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THE IMPACT OF SOCIAL MEDIA ALGORITHMIC TARGETING ON ADVERTISEMENT EFFECTIVENESS: EVIDENCE FROM DIGITAL CONSUMERS

Zahoor Ahmed[1], Dr. Tanvir Sajid[*2], Farooq Ahmad[3], Dr. Sajida Hafeez[4]

[1,*2,3,4]*Faisalabad Business School & National Textile University*

[1]ahmed.zahoor41@gmail.com, [*2]tanveersajidbajwa@gmail.com, [3]farooq.ahmad2266@gmail.com, [4]drsajida@ntu.edu.pk

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Dr. Tanvir Sajid

Abstract

Social media now deploy advertisements using machine-learning systems that gather users' behavioral data and make inferences about their interests, but it is not known what the experience of targeting looks like for consumers or whether the experience is effective for the advertising. The aim of the present study is to understand the effect of perceived algorithmic targeting on advertisement effectiveness of digital consumers in Pakistan and if perceived relevance and perceived intrusiveness mediate this effect. A multiple regression analysis was conducted on a cross-sectional sample of 230 adult social media users between 18 and 45 years old (M = 26.24, SD = 6.64) across nine cities, together with bootstrapped mediation analysis (with 5,000 resampling) and moderated regression. Perceived algorithmic targeting was positively related to perceived relevance (b = .52, p < .001), and unexpectedly, negatively related to perceived intrusiveness (b = −.28, p < .001). The direct association between targeting and favorable attitudes was not distinguishable from zero, but the indirect association between targeting and favorable attitudes was mediated by relevance (indirect effect = 0.25, 95% CI [0.18, 0.34]) and to a lesser extent, by lower intrusiveness (indirect effect = 0.06, 95% CI [0.03, 0.10]). The targeting–attitude relationship was not moderated by privacy concerns (M = 3.97 on a five-point scale), which had a positive association with advertisement attitude, though it was not independent (b = 0.23, p < .001); perceived transparency and control had an independent positive association with advertisement attitude (b = 0.23, p < .001). The measures of engagement and purchase intention exhibited almost ceiling effects and were not modelled, while purchase intention and self-reported click behavior were not correlated with perceptual variables. The results indicate that algorithmic targeting is effective for these consumers if they perceive it as relevance, not surveillance, and that transparency and control

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are a unique lever that advertisers and platforms can use in addition.

1-INTRODUCTION

Social media advertising has evolved from buying in spaces to buying in the attention of the sorted, predicted and priced audience. Chances are the ad that shows up when a person opens a feed is not a static ad in a specific spot. The result of an automated auction based on an individual's search history, time spent, social connections, location, device, and numerous other signals. Algorithmic targeting has been the business backbone of the big platforms and one of the reasons why social media ads have become a leading marketing spend in the world, as described by Bozkurt et al. (2025). Targeting systems are used by a very large number of people. In October 2025, according to DataReportal (2026), there were 79.9 million social media user identities in Pakistan, representing 31.2% of the total population, while NapoleanCat (2026a, 2026b) estimated the number of Facebook users in Pakistan at approximately 71 million and Instagram at approximately 25 million addresses in June 2026 and May 2026, respectively. Of course, it's a practical question for companies serving markets where mobile users consume most of their time on a handful of platforms: does targeting make them more likely to be convinced or driven away? It is well established in the academic literature that targeting has two sides. Adverts that are relevant to a person will be more likely to be noticed, processed and acted upon as they require less mental effort to process and will be more relevant to them.

The opposite, however, can cause discomfort, resistance, and distrust if the same precision indicates that it knows something more than a person has publicly admitted. The personalization paradox or the personalization–privacy paradox (Aguirre et al., 2015; Awad & Krishnan, 2006; Xu et al., 2011) has been coined for this duality. According to a meta-analytic review of 53 experimental studies, on average, personalized advertising is more effective in influencing persuasion, attitudes and behavioral intentions than non-personalized advertising, and this is because of perceived relevance, but not perceived intrusiveness (Yeo et al., 2025). Meanwhile, recent experiments suggest that personalization can be perceived as an intrusion of privacy and trigger negative emotions like creepiness, which negatively affect the willingness to purchase and can be hard to unlearn (Petrova et al., 2026).

The evidence, therefore, suggests a duality: meeting or escaping personalized advertising on social media (Loureiro et al., 2025), and the impact of this personalization in a given consumer population depends upon how it is perceived by that population. The following features of the existing evidence base inspire the present research. First of all, much of the experimental evidence is offered in the context of controlled stimuli where people are personalized; in actual life, they form impressions of personalization from their accumulated exposure to their own feed. This lived perception is captured through survey research quantifying the degree to which respondents feel the ads they are exposed to be targeted on their past activity and interests, which complements experiments (Lisboa et al., 2026). Second, there are a relatively small number of studies producing relevance and intrusiveness estimates at the same time and the results are not consistent. Some studies suggest that the relevance of the message has a similar effect as the personalization of the message (De Groot, 2022); while some others indicate that the perceived intrusiveness has a minor or even a negative effect on the engagement (Yeo et al., 2025).

Other studies reveal that a high level of perceived intrusiveness can significantly lower engagement

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levels due to irritation and skepticism (Al Helaly et al., 2025). Third, the vast majority of the published literature is from North America, Western Europe and East Asia. The evidence from South Asian markets is limited and often focuses on how personalization can foster purchase intention without considering privacy concern, transparency and control as conditions where this impact can diminish (Haq et al., 2026; Zubair et al., 2024). Research on TikTok consumption in Vietnam also primarily focus on personalization as a factor that stimulates impulse buying and purchasing by the relevance, advert value, and emotions (Nguyen et al., 2025).

The present study is a step towards filling up these gaps with the data of digital consumers in Pakistan. It suggests a model where perceived algorithmic targeting is the key predictor, perceived relevance and perceived intrusiveness act as parallel mediators, privacy concern and perceived transparency and control are potential moderators, and attitude toward the advertisement is the main indicator of the effectiveness of the advertisement, However engagement intention and purchase intention were also measured, and were planned to complete the set of effectiveness outcomes, with reasons for not being able to analyses them inferentially explained clearly in both the Method and Results sections, as they are directly linked to the conclusions that can be drawn.

The study has 4 contributions. It offers evidence of relevance and intrusiveness mechanism from a sample of South Asian children in a simultaneous mediation design with bootstrapped confidence intervals. It reports a result that is contrary to the privacy-calculus expectation: the higher the perceived targeting, the less intrusive it is perceived to be, and it elaborates why this might be. It examines whether privacy concern moderates the targeting effect, as well as whether transparency and control moderate the same, and it suggests that transparency and control are an additive resource and do not moderate the targeting effect. Lastly, it reports a measurement problem, the ceiling effect for the items of engagement and purchase intention that other researchers utilizing the same scenario-based instruments should anticipate and design around.

The article is organized as follows. The next section is a review of the literature, followed by the development of the hypotheses. The Method section outlines the instrument used, the sample, how the data are treated and the analytical plan. The Results section includes tests of the quality of the measurements, descriptive statistics, tests of the hypotheses and exploratory group comparisons. The Discussion presents interpretations, theoretical, managerial and policy implications and limitations. The article ends with suggestions for further studies and a short conclusion.

2- LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1 Algorithmic Targeting in Social Media Advertising

Algorithmic targeting is the process of dedicating and showing ads to individual users based on a prediction made with their data. It is different from the earlier techniques of audience segmentation in three ways. It is personalized, it is constantly updated as new behavior is seen, and it is not obvious to the individual being targeted that their behavior is being monitored and that the advertisement is designed for them. The shift from the rule-based segmentation to the machine learning-based real-time personalization has been described in reviews of personalization in marketing, and it is a continuous trend that brings with it increased awareness of manipulation, discrimination and privacy (Chandra et al., 2022). The idea of hyper-personalization in contemporary marketing treatments focuses on the ability to customize messages and/or visual designs at a comparatively low marginal cost (Bozkurt et al., 2025) as a result

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of massive behavioral data and generative design solutions.

The mechanism is concealed, so consumers can only develop beliefs about the mechanism. The reason for this is because in the present study we are measuring perceived algorithmic targeting, not the actual amount of targeting. Users, for example, see that an ad for a product pops up after they've searched for it, that their feed is not the same as a friend's, or that the platform is somehow attuned to their interests. Their beliefs about how the platform works are based upon these observations, which are their raw material, rather than the technical truth of the matter. In most of the survey based literature, perceived personalization has been used as the proximal predictor of consumer responses (De Groot, 2022; Lisboa et al., 2026). Perceived targeting is not an indicator of accurate targeting. A user who is exposed to very accurate advertisements, but has not thought about why may experience low perceived targeting, whereas a user exposed to a few coincidences may think that there is widespread tracking. The effects in terms of effectiveness are therefore mediated by interpretations and the main question is how people interpret what they think the algorithm is doing: as help in discovering relevant offers or as intrusive into their private sphere.

2.2 Theoretical Foundations

There are a number of theories that explain the link between targeting and effectiveness. Mehrabian and Russell (1974) have proposed a stimulus–organism–response (S-O-R) model in which stimuli affect the internal cognitive and affective processes which ultimately lead to behaviors. From the perspective of advertising, the stimulus is perceived algorithmic targeting, perceived relevance and intrusiveness are internal evaluations, and attitudes and intentions are responses. The S-O-R logic has been used in the context of social media advertising, and in personalization advertising specifically, including research on irritation and skepticism as organismic states (Al Helaly et al., 2025). The positive pathway is explained by congruity theories and self-referencing theories. Messages congruent with a person's self-concept and that are congruent with the person's interests are elaborated more, due to their association with self-relevant knowledge structures, which tends to lead to more positive evaluations.

The meta-analytic evidence that perceived relevance explains the persuasiveness of personalized advertising is consistent with this account (Yeo et al., 2025). The personalization–privacy paradox and the privacy calculus theory account for the negative pathway. The trade-off between the advantages of personalization and the privacy costs of the data collection that enables it are assumed by consumers (Awad & Krishnan, 2006; Xu et al., 2011). If the expected cost is higher than the benefits, the evaluation becomes worse. The calculation of the calculus is sensitive to the type of information employed. Kim et al. (2019) demonstrated that disclosure of targeting information (e.g., when inference included attributes not expressed or content from other sites) decreased the effectiveness of an ad when the information was regarded as inappropriate, but increased effectiveness when the information was viewed as acceptable and the advertiser trusted.

One explanation for the possibility of active resistance to intrusive targeting is psychological reactance theory. Reactance is a motivational state which is created when individuals feel threatened to their freedom of choice (Brehm, 1966). Personalized messages can be interpreted as a possible manipulation of behavior, leading to reactance, irritation and skepticism. A recent study provides a clear answer to the relationship of perceived privacy intrusiveness and engagement with personalized advertising: skepticism fully mediates this relationship (Al Helaly et al., 2025). The persuasion knowledge model also suggests that consumers form lay

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theories about the tactics of marketers to deal with persuaders (Friestad & Wright, 1994). Knowledge of such a private algorithm may lead to a defensive posture and the application of such knowledge.

The contemporary research on creepiness combines these notions: In four experiments (with over 2,500 participants), Petrova et al. (2026) demonstrate that creepiness affects purchase intent both when it is initially created due to "ambiguity about what lies behind" and when it is subsequently assessed as "intrusive surveillance." Lastly, the attitude-toward-the-advertisement tradition posits that the affective response to an advertisement can act as a mediator between the advertising message and the attitude toward the brand and purchase intention (MacKenzie & Lutz, 1989). It has been a long-standing measure of advertising effectiveness, and this is what this study can predict best. These perspectives suggest a dual process model, where perceived targeting both increases perceived relevance, and increases perceived intrusiveness, with the latter negatively impacting attitudes and the former positively impacting attitudes.

Perceived Relevance as the Benefit Pathway

Perceived relevance is the extent to which a consumer believes an ad is relevant to him or her, his or her needs and his or her situation. It's the one thing that's been proved and documented to have a positive effect on advertising results consistently. The more relevant the ads are, the more likely they will be noticed and elaborated on, useful and evaluated favorably. Evidence from the studies of Facebook advertising indicate that perceived relevance fully mediates the relationship between perceived personalization and brand attitude (De Groot, 2022), while the above meta-analysis of the literature as a whole suggests that this relationship also holds at the level of the research literature as a whole (Yeo et al., 2025). Perceived relevance and related constructs have been consistently found to be significant factors influencing purchase intention and impulsive buying in the context of social media advertising in Pakistani samples (Atta et al., 2023; Zubair et al., 2024).

This is corroborated by recent studies conducted elsewhere in Asia, which found that perceived personalization increased consumers' perceived relevance, advertising value, and brand engagement to the ads (Arora et al., 2025), and that perceived relevance and perceived advertising value mediated the relationship between personalized advertising and purchase intention among young TikTok Shop users (Nguyen et al., 2025). Two things are of note. Relevance in the present study has an informational element (e.g., advertisements that present information about products and services consumers are likely to be interested in) and a fit element (e.g., advertisements that correspond to consumers' interests). Both are covered by the measure used here. Second, relevance also has a component of perception as it relates to the person and a component as it relates to the algorithm: seeing relevant ads means that the algorithm is working. One might expect that those who think their feeds are custom-made to themselves, on average, also think that the ads are custom made to them, and that the experience of "fit" goes hand in hand with the experience of "targeting." The connection between relevance and attitude is also well-theorized.

The attitude toward the ad is an effective response (good–bad, appealing–unappealing, favorable–unfavorable) and one of its major cognitive determinants is ad relevance. Similarly, advertising value, which is a construct that is very closely related to personalization, and is argued to be a combination of in formativeness, entertainment and credibility (Ducoffe, 1996), is shown to account for the effect of personalization on purchase intention of young adult users of Instagram in Pakistan (Haq et al., 2026) and for the role of personalization in advertising value for

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effectiveness (Ul Haq et al., 2025). The evidence is also cross cultural, showing that the value that consumers perceive of advertising is influenced by cultural context (Crespo et al., 2025), while research on Generation Y consumers looks at the antecedents of the value consumers ascribe to social media advertising (van Deventer & Saraiva, 2025). On this basis the following hypotheses are proposed.

H1: Perceived algorithmic targeting is positively associated with perceived relevance.

H3: Perceived relevance is positively associated with attitude toward the advertisement.

2.3 Perceived Intrusiveness as the Cost Pathway

The concept of perceived intrusiveness is based on studies studying the interruption of goal-directed behavior by advertising. It has been defined by Li et al. (2002) as the level of disruption caused when ads are placed within a medium, and Edwards et al. (2002) demonstrated that exposure to ads that disrupt the flow of an editorial unit can produce irritation and avoidance due to reactance. The idea has expanded with the introduction of personalized social media advertising. Today, intrusiveness involves notions of being watched, knowing too much about the ad, and invading a personal space besides the original concept of interruption. Items on feeling watched, knowing too much about the advertisements, interrupting in a manner that is annoying and invasiveness are related to this overall concept.

The standard prediction based on privacy calculus and reactance theories is that the more an ad appears to be based on personal data, the more it will elicit the sense of surveillance (Petrova et al., 2026; Segijn & Strycharz, 2025). Attitudes and intentions are likely to be lowered in turn, when intrusiveness is present. There is more to the empirical record than this simple logic. Once relevance was taken into account, the meta-analysis by Yeo et al. (2025) revealed that intrusiveness had no impact on persuasiveness of personalized ads. The relevance–attitude relationship also has been studied in relation to intrusiveness; it has been found that when ads are seen as intrusive, the relationship between relevance and attitude is negative (De Groot, 2022). Conversely, psychological reactance research suggests that when privacy is perceived as intrusive, there is increased irritation and skepticism, which in turn diminishes engagement with personalized ads (Al Helaly et al., 2025); and studies of young users of Instagram found that perceived high personalized, high useful and low intrusive communication is required for high affective involvement (Lisboa et al., 2026).

A study of 427 social media users found, however, that there was no correlation found between perceived personalization and perceived intrusiveness of social media (Arora et al., 2025). One plausible reason for targeting to reduce intrusiveness in a measure that contains interruption is that an ad that appears random and unrelated to the viewer is a less than pleasant interruption than an ad that fits the viewer's interests. Based on the theoretical view that targeting-intrusiveness is likely to be positively related, and intrusiveness is likely to be negatively related, the following hypotheses are presented, while it is not ruled out that the relationship between targeting and intrusiveness may be null or even negative based on the empirical literature.

H2: Perceived algorithmic targeting is positively associated with perceived intrusiveness.

H4: Perceived intrusiveness is negatively associated with attitude toward the advertisement.

2.4 Mediation: A Dual-Process Account of Targeting Effects

The impact of perceived targeting on the effectiveness of advertising is the combination of a positive indirect effect of relevance and a negative indirect effect of intrusiveness; the net effect will be dependent on the relative strength

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of these effects. The logic is that of competitive or parallel mediation, and offers an explicit resolution of the personalization paradox: positive and negative effects of personalization can hold true at the same time, with the stronger pathway in a sample prevailing. It is therefore more informative to obtain a simultaneous estimate of both than to obtain separate estimates of either. Previous studies that have taken this approach among social media users have found that the relevance pathway dominates (De Groot, 2022; Yeo et al., 2025). Based on this evidence, it is hypothesized positive correlation between targeting and attitude will exist and that this will be carried through primarily through relevance.

H_5: Perceived algorithmic targeting is positively associated with attitude toward the advertisement, and this association is mediated by perceived relevance (positively) and perceived intrusiveness (negatively).

2.5 Privacy Concern as a Boundary Condition

Privacy concern refers to the degree of concern people have about the collection, use and sharing of their personal information. A key feature of the personalization–privacy paradox, for consumers who are highly concerned with privacy, the privacy costs are expected to be higher and have a negative effect on their attitude toward the advertising (Awad & Krishnan, 2006; Xu et al., 2011). Based on the evidence found in the Indonesian Instagram user, it can be seen that the perceived advertising value is reduced when a user is concerned about his/her privacy in the use of the platform (Lina & Setiyanto, 2021). There is mixed evidence for other emerging markets. While perceived relevance was found to have a significant moderating effect on attitude in the social media sample (n = 427), privacy and security concerns did not significantly moderate perceived relevance and attitude among the Vietnamese TikTok users (n = 743). Similarly, survey evidence indicates that privacy concern, privacy fatigue, and previous negative experiences are also directly correlated with advertising avoidance (Chen et al., 2026). A moderating role is not supported by all of the literature, though, and the personalization–privacy paradox is frequently described as disconnect between what people say and what they do.

The notion of privacy cynicism may help to explain such inconsistencies. Interviews with consumers reveal that people want to be aware of and in control of data collection, but feel powerless and a sense of resignation that they can't control it, which means that worry is intertwined with continued use (Segijn & Strycharz, 2025). The same goes for qualitative research of AI personalized journeys where tensions between personalization and customer empowerment are also identified (Hardcastle et al., 2025). If privacy skepticism is rampant, then concern can be an implicit stance that applies to all ads, which in turn does not affect the evaluation of the ad in question. However, the prevailing theoretical expectation is that the perceived targeting advantage will be less for those who are more privacy concerned.

H_6: Privacy concern moderates the relationship between perceived algorithmic targeting and attitude toward the advertisement, such that the relationship is weaker when privacy concern is high.

2.6 Transparency and Perceived Control as Boundary Conditions

Transparency is about understanding why one is seeing certain ads and how one's info is utilized, while control is about the perception of control over the ads seen, such as through advertisement settings or by hiding ads. Through explanations, such as the feature that informs users of why they're seeing an ad, and advertising preference settings, both have been promoted by regulators and platforms. The relationship between such measures and effectiveness is not necessarily direct. Kim et al. (2019) argued that when transparency results in undesirable information

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flows, it can have a negative effect but when flows are desirable and transparency is trusted by consumers it can have a positive effect. Experimental research has seen privacy controls in a social network lead to greater sensitivity to personalized advertising (Tucker, 2014). Research with a reactance lens reveals that the effect of perceived intrusiveness on irritation is mediated by the importance consumers place on transparency, which in turn can have a subsequent effect on engagement (Al Helaly et al., 2025). Recent studies about advertising avoidance also suggest transparency in targeting and display of user control is effective at engaging in less advertising avoidance (Chen et al., 2026).

Two types of roles can be envisioned. Transparency and control as a moderator can help to dampen down the relationship between targeting and its consequences: If consumers have some awareness of targeting, and are able to influence it, they become less vulnerable to appear to be targeted, and fewer benefits accrue from targeting than from being targeted, while the costs of being targeted rather than targeted are reduced. Transparency and control can just be more accepted advertising without being seen as strong or targeted in any particular way. The formal hypothesis is a moderation hypothesis because two variables being examined as moderators are perceived transparency and perceived control; the likelihood of a direct relationship is explored as a subsidiary question.

H_7: Perceived transparency and control moderates the relationship between perceived algorithmic targeting and attitude toward the advertisement, such that the relationship is stronger when perceived transparency and control is high.

2.7 Advertisement Effectiveness: Attitude, Engagement, and Behaviour

The effectiveness of an advertisement is a multi-level concept. At an affective level, it is reflected in the attitude towards the advertisement. At the conative level it comprises engagement intention "click, like, comment, share, find out more information" and purchase intention "think about, intend to buy, recommend". The real numbers of clicks and purchases determine behavioral effectiveness. Advertisement attitude is usually positively related to engagement and purchase intentions, meaning that any effects on attitude will carry over to purchase intentions (MacKenzie & Lutz, 1989). According to research conducted with Pakistani consumers, personalized ads on Instagram have a substantial direct impact on purchase intention, which is mediated by perceived creativity, advertising value and perceived authenticity (Haq et al., 2026) while research revealed that the influence of brand authenticity on consumers' behavior is significant in the case of Generation Y consumers in Pakistan (Zafar et al., 2025).

Research on young consumers has also pointed out that affective involvement with personalized advertising is a necessary but not sufficient condition for purchase intention (Lisboa et al., 2026), meaning that positive attitudes might be necessary to achieve the conversion but not sufficient. The study included measurement of engagement intention and purchase intention following the scenario advertisements. The hypothesis is presented here for the sake of completeness even though, as will be seen in the Results, it cannot be tested because of the response distributions on these measures.

H_8: Perceived algorithmic targeting is positively associated with engagement intention and purchase intention, directly or through relevance and attitude.

Furthermore, since the survey asked participants about their click and interaction rates on social media ads and whether they have purchased goods following seeing an ad, a research question was asked regarding the relationship between perceived targeting, relevance, intrusiveness, privacy concern, transparency and control with these self-reported behaviors.

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RQ1: Are the perceptual variables associated with self-reported advertisement interaction frequency and with self-reported purchases after social media advertisements?

2.8 The Pakistani Digital Consumer Context

The study context is pertinent in various ways. The penetration of social media has been increasing and Pakistan's online population is young, large: As per DataReportal (2026), in October 2025 the number of social media user identities in Pakistan was 79.9 million. Demographic estimates based on advertising data on the platforms indicate a marked bias. However, the addressable audience for Facebook in June 2026 is estimated to be approximately 71.2 million, with roughly three-quarters of those users being men, and the largest age group being between 25 and 34 years of age (NapoleonCat, 2026a), while Instagram's is estimated to be about 25.2 million, with 64% of those users being male, and the largest age group being between 18 and 24 years of age (NapoleonCat, 2026b). The figures represent advertising reach estimates and the sources warn that the numbers are only approximate.

They still suggest that the platforms that this study examined were able to reach a large audience and that audience was young and in some cases, male-dominated. The previous studies in Pakistan have mainly studied the direct effect of social media advertising features on purchase intention, including the study of purchase intention in the context of social media advertisements in Punjab (Zubair et al., 2024), the effect of personalized advertisements on social media platforms on impulsive purchase (Atta et al., 2023), and the study of personalized Instagram advertisements on young adults purchase intention (Haq et al., 2026). The studies included offer valuable evidence of the efficacy of personalization in the Pakistani context but the influence of consumers' privacy concern, sense of control, and feelings of intrusion on the benefits of personal relevance are not investigated. The present study will fill this gap. Its respondents are from nine city categories which are Faisalabad, Karachi, Lahore, Islamabad, Multan, Rawalpindi, Sialkot and Gujranwala and they have various professions from students to public and private sector employees as well as business owners.

2.9 Conceptual Model

The conceptual model combines the above arguments. Perceived algorithmic targeting is the independent variable and mediator variables are perceived relevance and perceived intrusiveness. Attitude towards the ad is the main dependent variable with engagement intention and purchase intention as downstream dependent variables. Privacy concern and perceived transparency and control moderate the relationship between targeting and the outcomes. Product involvement, age and gender are provided as controls as they increase the motivation to process advertisements about a product category and demographic characteristics may be related to the perception of targeting and attitudes. Table 1 summarizes the hypotheses.

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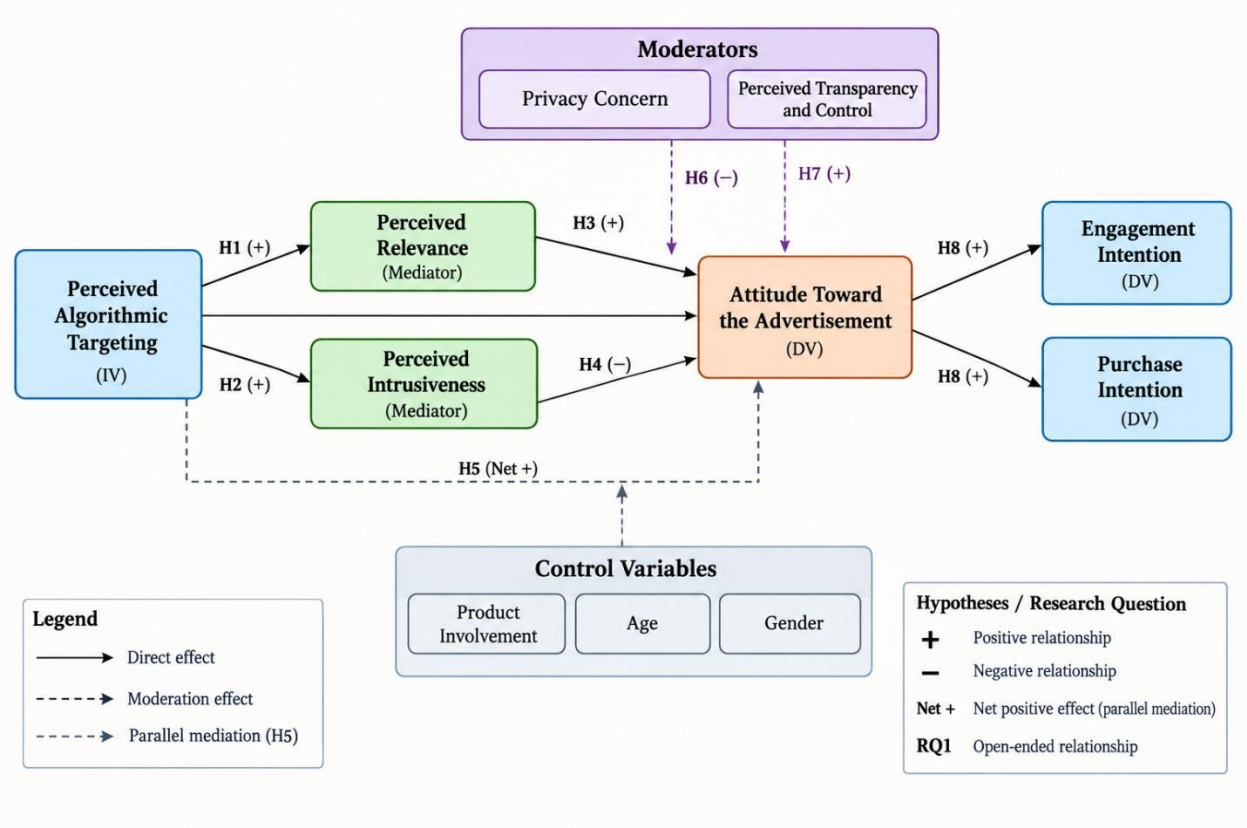


Figure 1: Conceptual Framework

Table 1 Summary of Research Hypotheses and Research Question

Code	Hypothesised or investigated relationship	Sign	Analytic test
H1	Perceived algorithmic targeting → Perceived relevance	+	OLS regression
H2	Perceived algorithmic targeting → Perceived intrusiveness	+	OLS regression
H3	Perceived relevance → Attitude toward the advertisement	+	OLS regression
H4	Perceived intrusiveness → Attitude toward the advertisement	−	OLS regression
H5	Targeting → Attitude, mediated by relevance (+) and intrusiveness (−)	Net +	Bootstrapped parallel mediation
H6	Privacy concern × Targeting → Attitude	−	Moderated regression
H7	Transparency and control × Targeting → Attitude	+	Moderated regression
H8	Targeting → Engagement and purchase intention	+	Not testable (ceiling effects)
RQ1	Perceptual variables → Self-reported interaction and purchase behaviour	Open	Ordinal logistic regression

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Note. OLS = ordinary least squares.

3. METHOD

3.1 Research Design

The study was conducted with a cross sectional survey method that employed a quantitative research approach in the form of an embedded advertisement scenario. The first set of questions asked respondents to report social media use and the second set on their most used platform to rate their perceptions of the ads they typically see (perceived targeting, relevance, intrusiveness, concern with privacy, transparency and control). They then saw a set of normalized mock advertisements and were asked to think about how they might have been displayed in their own feed, and to rate their attitude towards the advertisement, their engagement with the advertisement, and their intention to purchase the product. Product involvement was measured last as a control variable, and then followed by demographics. The order of the measures in this ordering is in accord with the design recommendations in the instrument, where the outcome measures are presented after the scenario, in order to reduce priming of the mediators, and to separate the independent and dependent variable blocks in the questionnaire, a procedural remedy for common method bias (Podsakoff et al., 2003).

The analytic model is a moderated parallel-mediation model testifying regression based path analysis. This approach was selected because there are only a few well-measured multi-item constructs in the model, the sample size is medium, and there is a transparency and wide use of regression-based mediation with bootstrapped confidence intervals for models of this type (Hayes, 2013).

3.2 Data Source, Provenance, and Treatment of the Data File

A total of 236 responses were received for the study, of which 230 were found to be complete, valid, and suitable for further analysis. The remaining six responses were excluded due to incomplete information or failure to meet the data screening criteria. Consequently, the final analysis was conducted using 230 valid responses, representing a usable response rate of 97.46% of the total responses received. This screening process helped ensure that the dataset was appropriate for subsequent statistical analysis. No values for any analysis variable were missing. There were two embedded attention checks: one asking the respondent to tick “Disagree” and another asking the respondent to tick “Strongly agree”—100% of the 230 respondents did both of these, thus no one was excluded on that basis. There were no straight lining exclusions as all multi-item scale items were answered in a similar manner by all respondents. The speeding criterion could not be applied as completion times were not recorded in the file. One screening condition was confirmed by all respondents, who stated that they had seen ads on social media in the last month. A point of data that is retained needs to be explicitly disclosed, since it restricts analysis. The variance of the three item purchase-intention (PI1–PI3) was 0 for all 230 respondents, and the three item engagement-intention (ENG1–ENG3) were 5 for between 225 and 227 of the 230 respondents, with the remaining responses being 4. A variable that has either no variation or so little variation that it is not seen as correlated with other variables, or as an outcome in a regression. As such, these two outcome constructs are simply reported descriptively and are not included in the inferential models. This is an unusual pattern for a self-report survey, and could be due to a ceiling effect from a scenario that was liked by everyone, acquiescent responding, a data capture or coding error in the source file, or a combination of these. These explanations cannot be picked out from the available file and the reader should

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consider the zero outcome variance as a limitation of the data set, and not as evidence of maximal purchase intention among Pakistani consumers. The indicators of the effectiveness (attitude to advertisement and the self-reported behavioral indicators (frequency of interaction with the advertisement and past purchases following social media advertisement)) were those indicators that were found to show significant variance.

3.3 Participants

The analytic sample comprised 230 adults aged 18 to 45 years (M = 26.24, SD = 6.64). The source of recruitment and the response rate of the file are not written so it is considered as a non-probability sample and the results could not be generalized statistically to Pakistani populations. Gender was reported as male by 116 respondents (50.4%), female by 105 (45.7%), prefer not to say by 7 (3.0%), and other or self-described by 2 (0.9%). Half of the respondents (n = 117, 50.9%) were aged 18 to 24, 89 (38.7%) were aged 25 to 34, and 24 (10.4%) were aged 35 to 45. Respondents lived in Faisalabad (28.7%), Karachi (16.5%), Lahore (12.2%), Islamabad (12.2%), Multan (7.0%), Rawalpindi (7.0%), Sialkot (6.1%), Gujranwala (5.2%), and other cities (5.2%). Two thirds of the population resided in urban areas (65.2%), 22.2% in semi-urban areas and 12.6% in rural areas. Students comprised the largest occupational group (38.3%) and the sample was well educated with 43.5% having completed a bachelor's degree, 28.3% a master's degree and 1.7% a doctorate. The information about the social media profile of the sample is summarized in Table 2.

Table 2 Sample Characteristics and Social Media Usage Profile (N = 230)

Characteristic	Category	n	%
Gender	Male	116	50.4
	Female	105	45.7
	Prefer not to say / other	9	3.9
Age group (years)	18–24	117	50.9
	25–34	89	38.7
	35–45	24	10.4
Education	Secondary or below	12	5.2
	Intermediate / higher secondary	49	21.3
	Bachelor's degree	100	43.5
	Master's degree	65	28.3
	Doctorate or above	4	1.7
Occupation	Student	88	38.3
	Employed (private sector)	58	25.2
	Employed (public sector)	32	13.9
	Self-employed / business owner	26	11.3
	Unemployed / seeking work	14	6.1
	Homemaker / other	12	5.2
Area of residence	Urban	150	65.2
	Semi-urban	51	22.2
	Rural	29	12.6
Most-used platform	Instagram	77	33.5
	Facebook	57	24.8

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Characteristic	Category	n	%
	YouTube	46	20.0
	TikTok	45	19.6
	Other	5	2.2
Daily social media time	Less than 1 hour	19	8.3
	1–2 hours	53	23.0
	3–4 hours	87	37.8
	5–6 hours	48	20.9
	More than 6 hours	23	10.0
Opened ad settings	Yes	84	36.5
	No	108	47.0
	Not sure	38	16.5

Note. Percentages may not sum to 100 because of rounding. Respondents used on average 2.99 platforms several times a week. The platforms most used at least several times a week were Instagram (65.2%), YouTube (59.1%), TikTok (58.7%), and Facebook (57.4%), followed by LinkedIn (27.8%), X (19.1%), and Snapchat (11.7%).

A regression with six predictors, with significance level .05 and N = 230, has a power of 80% to detect an incremental effect of about $f^2 = 0.035$ (about 3.4% of variance) for a single predictor or interaction term in the regression, an incremental effect that falls between the conventional small and medium benchmarks (Cohen, 2013). The study is thus powered to detect small to medium sized effects but may fail to detect smaller sized effects, which is addressed in the interpretation of non-significant moderation tests.

3.4 Instrument

The instrument consisted of a structured questionnaire that was structured into nine sections: participant information and consent, screening, social media usage profile, perceptions of social media advertising, privacy and control, an advertisement scenario, product involvement, demographics and an optional closing comment. The perceptual items were preceded by screening questions to ensure that the respondents were adults (18 years or older), used at least one of the three major social media platforms several times a week, had seen ads on these platforms in the last month, and the most-used platform was used as the reference platform for the perceptual items. The consent page indicated that the response was anonymous, voluntary, and that no name or contact information would be gathered, and responses would only be reported in aggregate. The scenario section was constructed to include three simulated advertisements for consumer electronics, fashion or apparel, and food delivery or lifestyle services, or one of the three were randomly selected. The data file contains only one product-interest rating and one set of outcome items and does not specify which advertisement was given to each respondent. Therefore, the outcomes of the scenarios are interpreted at the general level of social media advertisements, not per product category.

The items were developed for the study based on existing scales in the areas of personalization, intrusiveness, privacy concern, attitude towards advertisements, and purchase intention and are therefore compared to the validated scales prior to their use, the instrument notes. The constructs are drawn from previous conceptualizations based on the advertising intrusiveness literature (Edwards et al., 2002; Li et al., 2002), information privacy literature (Xu et al., 2011) and the semantic differential tradition (MacKenzie & Lutz, 1989). The psychometric

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evidence reported in the Results section is an important aspect of the validation because the items are new.

3.5 Measures

The perceptual items and outcome items were rated on a 5-point scale. Agreement items (1-5) 1 = strongly disagree, 5 = strongly agree. The semantic differential scale (bad–good, unfavorable–favorable, unappealing–appealing) was used for attitude toward the advertisement. Scale scores were calculated as the average of the items. Constructs, items, role in model and example items are displayed in Table 3. A full list of items is in the Appendix.

Table 3 Constructs, Items, and Roles in the Model

Construct (code)	Items	Role	Example item
Perceived algorithmic targeting (PAT)	4	Independent variable	The ads I see on social media appear to be based on my previous online activity.
Perceived relevance (REL)	4	Mediator	The ads I see match my interests and preferences.
Perceived intrusiveness (INT)	4	Mediator	Ads on social media seem to know too much about me.
Privacy concern (PC)	4	Moderator	I am concerned that my personal data may be used for purposes I did not agree to.
Transparency and control (TC)	3	Moderator	I feel I can control the kinds of ads I see.
Attitude toward the ad (ATA)	3	Dependent variable	Bad–Good; Unappealing–Appealing; Unfavourable–Favourable
Engagement intention (ENG)	3	Dependent variable (descriptive only)	I would be likely to click on this advertisement.
Purchase intention (PI)	3	Dependent variable (descriptive only)	I would consider buying the product shown in this advertisement.
Product involvement (INV)	3	Control	This type of product is important to me.

Note. Single-item behavioural measures were frequency of clicking or interacting with advertisements (never, rarely, sometimes, often, very often) and purchase after a social media advertisement (never, once, a few times, many times). Daily social media time, opening of advertisement settings, product interest (five levels), and demographic variables served as descriptive or control variables.

Both of the behavioral outcomes were recorded as ordinal data (interaction frequency: 1-5; purchase frequency: 1-4). Gender was included in the regression models as a dummy variable (female = 1) and those who did not specify male or female were left unprocessed in the descriptive analyses. A continuous control in the form of age in years was used.

3.6 Common Method Variance and Data Screening

Common method variance is a concern (Podsakoff et al., 2003) as all variables were measured from the same respondents at the same time using self-report. The design also incorporated procedural remedies, such as anonymity, the inclusion of scale instructions that differentiate the constructs, the inclusion of attention checks, and separation of the predictor

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and outcome blocks in the scenario section. The following statistical diagnostics were also employed: For this data, a single factor would not be definitive as the constructs are conceptually linked, and inflation factors in the regression models were checked and the discriminant validity of the constructs was examined. The distributions were checked for skewness and kurtosis with an absolute skewness over 1 considered a warning. Normality and heteroscedasticity of regression residuals were looked at; results were compared with heteroscedasticity-robust standard errors.

3.7 Analytic Strategy

The analyses carried out in five steps. The quality of the measurement of the multi-item constructs was evaluated using Cronbach's Alpha, the mean inter item correlations, corrected item total correlation and the average variance extracted (AVE) of loadings of a one component solution of each construct, and discriminant validity was determined by the Fornell–Larcker criterion (Fornell & Larcker, 1981) which involved comparing the square root of the average variance extracted of each construct with the correlation between the constructs. The AVE and the composite reliability were derived from the principal component loading values, and not from a confirmatory factor model, and for this reason are approximate; therefore, they are indicated. The second step was the computation of descriptive statistics and Pearson correlations. Third, the hypotheses (H1 to H4) were tested by ordinary least squares (OLS) regression, where product involvement, age and gender were used as controls. Fourth, to test the parallel mediation model (H5), each mediator was regressed on the perceived targeting, and attitude was regressed on the perceived targeting and both mediators; the indirect effects were tested using 5,000 bootstrap resamples and percentile 95% CIs (Hayes, 2013). Fifth, moderation (H6 and H7) was tested by adding the interaction term between the mean standardized targeting and the standardized moderator to a regression model predicting attitude from the main effects of the targeting, the moderator, and the controls, and by examining interactions with simple slopes at one SD below and above the moderator's mean. Exploratory supplementary analyses were conducted on interaction effects on mediators. Spearman rank correlation values were used to examine the research question regarding self-reported behavior, and ordered logistic regression models were developed in which the variables for interaction and purchase were regressed on the five perceptual variables and the variable for product involvement, along with age. Comparisons of platform, age group, gender, education, occupation, area of residence, daily time on social media, and awareness of advertisement settings were conducted using exploratory group comparisons that involved one-way analysis of variance and a nonparametric check using the Kruskal–Wallis test. These comparisons are based on a large number of tests and it is assumed that any single test at the .05 level is provisional. All tests were conducted with two tails. Effect sizes are presented as unstandardized coefficients (with confidence intervals) where informative, standardized coefficients (with confidence intervals), and R^2.

3.8 Ethics

The questionnaire included a statement of consent and was based on the principle of voluntarily and anonymously participating. The institutional review board name and approval number will be included in the consent page, which should be filled out by the researcher before the manuscript is submitted for publication (Ethics approval body and reference number). Only anonymized data were used and no identifying data was dealt with in the analysis.

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4. RESULTS

4.1 Measurement Quality

Table 4 shows the reliability and convergent validity statistics for the multi-item constructs along with descriptive statistics. High internal consistency was found for all seven constructs that were analyzed inferentially. Cronbach's alpha for the instruments ranged from .87 (privacy concern) to .92 (perceived relevance) which are significantly higher than the .70 minimum threshold recommended in the administration notes of the instrument and corrected item–total correlations were between .69 and .84. The composite reliability values were between .91 and .94 and the approximate average variance extracted was between .71 and .84, which is higher than the .50 threshold. Variance of the items was accounted for by the first component of each construct, ranging from 72% to 84% and the second component of each construct had an eigenvalue of less than 0.45 in all cases, which justified treating each scale as unidimensional. Items within a construct are very redundant with alpha values equal to or greater than .90 on five of the seven scales. This is typical of short scales that have parallel item wording; however, it also means that reliability estimates may partly reflect the parallel wording of the items.

Table 4 Reliability, Convergent Validity, and Descriptive Statistics of the Constructs (N = 230)

Construct	Items	α	Mean inter-item r	CR	AVE	M	SD	Skewness
Perceived algorithmic targeting	4	.91	.72	.94	.79	3.17	0.80	−0.01
Perceived relevance	4	.92	.75	.94	.81	3.18	0.88	−0.15
Perceived intrusiveness	4	.90	.69	.93	.77	3.05	0.73	0.01
Privacy concern	4	.87	.62	.91	.71	3.97	0.63	−0.20
Transparency and control	3	.89	.72	.93	.81	3.15	0.77	−0.05
Attitude toward the ad	3	.90	.74	.94	.83	4.34	0.71	−0.89
Product involvement	3	.90	.76	.94	.84	3.19	0.85	−0.12
Engagement intention	3	.80	.59	—	—	4.98	0.11	−7.36
Purchase intention	3	—	—	—	—	5.00	0.00	—

Note. CR = composite reliability; AVE = average variance extracted. CR and AVE were computed from the loadings of a one-component solution for each construct and are approximations to values from a confirmatory factor model. Alpha is not defined for purchase intention because all items had zero variance, and CR and AVE were not computed for engagement intention because of its near-zero variance.

The Fornell–Larcker criterion was used to establish the discriminant validity. The square roots of the AVE values (range = .84 . 92) were higher than the highest correlation between two constructs (r = .64; perceived relevance and attitude toward the advertisement) and the correlation between the constructs within the model was moderate rather than large. The variance inflation factors of the regression models were not greater than 1.37, which suggests that there is no serious multicollinearity.

4.2 Descriptive Statistics

Table 4 displays a unique profile of means. Privacy concern was high (M = 3.97, SD = 0.63), and 89% of respondents had a scale mean above the neutral midpoint, which is a very large departure from neutrality, $t(229) = 23.16$, $p < .001$, $d = 1.53$. On the item level, there was a high level of agreement or strong agreement that they were concerned about the collection of their

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information (PC1, 73.5%), the use of data for which they had not consented (PC2, 73.0%), the sharing of their data with unknown companies (PC3, 76.5%), and the tracking of their online activity (PC4, 75.7%). Perceptions of targeting, however, were relatively low (M = 3.17, SD = 0.80), t(229) = 3.13, p = .002, d = 0.21, with approximately one-third agreeing with each of the four targeting items (33.5% to 38.7%). Perceived relevance (M = 3.18) and perceived transparency and control (M = 3.15) were also somewhat above the midpoint, but not significantly so, t(229) = 1.13, p = .261, d = 0.07, and t(229) = 1.45, p = .147, d = 0.05, respectively. Perceived intrusiveness (M = 3.05) was not significantly different from neutral, t(229) = 1.13, p = .261, d = 0.07. Less than one in three respondents agreed with each of the intrusiveness items (25.7% to 30.4%), which mean that the feeling of being watched was a minority experience in this sample. Attitude towards the ad was highly positive (M = 4.34, SD = 0.71), with 77.0% of respondents with a scale score of 4.0 or above, and a moderately negative skew (−0.89). The rating of product interest for the scenario advertisement was distributed across the scale: 8.7% was not at all interested, 19.1% was slightly interested, 40.0% was moderately interested, 28.3% was very interested and 3.9% was extremely interested. Interest was unrelated to attitude, ρ(228) = −.002, p = .976. Behaviorally, respondents reported interacting with ads sometimes (42.2%), often (22.2%), very often (13.5%), rarely (18.3%) and never (3.9%) and 72.6% had purchased a product after seeing an ad on social media at least once (once 27.0%, a few times 32.6%, many times 13.0%). Thirty six and a half percent (36.5%) had opened their advertisement settings, 47.0% had not and 16.5% did not know. The correlations are shown in Table 5. Perceived targeting was correlated positively with perceived relevance (r = .47, p < .001); negatively correlated with perceived intrusiveness (r = −.31, p < .001) and positively correlated with transparency and control (r = .23, p < .001), and positively correlated with attitude (r = .32, p < .001). It was not correlated with privacy concern (r = .00, p = .964). The attitude was most closely associated with relevance (r = .64), intrusiveness (r = −.36) and transparency and control (r = .32). Privacy concern was not significantly correlated with any other construct, and product involvement was not correlated with any construct in the model.

Table 5 Pearson Correlations among the Study Constructs (N = 230)

Variable	1	2	3	4	5	6	7
1. Perceived targeting	1						
2. Perceived relevance	.47**	1					
3. Perceived intrusiveness	−.31**	−.26**	1				
4. Privacy concern	.01	−.10	.06	1			
5. Transparency and control	.23**	.43**	−.10	−.13	1		
6. Attitude toward the ad	.32**	.64**	−.36**	−.06	.32**	1	
7. Product involvement	−.07	−.03	.01	−.07	−.03	.06	1

Note. ** p < .01 (two-tailed). Engagement and purchase intention are excluded because of ceiling effects.

4.3 Perceived Targeting, Relevance, and Intrusiveness (H1 and H2)

The regressions of the two mediators on perceived targeting, controlling for product involvement, age and gender are reported in Table 6. Perceived targeting was a strong positive predictor of perceived relevance, b = 0.52, SE = 0.07, 95% CI [0.39, 0.65], p < .001, and the model explained 22.8% of the variance in relevance, F(4, 225) = 16.61, p < .001. H1 was

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thus upheld. There was a small positive correlation between the perceived targeting score and relevance (1-point rise in perceived targeting score corresponding to 0.5-point rise in relevance). The controls were not significant predictors of relevance, and thus the great bulk of the explained variance in relevance was due to the targeting. H2 hypothesized that the perceived targeting and perceived intrusiveness would be positively correlated. The estimated association was negative, b = −0.29, SE = 0.06, 95% CI [−0.40, −0.17], p < .001, with the model explaining 9.8% of the variance, F(4, 225) = 6.12, p < .001. H2 was therefore rejected as the association was significant but the opposite of that which was hypothesized. Those who felt that their ads were based on things they did and were interested in tended to feel that the ads were less intrusive, rather than more. Using heteroscedasticity-robust (HC3) standard errors did not change this result, and residuals from both models were normally distributed (Shapiro–Wilk p = .298 and .837).

Table 6 Regression of Perceived Relevance, Perceived Intrusiveness, and Attitude toward the Advertisement on Perceived Targeting (N = 230)

Outcome	Predictor	b	SE	95% CI	p
Perceived relevance	Perceived targeting	0.52	0.07	[0.39, 0.65]	< .001
	Product involvement	−0.00	0.06	[−0.13, 0.12]	.947
	Age	0.01	0.01	[−0.01, 0.02]	.327
	Female	−0.02	0.11	[−0.23, 0.18]	.840
	R^2 = .228				
Perceived intrusiveness	Perceived targeting	−0.29	0.06	[−0.40, −0.17]	< .001
	Product involvement	−0.03	0.06	[−0.13, 0.08]	.633
	Age	0.00	0.01	[−0.01, 0.02]	.487
	Female	−0.06	0.09	[−0.24, 0.13]	.556
	R^2 = .098				
Attitude toward the ad	Perceived targeting	0.28	0.06	[0.17, 0.39]	< .001
	Product involvement	0.06	0.05	[−0.04, 0.17]	.241
	Age	0.01	0.01	[−0.01, 0.02]	.294
	Female	−0.09	0.09	[−0.26, 0.09]	.346
	R^2 = .117				

Note. b = unstandardised regression coefficient. Female was coded 1 for female and 0 otherwise.

4.4 Relevance, Intrusiveness, and Attitude (H3 and H4)

The total association between perceived targeting and attitude toward the advertisement was positive, b = 0.28, SE = 0.06, 95% CI [0.17, 0.39], p < .001, R^2 = .117, F(4, 225) = 7.45, p < .001 (Table 6). Adding perceived relevance and perceived intrusiveness (Table 7) increased the model's power to explain the results: R^2 = .467, F(6, 223) = 32.56, p < .001. Perceived relevance was a strong positive predictor of attitude, b = 0.48, SE = 0.05, 95% CI [0.39, 0.57], β = .60, p < .001, supporting H3. Perceived intrusiveness was a significant negative predictor, b = −0.22, SE = 0.05, 95% CI [−0.32, −0.12], β = −.22, p < .001, supporting H4. In standardized terms the relevance was about three times stronger than the intrusiveness, and together these two variables accounted for approximately four times as much variance as the targeting alone. The direct effect of perceived targeting on attitude (after controlling for the mediators) was near 0 and not

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significant: b = −0.03, SE = 0.05, 95% CI [−0.13, 0.07], p = .542. There was no significant difference in product involvement, age or gender. Diagnostics were performed for this model and revealed that the residuals were not normally distributed (Shapiro–Wilk p value = .016) and that the model had some degree of heteroscedasticity (Breusch–Pagan p value = .004), as would be expected with a negatively skewed outcome. The nearly equal heteroscedasticity-robust (HC3) standard errors to conventional ones and unchanged conclusions (e.g., relevance p < .001 and intrusiveness p < .001 for both estimators) were found.

Table 7 Regression of Attitude toward the Advertisement on Perceived Targeting, Relevance, and Intrusiveness (N = 230)

Predictor	b	SE	95% CI	β	p
Perceived targeting	−0.03	0.05	[−0.13, 0.07]	−.03	.542
Perceived relevance	0.48	0.05	[0.39, 0.57]	.60	< .001
Perceived intrusiveness	−0.22	0.05	[−0.32, −0.12]	−.22	< .001
Product involvement	0.06	0.04	[−0.02, 0.14]	.08	.158
Age	0.00	0.01	[−0.01, 0.01]	.04	.401
Female	−0.09	0.07	[−0.23, 0.05]		.219
R^2 = .467, $F(6, 223)$ = 32.56, p < .001					

Note. β = standardised coefficient from a model with standardised continuous variables and without the gender dummy. All variance inflation factors ≤ 1.37.

4.5 Parallel Mediation (H5)

In the parallel mediation model, the effect of perceived targeting on attitude was mediated. Targeting relevance (a_1 = 0.52, SE = 0.06) and intrusiveness (a_2 = −0.28, SE = 0.06) were both positively predicted by relevance (b_1 = 0.49, SE = 0.05) and negatively predicted by relevance (b_2 = −0.21, SE = 0.05) at least in the model without covariates. The indirect effects via relevance were positive and significant (0.25, 95% bootstrap CI [0.18, 0.34]). The indirect effect through intrusiveness was also positive, with both the component paths being negative: $a_2 \times b_2$ = 0.06, 95% CI [0.03, 0.10]). Both indirect effects were therefore in the direction that favors the advertiser. The total indirect effect was 0.31, 95% CI [0.23, 0.40], and the direct effect was not distinguishable from zero (−0.03, 95% CI [−0.13, 0.07]). The two mediators then accounted for the overall effect of 0.28, which represents a pattern of indirect-only (full) mediation. Some 81% of the total indirect effect was due to relevance, while some 19% was due to intrusiveness partially supported. The overall association between targeting and attitude was positive and was fully mediated, with relevance as the hypothesized mediator, dominant. But there was no balancing cost on the intrusiveness pathway due to the reduction in perceived intrusiveness as well as the amplification of it as a cost. These are summarized in Table 8.

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Table 8 Bootstrapped Indirect Effects of Perceived Targeting on Attitude toward the Advertisement (5,000 Resamples)

Effect	Estimate	95% CI	Interpretation
Total effect (c)	0.28	[0.17, 0.39]	Positive
Direct effect (c′)	−0.03	[−0.13, 0.07]	Not different from zero
Indirect via relevance	0.25	[0.18, 0.34]	Positive; dominant pathway
Indirect via intrusiveness	0.06	[0.03, 0.10]	Positive (negative a-path × negative b-path)
Total indirect	0.31	[0.23, 0.40]	Full mediation

Note. Estimates are unstandardised and were obtained without covariates. The total effect is the slope of attitude on targeting alone; the covariate-adjusted value in Table 6 is also 0.28. Percentile confidence intervals for the indirect effects were based on 5,000 bootstrap resamples.

The perceived targeting score was categorized into three groups (low, n = 85; medium, n = 76; high, n = 69) as a descriptive example. Mean relevance rose from 2.73 to 3.23 to 3.67 across the groups, mean intrusiveness fell from 3.27 to 3.11 to 2.73, and mean attitude rose from 4.09 to 4.37 to 4.63, as shown in Table 9. The trend is monotonic for all three variables.

Table 9 Mean Relevance, Intrusiveness, and Attitude by Level of Perceived Targeting

Perceived targeting group	n	Relevance	Intrusiveness	Attitude toward the ad
Low	85	2.73	3.27	4.09
Medium	76	3.23	3.11	4.37
High	69	3.67	2.73	4.63

Note. Groups are approximate tertiles of the perceived targeting scale. Means are on five-point scales.

4.6 Moderation by Privacy Concern and by Transparency and Control (H6 and H7)

H6 suggested that the relationship between a perceived targeting and attitude would be weaker due to privacy concern. Privacy concern did not moderate the relationship, b (interaction) = −0.07, SE = 0.06, p = .220, ΔR^2 = .006 (Table 10). The direction of the interaction was as predicted, and simple slopes indicate a slightly smaller relationship between targeting and attitude at high privacy concern (b = 0.15, SE = 0.08, p = .054) than low privacy concern (b = 0.28, SE = 0.07, p < .001) or average privacy concern (b = 0.22, SE = 0.05, p < .001); however, these differences between the slopes were not statistically reliable. In addition, the main effect of privacy concern on attitude was close to zero (b = −0.04, p = .413). H6 was not available. Our finding was the same when using heteroscedasticity-robust standard errors (interaction p = .160). The observed ΔR^2 of .6% suggests that the interaction is, if it exists, relatively small given the 80% power of the study to detect an interaction that accounts for 3.4% of the variance. H7 hypothesized that there would be a stronger association between targeting and attitude when there was greater transparency and control. There was no significant interaction and its sign was in the wrong direction, b = −0.04, SE = 0.05, p = .429, ΔR^2 = .002, which did not support the prediction of H7. Again, little differences between the simple slopes of targeting on attitude at low (b = 0.22, p = .001), average (b = 0.18, p < .001) and high (b = 0.14, p = .034) transparency and control. Perceived transparency and control did not moderate the relationship between the other variables, but rather had a strong and significant main effect on attitude, b =

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0.19 per SD, SE = 0.05, p < .001, and the model with the interaction accounted for 18.4% of the variance in attitude. With this interaction and without the mediators, one point higher on transparency and control scale corresponds to one point higher on attitude, b = 0.24, SE = 0.06, p < .001, and privacy concern was not associated with attitude, b = −0.02, p = .794. Even when controlling for targeting, transparency and control was related to perceived relevance (b = 0.38, p < .001), but not perceived intrusiveness (b = −0.03, p = .690). The relationship of transparency with control disappeared from the full mediation model (b = 0.06, SE = 0.05, p = .256), but relevance (b = 0.46) and intrusiveness (b = −0.22) still remained significant. The pattern is consistent with the features of relevance and liking which were predicted by the cross-sectional design, that is, that people who feel they understand and can manage their advertising judge the advertisements as more relevant and relevantness brings with it greater liking.

Table 10 Moderated Regression Results for Attitude Toward the Advertisement (N = 230)

Predictor	Privacy concern model: b	SE	Transparency and control model: b	SE
Perceived targeting (z)	0.22**	0.05	0.18**	0.05
Moderator (z)	−0.04	0.05	0.19**	0.05
Targeting × moderator	−0.07	0.06	−0.04	0.05
Product involvement (z)	0.05	0.05	0.06	0.04
Age	0.01	0.01	0.01	0.01
Female	−0.09	0.09	−0.08	0.09
R^2	.126		.184	
ΔR^2 (interaction)	.006		.002	

Note. z = standardised. ** p < .01. Interaction p = .220 for privacy concern and p = .429 for transparency and control.

In addition, exploratory tests of interactions were conducted on the mediators as a supplement. The associations between targeting and relevance (p = .650) as well as targeting and intrusiveness (p = .826) were not moderated by privacy concern, nor was the association between relevance and transparency and control (p = .954). There was a small interaction between Privacy concern and targeting when predicting intrusiveness, b = 0.12, SE = 0.06, p = .039, which indicated that the negative correlation between targeting and intrusiveness was stronger among respondents with low privacy concern (b = −0.33, p < .001) and attenuated and non-significant among those with high privacy concern (b = −.10, p = .215). This effect did not hold up under the use of robust standard errors (p = .066) and is one of several exploratory tests, so should be viewed as tentative. However, it is a theoretically consistent phenomenon: targeting seems to desensitize consumers when the consumers are not particularly interested in privacy.

4.7 Engagement and Purchase Intention (H8)

No testing was available for H8. Purchase intention was highest (5.00) for all 230 respondents and thus was not correlated with or regressed on any other variable. The average engagement intention was 4.98 (SD = 0.11) with 227 people marking the highest point for click, 226 people marking the highest point for interaction, and 225 people marking the highest point for information seeking items, with the rest of the respondents marking 4. Correlational analyses which involve the inclusion of engagement intention (e.g., attitude, r = .33) are

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based on the small number of cases that deviated from the range of maximum and cannot be interpreted as evidence of association. As such, the impact of perceived targeting on intentions is still empirically explicated in this dataset. What the distributions do show is that in this scenario, all respondents said they would be likely to engage with and consider purchasing the advertised product, suggesting that the scenario measures did not discriminate between respondents, and that they were uniformly likely when compared to the more varied reported behavior which follows in self-reported terms.

4.8 Self-Reported Behavior (RQ1)

There was no relationship between the perceptual variables and the frequency with which respondents interacted with advertisements or the fact that they purchased after viewing an advertisement (Table 11). All interaction frequency correlations with the other variables were small and non-significant; ρ ranged from −.08 (perceived targeting) to .04 (privacy concern) and .00 (transparency and control) to −.04 (attitude). Correlations with purchase frequency were also low with the highest being for transparency and control (ρ = .12, p = .081) and relevance (ρ = .11, p = .106). There was also no correlation between the two behaviors, ρ = −.03, p = .620. None of the five perceptual variables, product involvement, or age were significantly associated with the outcome variable (likelihood-ratio test $p > .05$, McFadden pseudo-$R^2 < .010$) when added to a model with age alone for either ordered logistic regression of ordered interaction frequency, or ordered logistic regression of ordered purchase frequency. For example, the odds ratios for a one-point increase in privacy concern were 1.25 for interaction frequency and 1.27 for purchase frequency (both $p > .21$), in the direction of decreasing, rather than increasing, the likelihood of both behaviors as a result of greater privacy concern.

Table 11Ordered Logistic Regression of Self-Reported Behaviour on Perceptual Variables (N = 230)

Predictor	Interaction frequency OR	*p*	Purchase frequency OR	*p*
Perceived targeting	0.81	.210	1.02	.924
Perceived relevance	0.82	.262	1.12	.503
Perceived intrusiveness	0.85	.367	0.91	.570
Privacy concern	1.25	.262	1.27	.214
Transparency and control	1.19	.333	1.24	.221
Product involvement	0.92	.565	1.18	.252
Age	1.04	.063	1.02	.399
McFadden pseudo-R^2	.009		.010	

Note. OR = odds ratio for a one-unit increase in the predictor. Likelihood-ratio tests against a model containing age only were non-significant (p = .431 and p = .420).

Transparency and control was linked to daily time spent on social media (ρ = .17, p = .008), meaning that the more time spent on social media, the more control that was felt. Daily time on social media was not linked to targeting, relevance, intrusiveness, privacy concern or attitude.

4.9 Exploratory Group Comparisons

One hundred group comparisons were made (10 group variables x 6 constructs). There were five that were significant at the .05 level—just over the 3, or so, that would be expected by chance—as reported in Table 12 as "provisional." The means for perceived targeting varied significantly by

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most-used platform, F(3, 221) = 3.83, p = .011; highest mean was from TikTok users (M = 3.46), lowest was from Facebook users (M = 2.94), and Instagram and YouTube users were intermediate (M = 3.17, M = 3.09, respectively). There was a difference in privacy concern by education with highest concern among respondents with secondary education or less (M = 4.27) and those with intermediate education (M = 4.15) and lower concern among those with master's (M = 3.96) and bachelor's degrees (M = 3.84), F(3, 222) = 3.67, p = .013. It differed by age group, F(2, 227) = 3.26, p = .040 (18–24 years, M = 4.07; 25–34 years, M = 3.84; 35–45 years, M = 3.96), and by daily time on social media, F(4, 225) = 2.62, p = .036, with the highest mean among those using it less than one hour a day (M = 4.24) and the lowest among those using it for five to six hours (M = 3.76). The relationship of perceived transparency and control with occupation was significant F(4, 213) = 2.77, p = .028, with the lowest scores in public sector and the highest scores in the unemployed and the self-employed groups. The Kruskal–Wallis checks were in full agreement for all comparisons except for the age-group comparison, which was just short of significance (p = .055).

Table 12 Exploratory Group Differences Significant at p < .05 (Provisional)

Construct	Grouping variable	F	df	p	Kruskal–Wallis p
Perceived targeting	Most-used platform	3.83	3, 221	.011	.017
Privacy concern	Education	3.67	3, 222	.013	.011
Privacy concern	Age group	3.26	2, 227	.040	.055
Privacy concern	Daily time on social media	2.62	4, 225	.036	.020
Transparency and control	Occupation	2.77	4, 213	.028	.028

Note. Groups with fewer than 10 respondents were excluded from the relevant comparison. Sixty comparisons were run, and no correction for multiple testing was applied, so these results should be replicated before being relied upon.

Attitude to the advertisement was similar across all platforms, age group, gender, education, occupation, area of residence, time spending on social media, past purchase, frequency of interaction and awareness of advertisement settings (all p > .13). Attitude did not differ between male (M = 4.40) and female (M = 4.27) respondents, t(219) = 1.40, p = .162, and age was not correlated with perceived targeting (ρ = .06), attitude (ρ = .09), intrusiveness (ρ = .01), or privacy concern (ρ = −.09; all p > .19). However, those who had opened their advertisement settings did not report higher levels of perceived transparency and control (M = 3.02) than those who had not (M = 3.26) or were unsure (M = 3.17), though this difference was not statistically significant, F (2, 227) = 2.34, p = .099.

4.10 Summary of Hypothesis Tests

The result of each hypothesis is summarized in Table 13. Qualification about the intrusiveness pathway supported H1, contradicted with a significant effect in the opposite direction H2, not supported H6 and H7, could not be tested H8.

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Table 13 Summary of Hypothesis Testing Results

	Result	Key statistic
H1: Targeting → Relevance (+)	Supported	b = 0.52, p < .001
H2: Targeting → Intrusiveness (+)	Not supported (reversed)	b = −0.29, p < .001
H3: Relevance → Attitude (+)	Supported	b = 0.48, p < .001
H4: Intrusiveness → Attitude (−)	Supported	b = −0.22, p < .001
H5: Mediated effect of targeting on attitude	Partly supported (full mediation, both indirect effects positive)	Indirect via relevance = 0.25 [0.18, 0.34]; via intrusiveness = 0.06 [0.03, 0.10]
H6: Privacy concern moderation	Not supported	Interaction b = −0.07, p = .220
H7: Transparency and control moderation	Not supported	Interaction b = −0.04, p = .429
H8: Targeting → Engagement and purchase intention	Not testable	Zero or near-zero variance
RQ1: Perceptual variables → behaviour	No association	LR test p = .431 and .420

5. DISCUSSION

This research examined link between consumers' perception of algorithmic targeting and effectiveness of social media advertising in Pakistan with the question of whether and how they are linked. The main results are that perceived targeting was positively linked to positive attitudes toward advertising, the link was mediated completely by perceived relevance and partly by lower perceived intrusiveness, but neither privacy concern nor transparency and control changed the strength of the link. The secondary answers are: Privacy concern was general, but not necessarily active; Transparency and control had an independent positive relationship with attitudes; the perceptual variables in this data set did not provide a basis for predicting stated intentions or self-reported behavior. These findings are examined, one by one.

Targeting Works When It Is Experienced as Relevance

Perceived relevance is the most significant finding of this study. Participants who felt that their ads were based on their activities and interests also rated the ads as more relevant (b = 0.52); by far the highest correlation between the ads and attitude was with relevance (β = .60). However, let's observe that the relationship between targeting and attitude is not present when taking into account relevance and intrusiveness, a characteristic signs of full mediation. This finding is similar to the existing literature. Meta-analysis results suggest that personalized advertising does not only lead to better persuasion, attitudes and behavioral intentions than generic advertising, but also that the mechanism of action is perceived relevance (Yeo et al., 2025). Experimental studies on Facebook advertising, for one, have found that personalization does not directly affect attitude, but only indirectly via relevance (De Groot, 2022); research on young Pakistani adults has shown that personalized

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advertisements on Instagram increase purchase intention, mediated by creativity, value of ad and authenticity (Haq et al., 2026). The current study extends this finding by demonstrating this principle for a sample across four major platforms and several occupational categories within nine categories of cities in Pakistan. It is important to highlight two aspects of the outcome. The first is that as consumers view it, there is no value in targeting itself. Consumers did not like advertisements more simply because they believed that an algorithm was behind them. They enjoyed them more if they believed that the ads were congruent with their interests, useful for their needs, and to them, helpful in discovering things. So the impact of targeting depends on delivery, we can't expect an attitudinal return if a platform's targeting is known but irrelevant. The second is the explanatory size of the gap between the full and total models. Targeting alone explained 11.7% of the variance in attitude while targeting combined with relevance and intrusiveness of the ads explained 46.7%. Relevance and intrusiveness, therefore, provide a lot of information about attitude that is ignored when measuring perceived targeting and they are also more important than perceived targeting to measure if the manager is interested in understanding attitudes. Descriptively the same point is made in the fertile comparison. The relevance scores for respondents with high perceived targeting were 3.67 and the attitudes scores were 4.63, while the scores for relevance and attitudes were 2.73 and 4.09, respectively, for the respondents with low perceived targeting. The general impressions were positive even for the low group (4.09 on a five-point scale) indicating favorable attitudes towards the scenario advertisements in this sample. The differences reported here are therefore differences in degree of consumers who on the whole gave the ads a positive rating.

5.1 Why Did Targeting Reduce Rather Than Raise Intrusiveness?

When it comes to perceived targeting, this finding is in opposition to the hypothesis from privacy calculus and reactance theories (H2) and the intuition that in order to be targeted the advertising needs to be more intrusive. It was statistically sound and did not appear to be affected by heteroscedasticity robust standard errors; it should be taken seriously and not discarded as noise. There are a number of complementary explanations which are possible; it is not possible to separate them from the data. The first is an explanation of how a measurement is being taken. Items that measured intrusiveness collated items that measured surveillance (feeling watched, advertisements knowing too much) with items that measured interruption/invasion of privacy (interrupting in an annoying way, feeling invasive), and a scale of this type is able to capture annoyance as well as privacy discomfort. When the ads feel random, repetitive or unrelated to the viewer, that's likely to make for a more annoying experience. The ad which doesn't fit will interrupt. This finding aligns with the existing body of work on intrusiveness in advertising which focuses on disruptions to goal-directed activities (Edwards et al., 2002; Li et al., 2002). It also agrees with the fact that there was a negative correlation between relevance and intrusiveness ($r = -.26$). The second theory is that it's not creepiness when it's targeting, it's creepiness when it's ambiguous. Petrova et al. (2026) suggest that consumer experiences of creepiness have to do with an inability to figure out the sender and then evaluate the message as "intrusive surveillance". Respondents who perceive that advertisements are based on their activity have, in a sense, resolved the ambiguity: they know why the advertisement is there. People who feel they are being targeted don't may feel uncertain about the ads, and the uncertainty of an ad might be worse than if the person did feel targeted. From this perspective, perceived

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targeting serves as a sense making tool which decreases the ambiguity part of creepiness. The finding also confirms the observation of a positive relationship between perceived targeting and transparency/control (r = .23), suggesting that individuals who believe that the ads are directed at them also believe that they know what was happening when the ads were being shown.

The third explanation is normalization. If people are using mobile social media platforms every day, and in this sample, approximately 69% were using these platforms for three or more hours per day, targeted advertising can be so commonplace that it does not elicit a surveillance response. The privacy cynicism that has been documented in interviews, where consumers feel they are resigned to data collection and have little control over it, would also reduce the emotional reaction to data tracking (Segijn & Strycharz, 2025). The interactive nature of "targeting" and "privacy concern" in the context of "intrusiveness" lends itself to this interpretation: the effect of perceived targeting on intrusiveness was found for participants with low privacy concern only; for participants who had high privacy concern, perceived targeting did not lead to increased intrusiveness. This interaction was marginal (p = .039 using conventional SEs, and .066 using robust SEs), and thus is provided as a hypothesis for future research. Last, the outcome could be based on the specific platforms and users within the sample. The respondents were relatively young and well educated people, who used multiple platforms, with only a small minority opening their ad settings at any point. There might be different expectations among younger consumers, ones that have been raised by the algorithmically sorted feeds they have grown accustomed to, compared to older consumers or to the Western samples for which the privacy-calculus literature has been developed. However, care should be taken not to over-read the result. The intrusiveness pathway remained relevant: participants who perceived ads as more intrusive were less fond of them ($\beta = -.22$), in line with experimental and survey studies that found that intrusiveness, irritation and skepticism negatively affect engagement in personalized ads (Al Helaly et al., 2025) and that effective ad personalization on Instagram requires ads to be highly personalized, useful, and not too intrusive (Lisboa et al., 2026). The present study is different from the Yeo et al. (2025) meta-analytic result that intrusiveness was not a significant predictor of persuasion because in the present study, intrusiveness had an indirect, albeit statistically significant, effect. One reason is that the meta-analysis is largely based on experiments that involve the manipulation of personalization, while this study is based on perceptions of personalization in ordinary ads. Another reason is that how intrusiveness occurs and is measured is different for the experiments used in the meta-analysis than for this study, which is based on perceptions of personalization in ordinary ads. Interestingly, another sample of social media, reported by Arora et al. (2025), finds a null association between perceived personalization and perceived intrusiveness, showing that the positive association assumed in the privacy-calculus literature is not as strong as it is sometimes thought to be.

5.2 High Privacy Concern, Little Consequence

People were most concerned about privacy (89% scored above the midpoint); approximately three-quarters agreed with each statement. However, privacy concern had no relation to any of the perceived targeting, relevance, intrusiveness, or attitude and it did not moderate the relationship between targeting and attitude. This is the personalization–privacy paradox in extreme form. There is strong concern about data practices overall, but this concern does not differentiate between the targeting they see as strong and weak, and it does not affect how specific ads are regarded. There are a few pathways that could be involved. Attitude toward a particular ad is

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shaped when a user is exposed to the ad, and is influenced by its content and fit, while general privacy concern is a dispositional attitude toward platforms' data collection. But also fear can be dampened by resignation; in which users maintain their use and engagement with platforms they don't trust (Segjin & Strycharz, 2025). Another potential explanation is that the privacy calculus is not driven by generalized targeting concerns, but rather by specific information flows like access to data from other websites or inferences about sensitive attributes, meaning that a generalized concern measure wouldn't be expected to correlate with a generalized measure of targeting. Another potential explanation is that the privacy calculus is not about general concerns with targeted advertising, but about specific information flows (such as access to data from other websites or inferences about sensitive attributes), so that a generalized measure of concern would not be expected to correlate with a generalized measure of targeting. The mixed findings of the recent emerging-market studies support this interpretation: First, privacy and security concerns did not affect the relevance–attitude link among Vietnamese TikTok users; second, privacy concern moderated the relevance–attitude link in another sample of social media users (Arora et al., 2025); and third, privacy concern, privacy fatigue, and prior negative experiences predicted advertising avoidance directly (Chen et al., 2026). The lack of moderation should not be taken as proof that privacy concern is irrelevant. The interaction was as predicted, with the association between targeting and attitude at high privacy concern being half that of low privacy concern (b = 0.15 versus 0.28) and the study may not have had the power to detect an interaction of this magnitude. It is reasonable to presume, but not necessarily to assume, that there is some buffering effect of concern for privacy, but it is small compared to the primary effect of relevance and intrusiveness, rather than non-existent. Additionally, in provisional comparisons, practitioners should be aware that the group mean on the privacy concern differed by education, age and duration of social media use: respondents with lower levels of formal education, younger (18–24 years) and light users showed higher mean scores on the measure of privacy concern. These patterns must be replicated but they go against the stereotype of the highly educated, heavy user.

5.3 Transparency and Control as an Additive Resource

The targeting-Attitude relationship was not moderated by perceived transparency and control, although it was among the strongest correlates of attitude (r = .32), and it also had an independent association when it was also included with the targeting (b = 0.24 per scale point). It was also strongly correlated with perceived relevance (b = 0.38, after controlling for targeting), and was independent of perceived intrusiveness and the correlation between attitude and perceived relevance was reduced after controlling for perceived intrusiveness. The most feasible explanation is that those who know what they see in ads and feel they have control over them get more relevant ads - maybe because they choose to filter what they get, which means their attitudes are better. This result aligns with experimental proof that personalization can be beneficial for users' responses to personalized advertising when they have the control in the personalization process (Tucker, 2014) and that transparency can enhance advertising effectiveness when users trust the platform and the information flows are acceptable (Kim et al., 2019). Similarly, the awareness of and control over data use for advertising is valued by consumers (as corroborated with interview evidence), and this is consistent with the views of researchers. The awareness of and control over data use for advertising is also valued by consumers (as corroborated with interview

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evidence), which corresponds to researchers' views (Segijn & Strycharz, 2025). Tempting as it is, there is no moderating effect, meaning that transparency and control are not necessarily correlated to be useful. These seem to be a useful tool across the board in perceived targeting. Interestingly, the respondents who had opened their advertisement settings indicated a slightly lower rather than higher perceived transparency and control than those who had not. This wasn't significant, so don't read too much into it, but it is a reminder that settings and feeling in control are two different things. Individuals who open this setting might feel that they have little control, or they may find that the setting choices are restricted or unclear. Advertisement controls that are not meaningful might not provide the benefits of perceived control. Less than one third of the sample had ever looked at their settings, indicating an underutilized channel.

Attitudes Are High, Intentions Are Saturated, and Behaviour Is Unexplained

There are two characteristics of outcome data that merit frank discussion. There are two characteristics of the outcome data that merit frank discussion. Firstly, attitudes towards the scenario advertisements were very positive and both purchase intention and engagement intention were at ceiling. If everyone answers that they would click, share, search for information, consider purchasing, and recommend the product, the measure is unable to discriminate among respondents, thus the hypothesis of 'more targeting - more intentions' cannot be tested. Some explanations might be that the mock advertisements were appealing, a hypothetical scenario (no harm in saying that one would buy), social desirability or acquiescence, and that there may be a data capture issue in the source file. Future research should examine scenario advertisements with different appeal, forced-choice and behavioral measures of engagement, and worded two ways to assess acquiescence. Secondly, none of the perceptual variables was correlated with self-reported behavior, although some were significant in the other variable. For those who are very confident that advertising is very relevant to them, there was no evidence that they interact with ads more or purchase more often, and the two behaviors were not associated. This decoupling follows the trend of the research on young consumers in recent years, where favorable affective responses are required but not enough for purchase intention (Lisboa et al., 2026). It is also in agreement with the overall conclusion that attitudes only partially account for behavior. Both behavioral measures were recalled over unspecified time periods, and in single items; they also require opportunity and affordability as well as attitudes. The lack of behavior should thus be seen as an indication of the poor correlation between the perceptual variables and these "crude" indicators of behavior, rather than as evidence that relevance is not important for conversion.

5.4 Platform and Demographic Differences

Results showed that TikTok users experience the most algorithmic curation (M = 3.46) and Facebook users experience the least (M = 2.94), which aligns with the general perception that algorithmic curation is more noticeable on TikTok, while the social graph is more noticeable on Facebook. It should be noted that the platforms had small numbers of participants (between 45 and 77 respondents), that there was a one-to-one comparison in 60 platforms, and that the choice of platform is confounded with age and gender, for which the result is given as a hypothesis. However, it is interesting to note that there was no difference between attitudes on platforms, indicating that the relevance mechanism is not platform specific. The prediction of attitude by demographic variables (age, gender, area of residence, education) was not encouraging for generalizability, but not beyond the age range of the sample.

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5.6 Implications

5.6.1 Theoretical Implications

The study has four implications for theories. Firstly, it provides support for a relevance-based analysis of personalized advertising effectiveness in a South Asian sample. The effect of full mediation via perceived relevance, which included an intrusiveness pathway, supports the meta-analytic finding that relevance is the primary path to understanding the effect (Yeo et al., 2025) and extends the finding from experiments to the perceived experience of advertising in daily life. Second, it proposes to rethink the personalization paradox. The paradox is usually described as a duality between more personalization being more relevant and yet more intrusive. In the current data it did not seem that there was a relationship between the two pathways as opposed, rather more perceived targeting was associated with the more perceived relevance and less intrusiveness? Thus, a refinement is warranted, in which the direction of the targeting–intrusiveness relationship is dependent on (1) how intrusiveness is conceptualized (interruption versus surveillance) and (2) whether targeting resolves or deepens ambiguity (Petrova et al., 2026), but also on consumers' baseline privacy attitudes and cynicism (Segijn & Strycharz, 2025). Theory should represent intrusiveness as a phenomenon that it can be an effect of poor targeting or an effect of excessive targeting.

Third, it demonstrates the boundaries of general privacy concern as a moderator. The concept of general privacy concern is not a good predictor of the reactions to a specific advertising context and hence moderators should be operationalized at the level of information flows and platform trust (Kim et al., 2019) or as privacy cynicism and fatigue, rather than as a broad attitude. Fourth, it argues that transparency and control are relevant, rather than solely boundary conditions, in advertising effectiveness models.

5.6.2 Managerial Implications

The great lesson for the advertiser and agency is that the value of targeting is that it is relevant. The audiences' perceived match of the ads to their interests and usefulness of the ads as a whole should be the basis for judging the value of investing in audience precision. Brief survey items can be used to directly assess the relevance as in the instrument used here, and can serve as a leading indicator of attitudes prior to the accumulation of conversion data. Relevance failure can have real costs: In Chinese SNSs, failures of personalized advertising recommendations led to negative feedbacks as well as negative word of mouth and discontinuance intentions (Jin & Ryu, 2025). The second lesson is that the risk of backlash from targeting seemed to be minimal in this sample, as intrusiveness was neutral on average and lower in the cases where one perceived more targeting. However, 25–33% of the participants were in agreement that advertisements were intrusive or intrusive too much, and intrusiveness was a major negative predictor of attitude. Campaigns should thus refrain from any signals that might alert to surveillance, including explicit reference to very recent behavior, in keeping with the idea that managers should strive to avoid "creepiness" as that is hard to undo after it is done (Petrova et al., 2026). Third, advertisers should be aware of the strong interest in privacy of their audience, which is not yet undermining attitudes. Three-quarters of respondents were concerned about tracking and sharing of data. Brands that manage consumer data in a responsible way and make this clear to consumers might be able to secure a competitive edge and, at the very least, safeguard themselves against a negative consumer sentiment change. Fourth, this was because the interaction of high relevance and low perceived control indicated the potential for advertiser-facing and platform-facing tools that allow consumers to tune their advertising preferences, as perceived control was significantly

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associated with more relevant advertising and with more positive attitudes. In Pakistan's youth and mobile dominant market, where the reach of the major platforms is huge (DataReportal, 2026; NapoleonCat, 2026a, 2026b), these steps could benefit the advertising at scale experience for brands.

5.6.3 Policy Implications

The findings suggest the adoption of policies by regulators and platform governance that would raise awareness and control over advertising would not necessarily be costly to advertising effectiveness, and may enhance acceptance. Fewer than 40% agreed with any of the transparency and control items, with only 36.5% of respondents having opened their advertisement settings at all. This suggests a mismatch between access to controls and consumers' use and understanding of controls. That would fill the void and align with the interview evidence that consumers desire awareness and control over data veillance (Segijn & Strycharz, 2025), and that digital literacy initiatives could do this. The same data indicate that while the level of general concern is high, concern does not appear to influence evaluations, meaning that policy-makers would be better off not using general stated concern as a predictor of behavior and promoting protections that are not reliant on people being vigilant.

5.7 Limitations and Directions for Future Research

The results are qualified by several limitations. The first and foremost is the outcome data. The intention to purchase and engagement was not different and intention to purchase almost none, leaving only attitude toward the advertisement as a condition scenario that could be modeled. Attitude is upstream of effectiveness, and the study doesn't know if the relevance pathway leads to clicks and purchases. Self-reported behavior was available but was measured with only one item at a single time assessment and this item was not related to the perceptual variables. Behavioral data (e.g., click log, purchase records) or experimental designs with scenarios of different appeal should be used for future work. Second, the data are cross-sectional and self-reported. The mediation analysis does not imply a cause–and–effect relationship; a reverse causal relationship is possible: consumers who like advertising may be more likely to think it's relevant and that it's targeted. The high alpha coefficients may indicate that item wording is redundant, and the relationships may be inflated, especially for perceptual variables, due to common method variance. Procedural remedies were added but a marker variable or a temporally separated design would provide more protection (Podsakoff et al., 2003). Causal inference is possible if the experiments involve the manipulation of perceived targeting and transparency. Third, it is a non-probability sample of 230 young and educated people in few cities of which more than 25% were from Faisalabad. The findings cannot be generalized to the Pakistani population and the sample coverage for older consumers is limited, as is that of rural areas (12.6%). The sample size provided sufficient power for small-to-medium effects, but limited power for small subgroups and for small interactions. Platform groups were small, so that conclusions at the platform level are tentative. Fourth, the scales were created for the study. They had good reliability and discriminant validity, but were not validated against other tests, approximation values from one-component solution were used for AVE and composite reliability, and confirmatory factor analysis with a larger sample size is needed. The perceived intrusiveness scale combines elements of surveillance and interruption, which might explain the finding of a positive correlation with targeting, and would be recommended to be separated in future studies, such as by using a separate item for the creepiness aspect. Product category results could not be directly assigned to the scenario

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advertisements as there was no information about them in the data file.

Fifth, there were records in the file labeled as synthetic test data. They were omitted and all the results reported here are those of the 230 records marked as being original. This exclusion was required, but makes the size of the sample reported smaller than the size of the file as supplied, and the provenance label cannot be independently verified from within the supplied file. Researchers, who extend the results of this work, should keep records of data collection; that is, how they recruited the sample, their response rate, and the time required for data collection to facilitate data quality auditing. Some potential areas for further research are possible extensions to the model, which can overcome the limitations listed above. Studies could investigate if the targeting–intrusiveness relationship varies across types of data involved, as proposed by the information-flow account (Kim et al., 2019), and if it is different on recommendation-based versus social-graph based platforms. Longitudinal designs might investigate if exposure to ads makes consumers more tolerant of targeting, whether the perception of privacy cynicism increases over time (Segijn & Strycharz, 2025), and whether exposure to relevant ads decreases perceptions of intrusiveness. The open-ended comment item in the instrument may be used for mixed methods work to delve into consumers' own explanations. Comparative investigations on South Asian markets and across generations would be able to make clear the general applicability of the relevance-centered pattern. Lastly, with the potential to customize creative content and audiences (Bozkurt et al., 2025), research is warranted to examine consumer reactions to a generated message, rather than a generated audience.

Conclusion

The current study investigated the relationship between social media algorithmic targeting perceptions and advertisement effectiveness of 230 digital consumers in Pakistan. The evidence shows that targeting works to be effective as long as the user perceives it as relevant. Only perceived relevance mediated the direct association between perceived targeting and favorable attitudes toward ads, and only indirectly, through perceived intrusiveness, in a second analysis. Interestingly, consumers whose expectations of privacy were violated, because they thought that their ads were designed for them, reported less, not more, ad intrusion. The privacy concern effect, mediated by relevance, was strong, but did not condition on the effect and perceived transparency and control independently had more positive effects on attitudes via relevance. Stated intentions were uniformly at the ceiling, and as there was no relationship between the attitudinal advantage of relevant targeting and clicks and purchases, the study cannot answer the question of whether the attitudinal advantage of relevant targeting translates into clicks and purchases, which is the most important question for future research. The take-home for advertisers is to seek out a level of relevance that consumers can identify as being of value, to steer clear of signals of surveillance, and to provide consumers with understandable means of control over their advertising. For platform creators and policy makers, transparency and control can be achieved without compromising the effectiveness of ads. For researchers it is that the personalization paradox should be modeled with increased sensitivity to what constitutes intrusiveness, and to the flow of information that is involved in targeting, and that the scenario-based outcome measures should be designed so that they can distinguish between the respondents.

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