pursuit for precision.

With the rapid development of the Internet and the prevalence of e-commerce, companies have developed an increasing number of approaches for collecting the multidimensional information of consumers (Chang, Cheung, & Tang, 2013). The rapid development in data analysis techniques, such as big data, deep learning, and cognitive computing, has assisted manufacturers in identifying different types of consumers to characterize user profiles accurately. In so doing, manufacturers can convey product information to potential consumers directly through precision marketing (Wedel & Kannan, 2016). In China, due to the rapid development of Mobile Internet and the increasing prevalence of social media, WeChat has become the most popular platform that manufacturers chose to promote precision marketing ads. It has over 1 billion MAU, and has connected with dozens of industries

related to the daily lives of its users, including social, e-commerce, retail, food service, delivery, travel, hotel, and etc. Because of the large quantity of user data, WeChat is able to establish user profiles and interest tags precisely. Therefore, manufacturers can select a suitable target group according to their product and launch ads with precision. Currently, there are five types of ads in WeChat moments: images, videos, basic cards, optional cards, and advertiser-mentioning interactive ads. Each user will receive at most two different ads in WeChat moments in a day. However, the ad in WeChat moments can only display partial information of the product, such as brand, price, and product images, and the complete information is revealed once if the users click the ad link. Therefore, the click-through rate has become a critical index for evaluating the effectiveness of precision ad (Chapelle, Manavoglu, & Rosales, 2015).

Numerous studies have attempted to identify factors affecting ad click-through intention, such as ad personalization (Bleier & Eisenbeiss, 2015a), ad appeal (Liu & Mattila, 2017), banner design (Robinson, Wysocka, & Hand, 2007), product involvement (Yoo, Kim, & Stout, 2004), personalization paradox (Aguirre, Mahr, Grewal, de Ruyter, & Wetzels, 2015), personalized messages (White, Zahay, Thorbjørnsen, & Shavitt, 2008), ad strategies (format vs. placement) (Yoo, 2009a), advertisers' persuasion attempts and perceived fairness of the ad practice (Yoo, 2009b), trust (Cheung & To, 2017), perceived entertainment and informativeness values of ads (Zhang & Mao, 2016), match between consumers' needs and banner ad content (Idemudia & Jones, 2015). As for precision marketing, Current studies have focused on using big data analysis and optimizing personalized recommendation algorithms to increase the consumer satisfaction rates for ads (You et al., 2015; Zhao & Ma, 2017). Some studies have determined the effects of factors related to consumer perceptions, such as trust (Bleier & Eisenbeiss, 2015b) and perceived behavioral control (Cheung & To, 2017), on consumer attitudes toward personalized online ad. However, researchers have paid little attention to explore whether precision marketing can improve the consumers' click-through intention on targeted ads effectively.

Based on cue utilization theory (Kukar-Kinney & Xia, 2017), this paper argues that consumers' click-through intention will mainly depend on two kinds of cues provided by targeted ads: the degree to which the advertised product satisfies consumer demand and the design and content of ads that can be perceived by consumers intuitively. As mentioned above, the main goal of precision marketing is helping manufacturers choosing the right strategic decision-making policies for selling the right products to the right customers at the right time (You et al., 2015). Thus, the most important indicator to evaluate the precision degree of targeted ads is whether the advertised product matches the potential demand of consumers. Following Yoo et al. (2004), we use "product involvement" as a measurement indicator of precision marketing to measure the precision extent of targeted ads. Furthermore, past research categorized product cues as intrinsic and extrinsic cues (Richardson et al., 1994; Szybillo & Jacoby, 1974). As for ads, consumers can only obtain some extrinsic cues such as brand familiarity (Laroche, Kim, & Zhou, 1996), visual attractiveness (Verhagen, Feldberg, van den Hooff, Meents, & Merikivi, 2012), and information quality (Kim, Galliers, Shin, Ryoo, & Kim, 2012) before they click the ads. So we used these three variables as measurement indicators to represent the design and content of ads. Additionally, the personalized recommendations of targeted ads were based on consumers' private data, including the personal and behavioral characteristics of consumers. Therefore, Kehr, Kowatsch, Wentzel, and Fleisch (2015) discerned that trust and privacy concerns are opposing factors that, together, affect the behavior of consumers. Both the level of trust that consumers have for ads and their concerns regarding privacy affected their willingness to click on targeted ads (Bleier & Eisenbeiss, 2015b; Zarouali, Poels, Walrave, & Ponnet, 2018). As mentioned, the present study explored the factors related to consumer perceptions that affect the willingness of consumers to click on targeted ads. Moreover, this

study clarified the role that consumer trust and privacy concerns played in their willingness to click on targeted ads and identified the weaknesses of precision marketing, which served theoretical instruction for the optimization and application of online ads for manufacturers.

## 2.2. Consumers' perception to personalized online ads and click-through intention

Ad is a complex commercial activity. Companies used ads to launch marketing programs that will attract consumer attention to a given product and stimulate their purchase of the product. Compared with mass ad, targeted ad is more capable of attracting the attention of consumers because it fully utilizes data-mining techniques to acquire the information of online consumers. Moreover, data-analyzing techniques, such as big data analysis, cognitive computation, and deep learning, have been widely used to precisely predict consumer preferences and thereby push precision ads to them (Liu & Mattila, 2017). A high level of preference matching indicates a high level of precision for targeted ads (Idemudia & Jones, 2015). The present study used product involvement to define the precision level of targeted ads. Product involvement reflected the situation in which an advertised product or service was highly valued by the consumers because it corresponded to their needs, values, and ideas and thus incites their unobservable motivation and interests (Kwon, Ha, & Kowal, 2017). Therefore, based on the utilization theory, product involvement was the most important cue and the primary perception of consumers toward targeted ads. Involvement can be categorized into enduring involvement and situational involvement; the first category reflected the consistent valuing of a certain product with the consumer, and the second described the attention temporarily paid to a product as a result of a particular situation (Hong, 2015). Previously, the concept of product involvement has been introduced into banner ad effectiveness studies (Yoo et al., 2004; Yoo & Eastin, 2017), and been found to affect individual's attitudes toward the banner ads. Yoo et al. (2004) argued that individuals with high product involvement were more likely to click through banner ads than those with low product involvement. Higher click-through rates, in turn, led to more favorable attitudes toward the banner ads. Consumer perceptions of the design and content of ads can be considered the following three perspectives: brand familiarity, visual attractiveness, and information quality. Brand familiarity is the information that a consumer obtains directly from an ad at first sight and represents the direct and indirect experiences of the consumer with this retail brand (Mohan, Brown, Sichtmann, & Schoefer, 2018; Verhellen, Dens, & De Pelsmacker, 2016). When consumers select a product, famous brands immediately attract more attention from consumers and affect their purchasing decisions. Familiar brands provoke feelings of warmth and intimacy in consumers. Laroche, Kim, and Zhou (1996) investigated that brand familiarity influenced the consumer's confidence toward the brand, which in turn affected his/her intention to buy the same brand. Thus, this research proposed that brand familiarity can promote the consumers' click-through intention to personalized online ads. Visual attractiveness refers to the initial direct perception of consumers regarding the ad design and reflects the extent to which a consumer feels that an information system is aesthetically and visually pleasing (Van der Heijden, 2003). According to affect transfer theory, the ad design can provoke positive attitudes toward the advertised product or brand by appealing to the positive emotions of consumers (Gibson, 2008; Jung, Min, & Kellaris, 2011). Verhagen et al. (2012) identified that Visual attractiveness can positively influence the consumers' attitude toward virtual world product through the mediating effect of perceived entertainment value. Following the same logic, this research assumed that visual attractiveness can promote the consumers' click-through intention to personalized online ads. Information quality refers to the level of user satisfaction with the information content provided by the personalized online ads (Schaupp, Bélanger, & Fan, 2009). With respect to perceptions of the information

quality of banner ads, consumers primarily judge the information quality level of an ad according to the richness of the information provided in the ad and the consistency between the directly perceived information and objective contents. In other words, the richness, preciseness, and authenticity of information are the main criteria (Delone & Mclean, 2004). Rich information can decrease the uncertainty consumers feel regarding the product; authentic information can enhance the positive attitudes of consumers toward a product and promote their willingness to click the ad. Therefore, we proposed that:

**H1a.** The product involvement increases the consumers' click-through intention.

**H1b.** The brand familiarity increases the consumers' click-through intention.

**H1c.** The visual attractiveness increases the consumers' click-through intention.

**H1d.** The information quality increases the consumers' click-through intention.

## 2.3. Trust and click-through intention

Trust is “the willingness of a party to be vulnerable to the actions of another party based on the expectation that the others will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party” (Mayer, Davis, & Schoorman, 1995, p. 712). Trust can be understood from two perspectives. One is the cognitive perspective, which follows that trust in online environments is based on beliefs in the trustworthiness of a trustee (Gefen, Benbasat, & Pavlou, 2008). Such a belief enables a trustee to willingly take risks and accomplish a certain action (e.g., online transaction) in accordance with expectations for the trustor (Pavlou, Liang, & Xue, 2007). The other is the behavioral perspective, which causes a trustee to engage in a risky action that puts him or her in an inferior position (Mayer et al., 1995; Schlosser, White, & Lloyd, 2006). For example, during online transactions, buyers believe that the website will act according to a mutually agreed and recognized manner regardless of their supervision power or control over the website, and the buyer is willing to accept the possible loss caused by such an action (Lee & Turban, 2001). In general, trust has long been treated as an experience-based attribute of relationships (Schoder & Haenlein, 2004). This means that when we define trust, we need to specify what we trust. Previous researches highlighted that consumers' click-through intentions toward online ads mainly depend on their trust in the retailer (Bleier & Eisenbeiss, 2015b) or in the websites (Aguirre et al., 2015). As for the precision marketing in social network platforms, the ads that manufacturers push to consumers are often those brands that consumers have browsed or searched for. Moreover, social platforms with a large number of users usually have high reputation. Therefore, trust in the ad itself is the direct factor influencing consumers' click-through intentions in the case of precision marketing. Based on this, we explored how does consumers' trust in the targeted ads (Soh, Reid, & King, 2007) affects their intentions to click them in this study. Customer trust, which can stimulate customer behavior such as online purchasing (Bilgihan, 2016), is a function of the consumer's perceived ability, benevolence, and integrity (Mayer et al., 1995). When consumers have a higher trust to ads, they may have a stronger desire to know more about the advertised products or services (Cheung & To, 2017). Trust based on ability signifies that consumers believe that the manufacturers are capable of providing valuable and reliable products or services. If consumers can quickly establish trust in the ad based on the ability of the product or service provider, that is, if they believe that the provider is capable of providing information on valuable products or services with high quality and price advantages, then positive anticipation of the ad content would promote consumer click-through intention (Oliveira, Alhinho, Rita, & Dhillon, 2017). Trust

based on benevolence indicates that consumers believe that in addition to being economically oriented, manufacturers are consumer-demand oriented and will provide products or services they require. Pavlou et al. (2007) reported that trust based on benevolence could decrease the uncertainty of consumers in relation to transactions, which would notably increase their willingness to shop online. Similarly, targeted ads with trust based on benevolence promote the willingness of consumers to interact with the manufacturers and enhance the emotional connection between consumers and ads. Such a result then increases consumer click-through intention. Trust based on integrity reflects the belief of consumers that the actions of the manufacturers comply with relevant ethical and professional regulations, and that the product or service information presented in the ad is accurate. The Internet is currently flooded with numerous false ads. The perceived risk of a product will be lower if consumers believe that manufacturer conduct ads and promotional activities in accordance with professional and ethical regulations and provides consistent and valuable information on the advertised product rather than misleading consumers with short-sighted opportunistic actions. Moreover, this condition increases consumer desire to understand product information and increase consumer click-through intention. Therefore, we proposed that:

**H2.** The trust increases the consumers' click-through intention.

#### 2.4. Mediating effect of trust

Based on social cognitive theory, the establishment of an individual's trust is a process of environment–cognition–behavior interaction. The stimulation of external scenarios forms the cognition of individuals, which affects their behaviors. And then, the behaviors of individuals reshape the scenario, which then further affect their behaviors (Bandura, 2006). When consumers encounter personalized online ads, the cues offered by the ads stimulate the senses of consumers. According to the cue utilization theory, consumer trust depends on the cues provided by the firms (Kim & Kim, 2011). Specifically, all the information of the ads, including the brand, endorsement figure, price, ad page, animation design, or written presentations, are the cues that may help the consumer to create an image about ads. This image affects the consumer's cognition and judgment of the advertised information, which also affects the process of establishing consumer trust based on this information. Thus, the information perceived by consumers affects their trust in personalized online ads.

As mentioned, the components of consumer perceptions of personalized online ads are divided into four dimensions. In particular, product involvement does not contain information on a feature of the product itself but rather represents the level at which the advertised product matches the preferences, interests, and needs of consumers. Brand familiarity, visual attractiveness, and information quality comprise ad information perceived by consumers and may directly affect the level of trust that consumers have toward the ads. Brand familiarity reflects consumers' level of familiarity with the brand of the advertised product. Lafferty and Edmondson (2009) indicated that brand familiarity refers to consumers' knowledge accumulated on the product based on direct or indirect experiences. Thus, brand familiarity represents consumers' psychological associations with a given brand. According to attitude accessibility theory, higher brand familiarity correlates to more extensive consumer associations with the advertised product or service. Hence, brand information is easily accessible in the minds of consumers (Hardesty, Carlson, & Bearden, 2002) and has a greater effect on the trust and evaluation of the ad. By contrast, consumers can only access a limited amount of information on an unfamiliar brand. Therefore, relevant associations for unfamiliar brands are difficult for consumers to produce, which results in the inability of consumers to quickly establish trust toward such brands. Previous studies examined that brand familiarity had an indirect relationship with brand trust and brand trust could be achieved through a high level

of brand familiarity (Ha & Perks, 2005; Naidoo & Hollebeek, 2016). Visual attractiveness reflects the extent to which a consumer feels that an information system is aesthetically pleasing to the eye (Van der Heijden, 2003). According to existing literature, visual attractiveness was assumed to trigger both extrinsic and intrinsic reactions (Babin, Darden, & Griffin, 1994). Visual attractiveness draws the attention of consumers toward ads and increases emotional appeal. According to affect transfer theory, an attractive ad design that provokes happiness in the viewer results in consumers' positive attitude toward the product, brand, and company (Gibson, 2008; Jung et al., 2011). Interesting ads enable consumers to draw connections between products to positive emotions such as happiness, joy, and delight (Lee, Tinkham, & Edwards, 2005). Moreover, such ads enhance consumer trust by strengthening the aforementioned positive attitudes of consumers toward the ad and the advertised brand (Alwitt, 2000). Information quality refers to the level of user satisfaction with the information content provided by the personalized online ads (Schaupp et al., 2009). Consumers mainly assess information quality based on the level of consistency including the authenticity, accuracy, timeliness, and integrity observed between information content and objective reality (Delone & Mclean, 2004). Consumers generally strive to obtain high-quality information to reduce purchasing risks. Therefore, personalized online advertising that provides authentic, accurate, and complete information on products and services can more quickly obtain consumer trust. Therefore, we propose that:

**H3a.** The brand familiarity increases the consumers' trust in ads, such that the trust mediates the relationship between the brand familiarity and the consumers' click-through intention.

**H3b.** The visual attractiveness increases the consumers' trust in ads, such that the trust mediates the relationship between the visual attractiveness and the consumers' click-through intention.

**H3c.** The information quality increases the consumers' trust in ads, such that the trust mediates the relationship between the information quality and the consumers' click-through intention.

#### 2.5. Antecedent of privacy concerns and its moderating effect

Personalized online advertising usually involves collecting, analyzing, and leveraging consumers' private information beyond its original transaction purpose (Bleier & Eisenbeiss, 2015a). The extent of its precision depends on the ability of advertisers' data mining and cognitive computing. But there is also a potential downside to the collection and use of greater amounts of increasingly detailed personal information (Culnan & Armstrong, 1999). Because permissions for these practices are seldom solicited, so that consumers are usually not aware that their personal information has been leaked until they receive an individualized communication (Miltgen & Peyrat-Guillard, 2014). The marketing literature regards that these practices which can provide values to organizations and their customers may also raise the consumers' privacy concerns (Arli, Bauer, & Palmatier, 2018; Jung, 2017; Tucker, 2014; Walrave, Poels, Antheunis, Van den Broeck, & van Noort, 2018), where privacy is defined as “the ability of the individual to control the terms under which personal information is acquired and used” (Westin & Ruebhausen, 1967). Nowak and Phelps (1995) demonstrated that privacy concerns, from a legal, social, or ethical standpoint, are not issues when consumers are made aware of all subsequent uses of the information. Only when the consumers are aware that their personal privacy information have been collected and used without their permission, their privacy concerns will be triggered. So the extent to which personalized online ads trigger privacy concerns depends on the degree of consumer-specific information they are based on (Nowak & Phelps, 1992). This means that the higher the product involvement is, the more likely it is to trigger consumers' concerns about privacy. Bleier and Eisenbeiss (Bleier & Eisenbeiss, 2015a,

2015b) indicated that personalized online ads may elicit privacy concerns especially when every personalized ad signal that the manufacturers has tracked and analyzed consumer's detailed information about their online activities. Therefore, we proposed that:

**H4.** The product involvement increases the consumers' privacy concerns.

Because of privacy concerns, advertisers have encountered a dilemma regarding the precision of targeted advertising. High precision may reduce the cost of information searching for consumers and increase their satisfaction and click-through rate. However, excessively precise ads may provoke privacy concerns for consumers, who may respond by implementing measures to protect their privacy (Smit, Van Noort, & Voorveld, 2014). If consumers believe that too much of their personal information has been controlled by online advertising operators, they will be concerned regarding leakages or abuse of personal information, such as the possibility that their information will be bundled and sold by a cybermediary to other marketers interested in selling products (Luo, 2002). Consequently, consumers will deliberately avoid disclosing personal information and develop negative attitudes and behaviors toward online precision ads, such as exercising caution when clicking on ads to prevent leaving a personal trail of online activity. Aguirre et al. (2015) found that the click-through rates declined sharply when consumers realized that the retailer has covertly collected their personal information to provide personalized banners. In some previous studies the negative impact of privacy concerns on click-through intention to personalized ads has been empirically confirmed (Bleier & Eisenbeiss, 2015b). This paper considered consumers' perception to personalized online ads as the direct influencing factor of click-through intention. Privacy concerns were triggered based on the perception to ads, which belong to the second layer of perception content. Thus, we think that privacy concerns are not affecting the click-through intention directly, but affecting the relationship between consumers' perception to ads and click-through intention. That is, privacy concerns play the moderating role in the relationships between consumers' perception to ads and click-through intention, and the greater consumer privacy concerns, the weaker the relationship between perception and click-through intention. Therefore, we proposed that:

**H5a.** Privacy concerns play a negative moderating role between the product involvement and the consumers' click-through intention.

**H5b.** Privacy concerns play a negative moderating role between the brand familiarity and the consumers' click-through intention.

**H5c.** Privacy concerns play a negative moderating role between the visual attractiveness and the consumers' click-through intention.

**H5d.** Privacy concerns play a negative moderating role between the information quality and the consumers' click-through intention.

**H5e.** Privacy concerns play a negative moderating role between the trust and the consumers' click-through intention.

Fig. 1 shows our conceptual model and relationships to be examined in this research.

### 3. Method

#### 3.1. Sample and data collection

This study chose the users of WeChat moments as research object's and explored the influencing factors of their click-through intentions about the precision ads in their WeChat moments. As mentioned above, WeChat, which has over 1 billion MAU (Monthly Active Users), is the most widely used social networking app in China. Thousands of manufacturers have promoted precision marketing ads in the WeChat moments. This social platform has evolved into the largest social-

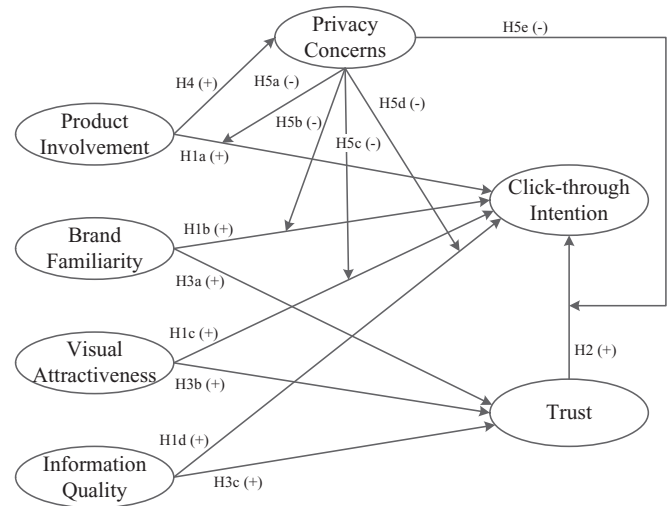


Fig. 1. Research framework.

promotion marketing platform in China and has become a standard channel for the social-media advertising of almost all companies. This provided a perfect scenario exceptionally suitable for conducting the present study.

The questionnaire used in this study comprised three parts. The first part involved a presentation of the research scenario, in which participants were asked to browse the recent three ads in their WeChat moments before completing the questionnaire. Moreover, participants were asked to recall the ads in their WeChat moments in the past 3 days and whether they have acquired or produced information concerning these advertised products or services in WeChat through browsing, searching, chatting with friends, or offline consumption in the past 5 days. The second part was a scale for measuring product involvement, brand familiarity, visual attractiveness, information quality, trust, click-through intention, and privacy concerns, in which participants were asked to recall their memory and respond according to their perceptions of advertising content. The third part is to measure the demographic characteristic of participants, including gender, age, education and work experience. The snowball sampling method was employed in this study and 235 university undergraduate and graduate students who use WeChat in Guangzhou city in southern China were firstly invited to answer the questionnaire. At the same time, they were asked to spread the survey to their family, friends or colleagues. Finally, 528 responses were collected for this research. 62 cases were deleted because five consecutive values were the same or > 5% of their values were missing, leaving 446 valid questionnaires (a valid response rate of 84.47%). The detailed demographic characteristics of respondents were showed in Table 1.

Following Armstrong and Overton (1977)'s extrapolation method which assume that the subjects who responds later are more like non-respondents, we conducted several *t*-tests comparing the early responses versus the late responses in terms of gender, age, education and work experience to test for the potential non-response bias. Results of these tests indicated no statistical differences ( $p > .05$ ) between them, suggesting that non-response bias was not a major concern in our study.

#### 3.2. Measurement

All the scales for constructs in our study were developed based on previous researches. The items were obtained from earlier literatures, then translated (English to Chinese) and back-translated (Chinese to English) by two marketing and management scholars to ensure the validity of the translation in a cross-cultural setting. The survey was a "tick the box" survey. All the items were presented using a seven-point

**Table 1**  
Description of sample ( $N = 446$ ).

| Profile of respondents        | Class                    | Frequency | %    |
|-------------------------------|--------------------------|-----------|------|
| Gender                        | Male                     | 229       | 51.3 |
|                               | Female                   | 217       | 48.7 |
| Age (in years)                | < 25                     | 84        | 18.8 |
|                               | 25 to < 30               | 162       | 36.3 |
|                               | 30 to < 35               | 126       | 28.3 |
|                               | > 35                     | 74        | 16.6 |
| Education                     | High school              | 44        | 9.9  |
|                               | Undergraduate student    | 88        | 19.7 |
|                               | Bachelor's degree        | 216       | 48.4 |
|                               | Masters' degree or above | 98        | 22   |
| Working experience (in years) | 0 to < 2                 | 115       | 25.8 |
|                               | 2 to < 5                 | 137       | 30.7 |
|                               | 5 to < 8                 | 103       | 23.1 |
|                               | > 8                      | 91        | 20.4 |

Likert scale ranged from “strongly disagree” (1) to “strongly agree” (7). Before undertaking the survey, we conducted some pre-tests by three scholars, three undergraduate students from universities and five employees from five different firms in China. We interviewed the

respondents in person, and asked them to express their understanding of the items, which were led to refine the survey structure and item-wording of the questionnaire, and to secure the questionnaire quality. All the measurement items of constructs were presented in Table 2.

To measure the product involvement, we focused on how closely the advertised product is linked to the respondent's interest, need and self-concept (Hong, 2015). A five-item scale was designed through modifying the established scale used by Kwon et al. (2017) to access the product involvement.

Brand familiarity was measured using a two-item scale developed by Laroche, Kim and Zhou, 1996). Respondents were asked to indicate “the extent to which they feel they have enough information to make an informed judgment about the brands displayed in WeChat moments advertising; and the previous experience they had with the advertising brands”.

Consistent with Verhagen et al. (2012), we measured visual attractiveness using a four-item scale. Respondents were requested to indicate “the extent to which they feel that the advertising design displayed in WeChat moments is aesthetically pleasing to their eyes” (Van der Heijden, 2003).

Information quality which refers to the level of respondents' satisfaction with the information content provided by the personalized online advertising (Schaupp et al., 2009) was assessed using four items from Kim et al. (2012).

A scale consisting of four items was adapted from Cheung and To (2017) to measure the overall trust the respondent has in personalized

**Table 2**  
Constructs, items, and measurement model.

| Construct and items   | Factor loading <sup>a</sup> | Cronbach's alpha | CR    | AVE   |
|---|-----------------------------|------------------|-------|-------|
| Product involvement   |                             | 0.841            | 0.845 | 0.523 |
| I'm very interested in advertising products in WeChat moments in general.   | 0.776                       |                  |       |       |
| Advertising products in WeChat moments are very important to me.  | 0.772                       |                  |       |       |
| I'm very enthusiastic about advertising products in WeChat moments.   | 0.664                       |                  |       |       |
| Advertising products in WeChat moments are relevant to me.  | 0.708                       |                  |       |       |
| Advertising products in WeChat moments does not matter to me (reverse).   | 0.689                       |                  |       |       |
| Brand familiarity   |                             | 0.755            | 0.756 | 0.608 |
| The extent to which you feel you have enough information to make an informed judgment about the brands displayed in WeChat moments advertising. | 0.774                       |                  |       |       |
| The previous experience you have with the brands displayed in WeChat moments advertising.   | 0.785                       |                  |       |       |
| Visual attractiveness   |                             | 0.832            | 0.832 | 0.553 |
| The advertising design displayed in WeChat moments is attractive.   | 0.714                       |                  |       |       |
| Advertising in WeChat moments is aesthetically appealing.   | 0.750                       |                  |       |       |
| I do not like the way advertising in WeChat moments looks (reverse).  | 0.762                       |                  |       |       |
| Overall, I find that advertising in WeChat moments looks attractive.  | 0.748                       |                  |       |       |
| Information quality   |                             | 0.855            | 0.856 | 0.598 |
| Advertising in WeChat moments provides abundant information regarding product functions and quality.  | 0.728                       |                  |       |       |
| Advertising in WeChat moments offers useful information related to price and shopping.  | 0.798                       |                  |       |       |
| Advertising in WeChat moments provides the latest product information.  | 0.758                       |                  |       |       |
| Information posted on advertising in WeChat moments is relatively new and current.  | 0.806                       |                  |       |       |
| Trust   |                             | 0.893            | 0.895 | 0.681 |
| Advertising in WeChat moments is believable.  | 0.856                       |                  |       |       |
| Advertising in WeChat moments is reliable.  | 0.832                       |                  |       |       |
| The content of advertising in WeChat moments is accurate.   | 0.860                       |                  |       |       |
| I trust advertising in WeChat moments.  | 0.749                       |                  |       |       |
| Click-through intention   |                             | 0.767            | 0.767 | 0.524 |
| I would like to click advertising in WeChat moments to acquire further information.   | 0.770                       |                  |       |       |
| I often think about click advertising in WeChat moments.  | 0.691                       |                  |       |       |
| It is very likely that I will spend more time clicking advertising in WeChat moments.   | 0.708                       |                  |       |       |
| Privacy concerns  |                             | 0.819            | 0.824 | 0.541 |
| It bothers me that the firm is able to track information about me.  | 0.829                       |                  |       |       |
| I am concerned that the firm has too much information about me.   | 0.704                       |                  |       |       |
| It bothers me that the firm is able to access information about me.   | 0.730                       |                  |       |       |
| I am concerned that my information could be used in ways I could not foresee.   | 0.668                       |                  |       |       |

<sup>a</sup> Significant at 0.001, which means that the error variable of each item is significant at the level of 0.001 during the confirmatory factor analysis (CFA).

online advertising including its accuracy and reliability.

Privacy concern was measured by four items adopted from Bleier and Eisenbeiss (2015b). Items include firms' information tracking, information collection, information storing and information use.

Click-through intention was measured with three items based on Bleier & Eisenbeiss (2015a, 2015b) and Aguirre et al.'s (2015) researches. Respondents were requested to assess how likely they would "click on the personalized online advertising to get further information". Privacy concerns were measured with four items adapted from Bleier & Eisenbeiss (2015a, 2015b).

In addition, we chose gender, age, education and work experience as control variables, as these demographic characteristic variables could influence individual's intention and behavior (Cheung & To, 2017).

### 3.3. Statistical analyses

The statistical analyses were conducted with SPSS 20.0 and AMOS 22.0. Pearson's correlation analyses were performed to explore the potential relationships among the research variables in this study. Covariance-base structural equation model (SEM) was used to test the mediation model. Furthermore, using the PROCESS for SPSS developed by Hayes (2013), bias-corrected bootstrap confidence intervals (CIs) derived from 5000 bootstrap resamples were estimated to test the significance of trust's indirect effect. The indirect effect was considered significant if the CI values do not include zero. In addition, hierarchical linear regression was performed to test the moderating effect of privacy concerns.

## 4. Analysis and results

### 4.1. Descriptive statistics of the latent constructs

Table 3 reported the means, standard deviations and correlations among the study variables. The bivariate correlations indicated that all the study variables had significant relationship between each other, which suggested that it's suitable for empirically validate our theoretical framework and conducting a series of structural equation modeling (SEM) analyses and hierarchical linear regression as described below.

### 4.2. Reliability and validity tests

A confirmatory factor analysis (CFA) was executed to examine the measurement model. The model fit indices were as follows:  $\chi^2/df = 1.879$ ; comparative fit index (CFI) = 0.953; goodness-of-fit index (GFI) = 0.917; Tucker–Lewis index (TLI) = 0.945; incremental fit index (IFI) = 0.953; root mean square error of approximation (RMSEA) = 0.044. Following the guidelines in the literature (Fornell & Larcker, 1981), all the indices were above the minimum acceptable values, indicating an adequate fit. The reliability of the multi-item scale

for each construct was assessed using Cronbach's alpha coefficient and composite reliability (CR). As shown in Table 2, all of the seven Cronbach's alpha values were above 0.755, and all of the seven CR values were above 0.756, greater than the recommended criterion of 0.7 (Hair, Black, Babin, Anderson, & Tatham, 1998), which indicated that internal consistencies of all the constructs used in this research were acceptable. In addition, all of the factor loadings from CFA were higher than 0.60 and significant at the  $p < .001$  level, and the average variance extracted (AVE) values of all of the constructs exceeded the minimum threshold of 0.50 (see in Table 2), which supports the convergent validity of the measures (Bagozzi & Yi, 1988). Furthermore, no correlation is greater than the square root of AVE (see in Table 3), thus supporting the discriminant validity between the constructs. Based on the above results, we concluded that the reliability and validity of the measurements in this study were acceptable.

### 4.3. Common method variance

Following the suggesting from Podsakoff, MacKenzie, Lee, and Podsakoff (2003), both procedural methods and statistical techniques were employed in this research to reduce concerns about common method variance (CMV). Firstly, while collecting our data, several procedural remedies were used to reduce the respondents' evaluation apprehension, which could make them "less likely to edit their responses to be more acquiescent, lenient, socially desirable and consistent with how they think the researcher wants them to respond" (Podsakoff et al., 2003). For example, the beginning of the questionnaire emphasized that all of the surveys were to be submitted anonymously with no identifying information supplied, which can minimize social desirability bias. In addition, we declared in the survey that no particular answer was encouraged or discouraged (i.e., "There is no right or wrong answer to these questions. We are just interested in your general impressions."), and their answers were confidential, which can reassure the respondents. The criteria developed by Podsakoff et al. (2003) (e.g., no double-barrelled questions and no complicated syntax) were also used to reduce the ambiguity as much as possible. Secondly, following the opinion of Harrison, McLaughlin, and Coalter (1996), common method bias may be more problematic at the item level than at the construct level, thus we used multiple-item constructs in our research. Finally, several statistical techniques suggested by the literatures were used to assess common method variance after collecting our data. According to the suggestion of Pavlou et al. (2007), if there were no excessively high correlations (criteria: correlation > 0.9, see in Table 3), we can conclude that CMV is unlikely. Following the recommendations of Podsakoff et al. (2003), two measurement models, in which one measurement model included all of the traits and the other model added a method factor, were compared using the analytical procedure in SEM (i.e. structural equation model). The results indicated that the path coefficients were insignificant. Moreover, Harman's single-factor test (Podsakoff & Organ, 1986) was used, and the results showed that the first factor only accounted for 28.079% of the 69.760%

**Table 3**  
Descriptive statistics and Pearson's correlations.

| Constructs                 | Mean  | SD    | 1       | 2       | 3       | 4       | 5       | 6       | 7     |
|----------------------------|-------|-------|---------|---------|---------|---------|---------|---------|-------|
| 1. Product involvement     | 4.646 | 0.956 | 0.723   |         |         |         |         |         |       |
| 2. Brand Familiarity       | 4.901 | 1.071 | 0.323** | 0.780   |         |         |         |         |       |
| 3. Visual attractiveness   | 5.109 | 0.913 | 0.304** | 0.278** | 0.744   |         |         |         |       |
| 4. Information quality     | 4.604 | 1.081 | 0.290** | 0.192** | 0.276** | 0.773   |         |         |       |
| 5. Trust                   | 4.715 | 1.097 | 0.219** | 0.153** | 0.294** | 0.439** | 0.825   |         |       |
| 6. Privacy concerns        | 5.041 | 0.958 | 0.273** | 0.234** | 0.303** | 0.350** | 0.311** | 0.736   |       |
| 7. Click-through intention | 4.571 | 0.860 | 0.343** | 0.311** | 0.351** | 0.331** | 0.373** | 0.318** | 0.724 |

Squared root of AVE is on the diagonal.

Pearson's correlations are below the diagonal.

\*\* Significant at 0.05.

**Table 4**  
Results: hypothesized direct effects.

| Hypothesized path                               | Path coefficient | Standard deviation | t-value | p value | Hypotheses         |
|---|------------------|--------------------|---------|---------|--------------------|
| Product involvement → Click-through intention   | 0.187            | 0.056              | 3.016   | 0.003   | H1a: supported     |
| Brand Familiarity → Click-through intention     | 0.171            | 0.058              | 2.688   | 0.007   | H1b: supported     |
| Visual attractiveness → Click-through intention | 0.192            | 0.068              | 3.052   | 0.002   | H1c: supported     |
| Information quality → Click-through intention   | 0.132            | 0.057              | 2.065   | 0.039   | H1d: supported     |
| Trust → Click-through intention                 | 0.250            | 0.046              | 4.153   | 0.000   | H2: supported      |
| Brand Familiarity → Trust                       | 0.007            | 0.068              | 0.120   | 0.905   | H3a: not supported |
| Visual attractiveness → Trust                   | 0.218            | 0.081              | 3.826   | 0.000   | H3b: supported     |
| Information quality → Trust                     | 0.415            | 0.067              | 7.364   | 0.000   | H3c: supported     |
| Product involvement → Privacy concerns          | 0.346            | 0.064              | 6.069   | 0.000   | H4: supported      |
| Gender → Privacy concerns                       | -0.043           | 0.075              | 1.186   | 0.236   | Control            |
| Age → Privacy concerns                          | 0.182            | 0.073              | -0.459  | 0.646   | Control            |
| Education → Privacy concerns                    | -0.056           | 0.055              | 0.401   | 0.689   | Control            |
| Work experience → Privacy concerns              | -0.084           | 0.056              | -1.127  | 0.260   | Control            |
| Gender → Click-through intention                | 0.055            | 0.100              | -0.877  | 0.381   | Control            |
| Age → Click-through intention                   | -0.040           | 0.095              | 1.972   | 0.049   | Control            |
| Education → Click-through intention             | 0.024            | 0.072              | -0.892  | 0.372   | Control            |
| Work experience → Click-through intention       | -0.083           | 0.073              | -1.066  | 0.286   | Control            |
| R <sup>2</sup> (Privacy concerns)               | 0.145            |                    |         |         |                    |
| R <sup>2</sup> (Trust)                          | 0.282            |                    |         |         |                    |
| R <sup>2</sup> (Click-through intention)        | 0.408            |                    |         |         |                    |

explained variance and no single-factor emerged. Based on the preceding, we were reasonably confident that common method variance was not a serious problem in our data.

#### 4.4. Testing of hypothesized direct and indirect effects

Covariance-base SEM for our data analyses was drawn using AMOS 22.0 to test the hypothesized direct effects and the trust's mediating effect. The model had adequate fit with the observed data,  $\chi^2/df = 1.914$ ; CFI = 0.943; GFI = 0.907; TLI = 0.932; IFI = 0.944; RMSEA = 0.045. The results were showed in Table 4. The model explains 14.5%, 28.2% and 40.8% of the variance (R<sup>2</sup>) of privacy concerns, trust and click-through intention respectively. H1a, H1b, H1c and H1d predicted that the consumers' perceptions to personalized online ads make a considerable contribution to click-through intention. The results showed that all the perceptions, i.e., the product involvement ( $\beta = 0.187$ ,  $p < .01$ ), the brand familiarity ( $\beta = 0.171$ ,  $p < .01$ ), the visual attractiveness ( $\beta = 0.192$ ,  $p < .01$ ) and the information quality ( $\beta = 0.132$ ,  $p < .05$ ), affected click-through intention significantly. Thus, H1a, H1b, H1c and H1d were all supported. As expected, trust had a significant positive impact on click-through intention ( $\beta = 0.250$ ,  $p < .001$ ), supporting H2. H3a, H3b and H3c predicted that brand familiarity, visual attractiveness and information quality increased the consumers' trust in ads, such that the trust mediated the relationships between each of them and the consumers' click-through intention. Whereas the results showed that the relationship between brand familiarity and trust was not significant ( $\beta = 0.007$ ,  $p > .05$ ), not supporting H3a, but both the paths from visual attractiveness ( $\beta = 0.218$ ,  $p < .001$ ) and information quality ( $\beta = 0.415$ ,  $p < .001$ ) to trust were positive and significant, supporting H3b and H3c respectively. In addition, product involvement raised the consumers' privacy concerns directly because the path between them was also positive and significant ( $\beta = 0.346$ ,  $p < .001$ ), and H4 was supported.

Furthermore, we used the bias-corrected percentile bootstrap method to test the mediating effect of trust. The indirect effect is considered significant if the CI values do not include zero. We generated 5000 Bootstrapping samples from the original data set ( $N = 446$ ) by random sampling. As shown in Table 5, the results showed that the indirect path of “Brand familiarity → Trust → Click-through intention” (bias-corrected 95% CI = -0.010 to 0.026, including zero) was not significant, and the indirect paths of “Visual attractiveness → Trust → Click-through intention” (bias-corrected 95% CI = 0.015 to 0.076, not

including zero) and “Information quality → Trust → Click-through intention” (bias-corrected 95% = 0.034 to 0.114, not including zero) were significant. Collectively, the results supported for H3b and H3c, but didn't support for H3a.

#### 4.5. Moderating effect of privacy concerns

We employed hierarchical linear regression to test the moderating effect of privacy concerns. The results were presented in Table 6. The interactions between product involvement ( $\beta = -0.093$ ,  $p < .05$ ), brand familiarity ( $\beta = -0.092$ ,  $p < .05$ ), trust ( $\beta = -0.114$ ,  $p < .05$ ) and privacy concerns had statistically significant and negative effects on click-through intention, which indicated that privacy concerns weaken the positive links between product involvement, brand familiarity, trust and click-through intention, thus H5a, H5b and H5e were supported. However, the interactions between visual attractiveness ( $\beta = -0.058$ ,  $p > .05$ ), information quality ( $\beta = -0.019$ ,  $p > .05$ ) and privacy concerns had statistically insignificant effects on click-through intention, which didn't support H5c and H5d. Fig. 2 showed how the effects of product involvement, brand familiarity and trust on click-through intention vary depending on the strength of consumers' privacy concerns. As shown in Fig. 2, the solid lines showed the effects of product involvement, brand familiarity or trust on click-through intention when the privacy concerns were relatively weak (privacy concerns at -1 SD), whereas the dashed lines showed the effects when the privacy concerns were relatively high (privacy concerns at +1 SD). Under low privacy concerns, the positive relationships between product involvement, brand familiarity or trust on click-through intention were stronger because the slope was higher. Thus, we concluded that privacy concerns played negative moderating effects on the positive effects of product involvement, brand familiarity and trust on click-through intention respectively.

## 5. Discussion

In order to enhance the effectiveness of their online ads, manufacturers increasingly employ precision marketing based on data analysis techniques such as big data and cognitive computing (Stone & Woodcock, 2014). However, the personalized online ads that can attract consumer attention has also proven to be a delicate matter whose usage comes at the risk of triggering consumer's concerns about privacy (Tucker, 2014). In this research we examined the effects of consumers' perception to personalized online ads on click-through intention based



**Table 5**  
Indirect effect of trust.

| Indirect path   | Indirect effect (95% confidence interval), p value           |
|---|--|
| Brand familiarity → Trust → Click-through intention     | $\beta = 0.005$ (95%, CI = $-0.010$ to $0.026$ ), $p = .000$ |
| Visual attractiveness → Trust → Click-through intention | $\beta = 0.038$ (95%, CI = $0.015$ to $0.076$ ), $p = .000$  |
| Information quality → Trust → Click-through intention   | $\beta = 0.069$ (95%, CI = $0.034$ to $0.114$ ), $p = .002$  |

on the utilization theory, as well as the trust's mediating effect and the privacy concerns' moderating effect. The hypotheses were tested using survey data from 446 participants. The results provided considerable support for our conceptualization. Fig. 3 showed the empirical test results of our research model.

Firstly, we found that consumer's ad click-through intention increased as a result of employing a higher extent of product involvement, brand familiarity, visual attractiveness and information quality to consumer. The result revealed that higher product involvement of ads can promote the consumers' click-through intention observably. This result responded to the calls from scholars (e.g., Drossos, Kokkinaki, Giaglis, & Fouskas, 2014; Hong, 2015) that click-through intention research should consider the impact of product involvement in the field of online ads and marketing. Furthermore, we demonstrated in this research that the design and content perceptions about personalized online ads, i.e., brand familiarity, visual attractiveness and information quality were also antecedents of click intention, which has been paid little attention in previous studies. In the era of highly developed commodity economy, consumers have more choices about their needs, which make it more difficult for manufacturers in attracting consumers' attention. They should provide more detailed information about their products in a more aesthetical and attractive design.

Secondly, we found that trust played a role of mediation in the processes of visual attractiveness and information quality affecting click-through intention. In line with previous research (Bleier & Eisenbeiss, 2015b; Okazaki, Katsukura, & Nishiyama, 2007), our results revealed that the direct effect between trust and click-through intention was stronger (i.e., higher path coefficient) than all the other direct effects between consumers' perceptions to ads (i.e., product involvement, brand familiarity, visual attractiveness and information quality) and click-through intention, which, suggested that trust is crucial when

consumers make decisions or take action on the basis of uncertain information. However, the antecedents of consumers' trust to ads have been largely neglected in prior literatures. Our results showed that there was no logical relationship between product involvement and trust, and the effect between brand familiarity and trust was insignificant. This means that trust just mediated the relationships between visual attractiveness and information quality respectively with click intention. These results extend the research of Drossos et al. (2014), and indicated that just improving product involvement based on data-driven or computing techniques is far from enough for precision marketing.

Thirdly and foremost, our results also revealed that the higher product involvement could also stimulate the consumer's privacy concerns, which played negative moderating effects on the positive impacts of product involvement, brand familiarity and trust on click-through intention. These findings were consistent with previous results which suggested that consumers who know and worry that manufacturers collect their personal information without permission for marketing purposes were more likely to take actions to avoid personalize online ads such as closing windows, scrolling down internet pages, or not clicking ads (Jung et al., 2011). However, different from the expectation, privacy concerns had no moderating effects on the positive effects of visual attractiveness and information quality on click-through intention respectively. The alternative explanations are that visual attractiveness and information quality are the characteristics of ads design, unable to stimulate consumer concerns about privacy.

### 5.1. Theoretical implications

Click-through rates to online ads have experienced a continuous decline in the past two decades. To address this issue, there have been

**Table 6**  
Results: moderation of privacy concerns on hypothesized paths.

|  | DV: Click-through intention |                  |                  | Hypotheses         |
|--|-----------------------------|------------------|------------------|--------------------|
|  | Model 1                     | Model 2          | Model 3          |                    |
| Gender                                   | -0.019 (0.081)              | 0.049 (0.070)    | 0.056 (0.069)    |                    |
| Age                                      | 0.233 (0.076)**             | -0.022 (0.068)   | -0.023 (0.067)   |                    |
| Education                                | -0.100 (0.058)              | 0.013 (0.051)    | -0.001 (0.050)   |                    |
| Work experience                          | -0.231 (0.059)**            | -0.088 (0.052)   | -0.090 (0.051)   |                    |
| Product involvement                      |                             | 0.150 (0.040)**  | 0.153 (0.041)**  |                    |
| Brand familiarity                        |                             | 0.136 (0.035)**  | 0.126 (0.035)**  |                    |
| Visual attractiveness                    |                             | 0.158 (0.043)**  | 0.128 (0.043)**  |                    |
| Information quality                      |                             | 0.097 (0.038)*   | 0.133 (0.038)**  |                    |
| Trust                                    |                             | 0.211 (0.037)*** | 0.171 (0.037)*** |                    |
| Privacy concerns                         |                             | 0.106 (0.041)*   | 0.122 (0.041)**  |                    |
| Product involvement × Privacy concerns   |                             |                  | -0.093 (0.040)*  | H5a: supported     |
| Brand familiarity × Privacy concerns     |                             |                  | -0.092 (0.037)*  | H5b: supported     |
| Visual attractiveness × Privacy concerns |                             |                  | 0.058 (0.038)    | H5c: not supported |
| Information quality × Privacy concerns   |                             |                  | 0.019 (0.036)    | H5d: not supported |
| Trust × Privacy concerns                 |                             |                  | -0.114 (0.040)*  | H5e: supported     |
| R <sup>2</sup>                           | 0.025                       | 0.3              | 0.333            |                    |
| Adjusted R <sup>2</sup>                  | 0.016                       | 0.284            | 0.310            |                    |
| R <sup>2</sup> change                    | 0.025                       | 0.276            | 0.033            |                    |
| F change                                 | 2.772*                      | 28.563***        | 4.276**          |                    |

\* Significant at 0.05.

\*\* Significant at 0.01.

\*\*\* Significant at 0.001.

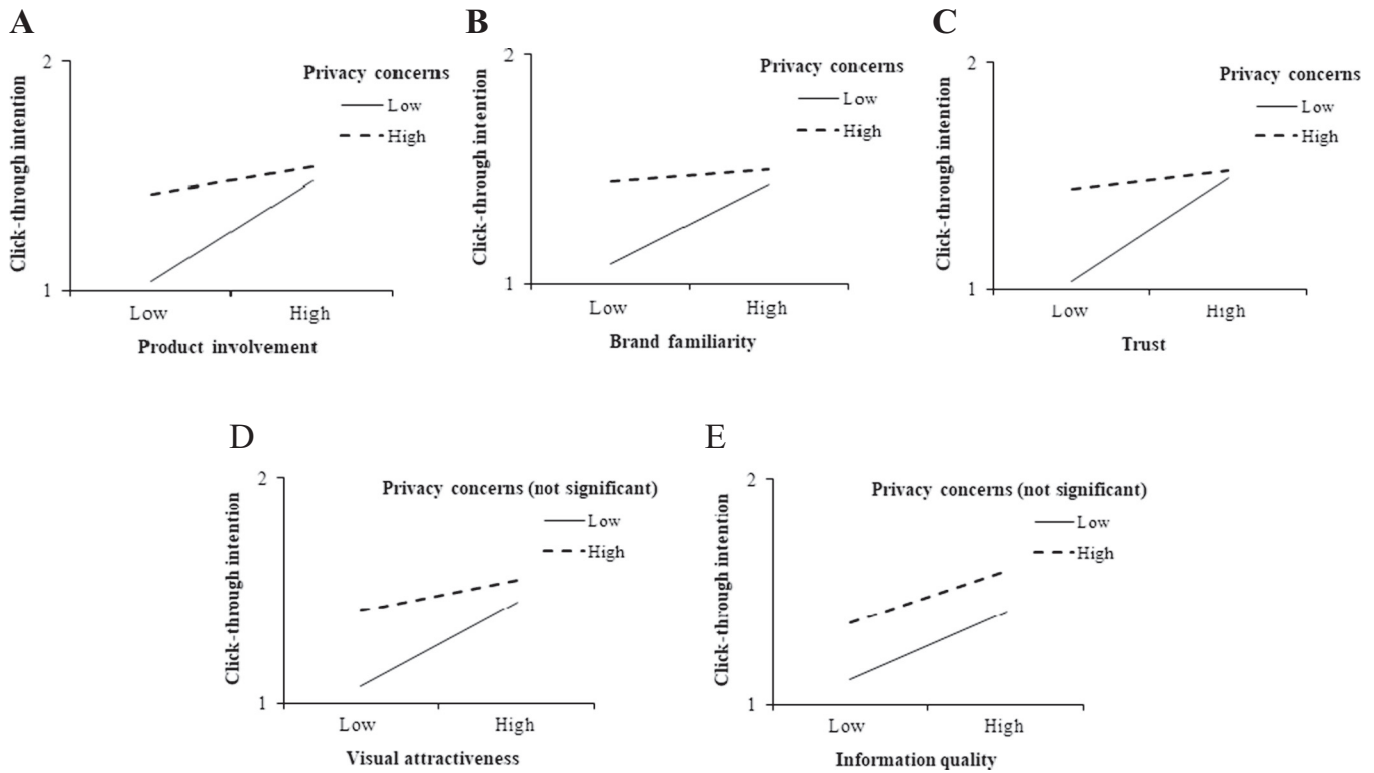
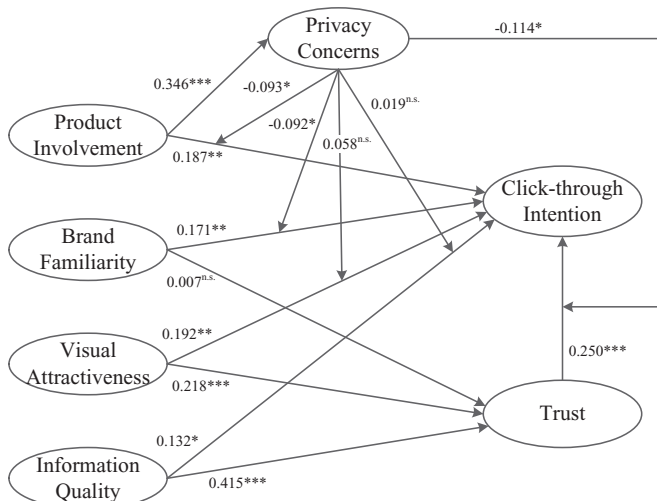


Fig. 2. The moderating effects of privacy concerns.



\* Significant at 0.05, \*\* Significant at 0.01, \*\*\* Significant at 0.001, ns Not significant.

Fig. 3. Empirical test results of the research framework.

amounts of published articles relating to algorithms, models, or mathematical approaches in the computer science, information systems, and marketing disciplines (Idemudia & Jones, 2015). With the rapid development of internet, big data and computing techniques, some literatures demonstrated that precision marking using data-mining techniques (i.e. personalized online ads) can offer personalized customer service and help manufacturers promote their profits by means of high-efficiency marketing (You et al., 2015). Most of these researches have either focused on how consumer online motivations can lead to ad clicks on social media (Zhang & Mao, 2016), or how the personalized advertising campaign cause click-through rates dropping sharply when customers realized that their personal information has been collected without their consent (Aguirre et al., 2015). Nevertheless, to date, there

are no published articles that have built a comprehensive framework to discuss the antecedents on consumers' click intentions to personalized online ads from the consumers' perception and cognitive factors. This study filled this gap and contributed to the understanding of the click-through intention's influencing factors from the consumers' perception and cognitive perspectives.

This research contributed to the precision marketing literature by enriching an understanding of psychological mechanism underlying consumers' perception and cognitive factors toward the personalized online ads based on the utilization theory. Our results implied that product involvement, which indicated the precision extent of personalized online ads, was the consumer's primary perception toward targeted ads. The core of precision marketing was improving the involvement of advertising product, i.e., improving the matching between advertising product and consumer needs base on big data and computing techniques. Our work provided a theoretical basis about why it's far from adequate to match the product to the consumer simply for manufacturers. In addition, our study provided a deeper understanding of the trust that mediated the impact of consumers' perceptions to ads and click-through intention, which indicated that manufacturers should carefully assess consumers' trust in them before promoting the personalized online ads to them based on their computed interests and preferences. Furthermore, this study also found that product involvement was positively related to consumers' privacy concerns. In other words, at the same time of personalization led to higher click-through intentions, it may also evoke consumer concerns about privacy. We further found that privacy concerns played negative moderating effects on the positive effects of product involvement, brand familiarity and trust on click-through intention. These results expanded our understanding of the implementation of precision marketing. Precision marketing is a double-edged sword, which may also stimulate consumer concerns about privacy, and weaken the effect of precision marketing.

## 5.2. Managerial implications

This study emphasized the importance of data-driven precision marketing in today's business environment. The results suggested that trust played a crucial role in governing consumers' ad responses. Being trusted was very important for manufacturers to ultimately benefit from ad personalization. We found in our results that the direct effect between trust and click-through intention was stronger (i.e., higher path coefficient) than all the other direct effects between consumers' perceptions to ads and click-through intention, and only visual attractiveness and information quality can raise consumer's trust to personalized ads. It means that just matching the product and consumer preference is far from enough for precision marketing, an attractive ad design for consumers is also very important. Based on our research results, we proposed some guidelines of best practices for manufacturers as follows to promote precision marketing.

- (1) Manufacturers should consider devoting more resources to optimize personalized recommendation algorithms because a high level of precision for targeted ads can promote consumer interest in such ads.
- (2) Meanwhile they also need to understand how to balance “collecting consumer information to provide better personalized services” with “protecting consumer privacy” (Arlı et al., 2018), and take full consideration to the negative impact of consumer privacy concerns. Effective approach is not collecting excessive and unnecessary information, which can reduce consumer privacy concerns in providing personal information.
- (3) To collect consumer information, the purpose of information collection, storage and use should be defined in terms of privacy statements, and manufacturers should keep their promises in practices. Because consumers' privacy concerns will be triggered only when they are aware that their personal privacy information have been collected and used without their permission.
- (4) Manufacturers should pay more attention to the design of personalize online ads, especially in visual attractiveness and information quality, because they are the key sources of consumer trust in ads. They can make more efforts in improving the aesthetic feelings of the ads and presenting as much product information to customers in ads.

## 6. Limitations and future research directions

We acknowledge several limitations of this research. Firstly, as the sample of this study consisted of one single source of WeChat users, the selection bias may cause that the results have limited generalizability. Secondly, this study was based on self-reporting data under certain circumstances which were limited to describe consumer behavior patterns in real situations. Employing various research methods will be helpful to obtain realistic consumer intention to click personalized ads. For example, using eye-tracking to get realistic consumer intention will compensate for self-reporting data significantly. Furthermore, there are lots of variables which influence consumers' intention to click personalized ads such as personal characteristics of consumers and their attitudes. Considering some other variables in a study can provide a more comprehensive explanation of ad click intention. Overall, personalized ads will become one of the main methods of precision marketing in the future, but there are still numerous areas and gaps left uninvestigated. Thus, further researches including those suggested above will provide a better understanding of how consumers' perception to personalized online ads can predict their ad click intentions.

## 7. Conclusion

In close, this study addressed a major gap in the precision marketing literature. To data, issues concerning the decline of Click-through rates

to online ads have attracted a great deal of attention. In today's business environment, it is important to explore if precision marketing based on consumers' computed interests and preferences can improve customers' click-through intention to ads. Drawing on cue utilization theory, results from this study showed that consumer's ad click-through intention increased as a result of employing a higher extent of product involvement, brand familiarity, visual attractiveness and information quality to consumer. Trust played a role of mediation in the processes of visual attractiveness and information quality affecting click-through intention. In addition, the higher product involvement could also stimulate the consumer's privacy concerns, which played negative moderating effects on the positive impacts of product involvement, brand familiarity and trust on click-through intention.

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