

Targeted Ads and Privacy Intrusion: The Anxious Feeling of Being “Always Watched”

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The current research examines associations between targeted advertising intensity and privacy intrusion perception, with perceived surveillance awareness as a proposed mediator and privacy literacy as a moderator. Leveraging theories from Communication Privacy Management and Psychological Reactance, a conceptual model was tested via partial least squares structural equation modeling using data from a cross-sectional survey of 1,700 social media users from the United States. Multiple techniques were employed to assess common method bias; results suggest that method variance is unlikely to account for the observed structural relationships, though residual bias cannot be fully excluded given the single-source design. Perceived surveillance awareness partially mediates the association between targeting and privacy intrusion (indirect effect $\beta = .316$, 95% confidence interval [CI] [.279, .354]), while privacy literacy moderates the link between surveillance awareness and privacy intrusion ($\beta = .089$, $p < .001$), accounting for 52.7% of variance in perceived privacy intrusion. A notable finding is a pattern consistent with a “knowledge paradox,” wherein higher privacy literacy is associated with increased psychological costs of surveillance awareness — a finding that warrants further investigation and replication.

Keywords: targeted advertising, privacy intrusion, surveillance anxiety, PLS-SEM, communication privacy management theory, psychological reactance theory, perceived surveillance awareness, privacy literacy, knowledge paradox

1. Introduction

Within the last ten years, online advertisement targeting has transitioned from demographically-based to personalized through algorithms, allowing advertisers to track users' movements and activities across multiple devices on a never-before-seen scale (Statista, 2022a, 2022b). Though greater precision

increases the efficacy of marketing campaigns, it creates a psychological burden in the form of uneasiness and discomfort on the part of users when advertisements seem to know what they are talking about or searching for, based on their personal interests (Barbosa, Wang, Ur, and Wang, 2021). Such feelings reveal not just another intrusive method of

advertisement, but a process by which personal information is collected and analyzed secretly

Privacy concerns have already been established in previous research as a predictable reaction to the practice of targeted advertising (Westin, 1967; Dinev & Hart, 2006; Smith, Dinev, and Xu, 2011), cultural variations in the expression of fears regarding digital surveillance (Abokhodair and Vieweg, 2016; Ahmed et al., 2017; Al-Ameen et al., 2020), and the cognitive and affective underpinnings of experiences with privacy invasion. However, little is known about the process involved, especially regarding the role of specific pathways of how advertising intensity leads to feelings of privacy intrusion and factors that influence the strength of this process.

A substantial research gap exists within the body of knowledge on privacy and its relationship with targeted advertising practices. Previous literature has demonstrated privacy concerns associated with targeted advertisements (Boerman, Kruikemeier, and Zuiderveen Borgesius, 2017). While many of the studies have shown positive associations between the intensity of advertisements and privacy concerns, little empirical evidence has been offered regarding the mechanisms behind the correlation.

Previous research has examined privacy from the perspective of cognitive risk/benefit analysis (Dinev and Hart, 2006; Smith et al., 2011), which undervalues the affective component of surveillance experience. Being under constant surveillance is an emotional state as well as a risk assessment, and it impacts all online experiences. To capture the affective aspect of surveillance, we need frameworks that encompass cognitive appraisals and emotions related to them.

The current study attempts to bridge this knowledge gap and examines whether there is a link between the level of targeting and the perception of privacy violation via a mediated-moderated structural model. With the use of CPM Theory and Psychological Reactance Theory, the authors introduce the concept of perceived surveillance awareness as the mediator that links the intensity of targeting to privacy violation, as well as privacy literacy as the moderator that controls the intensity of this relationship

One important and theoretically notable implication of the model is what the researchers term the “knowledge paradox,” which refers to the pattern whereby higher privacy knowledge is associated with amplified rather than mitigated negative effects of perceived surveillance. To the authors’ knowledge, this is among the first studies to examine this

conditionally mediated relationship in the domain of targeted advertising, though the cross-sectional design means the finding should be treated as preliminary and hypothesis-generating.

More specifically, the study will (a) examine the direct effect of targeting intensity on perceived surveillance awareness, (b) investigate perceived surveillance awareness as a mediating factor and privacy literacy as a moderating variable, (c) examine the psychometric characteristics of the measurement scales, (d) test for the presence of common method variance, and (e) assess the validity of the relationships of interest when accounting for demographic factors.

2. Theoretical Framework

2.1 Communication Privacy Management Theory

Communication Privacy Management (CPM) Theory, developed by Sandra Petronio (2002), provides the primary cognitive framework for this study. CPM holds that individuals treat personal information as owned property, governed by self-formulated privacy rules that specify when, with whom, and in what context information may be shared. These rules are shaped by cultural norms, personal experience, and contextual expectations, forming an individualized privacy management system.

In CPM terms, when information is shared, co-owners are bound by the original owner’s privacy rules. Boundary turbulence occurs when these rules are violated—when information is reused out of context or disclosed unexpectedly—producing psychological unease, betrayal, and anxiety. Petronio and Child (2020) extended this concept to describe “turbulence cascades,” whereby a single boundary breach propagates across interconnected digital platforms, compounding the feeling of violation. Child and Starcher (2016) further demonstrated that users maintain platform-specific privacy expectations that algorithmic content streams regularly transgress, while Frampton and Child (2013) showed that repeated turbulence erodes systemic trust and generates generalized privacy anxiety. Targeted advertising exemplifies this dynamic: personal data from one interaction context is commercially repurposed across platforms without meaningful renegotiation of privacy norms. The resulting subjective experience of boundary violation is precisely what the present study operationalizes as perceived privacy intrusion. CPM’s account of cognitive boundary appraisal is theoretically complemented by Psychological Reactance Theory’s emphasis on the affective

dimension of these violations, and together these theories motivate the mediated-moderated structure of the present model.

2.2 Psychological Reactance Theory

The Psychological Reactance Theory by Brehm (1966) offers a further extension to CPM by focusing on the role of affect in privacy behavior. While CPM addresses the cognitive aspect of boundary crossing through an evaluation of the situation, psychological reactance theory addresses the negative emotional reactions following these situations, which offer a basis for understanding the association between targeted advertising and privacy breach. According to the theory, when individuals perceive their behavioral freedoms being threatened, there is likely to be a reactive response motivated toward recovering the threatened freedom.

There are several ways in which targeted advertising acts as a perceived threat to one's behavioral freedom. This includes feeling monitored leading to loss of agency, the pervasiveness of personalized advertising through social media causing loss of autonomy, and more directly related to our topic in question, a threat to the freedom of controlling personal information. According to Tucker (2014), such a perceived freedom violation occurs when information is obtained from an individual without real consent. The nature of digital monitoring makes reactance chronic in nature, leading to privacy-related anxiety.

2.3 The Personalization–Privacy Paradox

The personalization-privacy paradox refers to the conflict between people's privacy concerns about

participating in online activities that collect data and people's willingness to continue to use such platforms (Aguirre, Mahr, Grewal, de Ruyter, and Wetzels, 2015; Xu, Luo, Carroll, and Rosson, 2011). Possible reasons for this phenomenon include the trade-off between privacy losses and the benefits gained from personalized services in decision-making (Acquisti and Grossklags, 2005) and structural conditions that limit user choices (Al-Ameen et al., 2020; Goldfarb and Tucker, 2011).

This research extends the existing studies by exploring the psychological process behind the personalization-privacy paradox. Instead of studying whether people respond to their privacy concerns, it explores the link between targeted advertisement and surveillance experience. This way, the personalization-privacy paradox continues to exist as a continuous dilemma between the advantages of interacting with platforms and the cost of experiencing commercial surveillance..

2.4 Conceptual Model and Empirically Tested Mechanisms

The proposed conceptual model is illustrated in Figure 1 below. This conceptual model presents a mediated and moderated structure whereby the level of targeted advertising is hypothesized to be associated with surveillance awareness (the mediator) while privacy literacy will moderate the relationship between surveillance awareness and privacy intrusion. There is a direct link that is also expected from targeted advertising to privacy intrusion for testing full mediation.

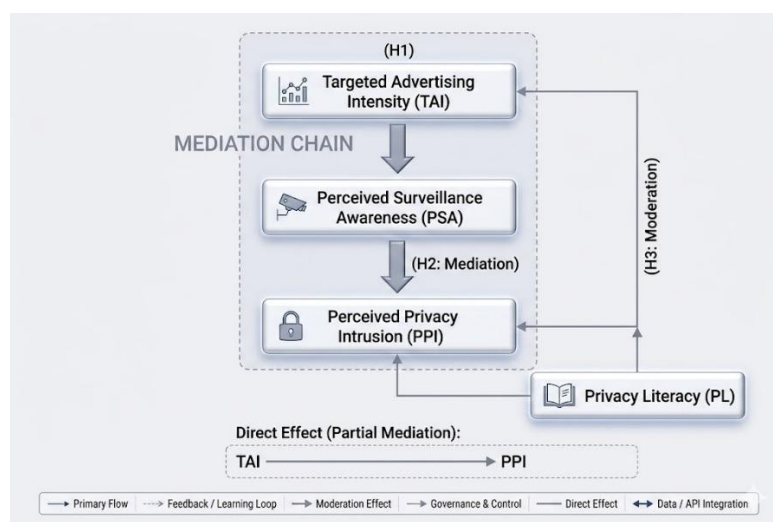


Figure 1. Conceptual Model of Targeted Advertising Intensity and Perceived Privacy Intrusion

While CPM Theory can be used to justify the creation of boundary turbulence due to targeting intensity, Reactance Theory helps explain the emotional reactions to such violations. The mechanisms of privacy turbulence cascade (Petronio and Child, 2020) can also be used to explain how an act of targeting may spread to multiple platforms, intensifying the feelings of boundary violation.

Process 2: Perceived Surveillance Awareness. Targeted advertising alone does not induce feelings of invasion of privacy – it is necessary for individuals to recognize their behaviors as systematically watched. Measured by the scale of online surveillance awareness (Büchi, 2017), perceived surveillance awareness represents the cognitive threat in CPM, which results in boundary turbulence, and the threat recognition in Reactance Theory. Such relationship is confirmed by the findings of Barbosa et al. (2021).

Moderator Variable: Privacy Literacy. The conversion of surveillance awareness into an experience of privacy violation depends on whether users are able to make sense of surveillance signals and understand that these are threatening to their informational sovereignty. In the context of the present research, privacy literacy, which will be measured using the OPLIS test by Trepte et al. (2015), will help users who have a higher level of understanding about information gathering to better convert surveillance signals into privacy threats.

3. Hypotheses Development

3.1 Theoretical Foundation

Hypotheses have been formed based on the above theoretical background, which is backed up by empirical research. There has been ample evidence that targeted advertisements are common causes of privacy threat perception (Boerman et al., 2017). Transparency on profiling has also been shown to increase rather than reduce users' discomfort, directly suggesting a mediation effect of surveillance awareness (Barbosa et al., 2021). Cross-cultural evidence has shown that such reactions are not culturally specific (Abokhodair and Vieweg, 2016; Ahmed et al., 2017; Al-Ameen et al., 2020). Evidence from prior studies shows a positive relationship between the intensity of advertising and perceptions of privacy invasion (Westin, 1967; Dinev & Hart, 2006; Goldfarb & Tucker, 2011; Xu et al., 2011; Tucker, 2014; Aguirre et al., 2015).

3.2 Hypotheses for Analysis

H1: The higher the intensity of targeted advertising, the greater the perceived surveillance awareness.

H2: The perceived surveillance awareness acts as a mediator between the intensity of targeted advertising and perceived privacy intrusion.

H3: The higher the privacy literacy, the stronger the relationship between perceived surveillance awareness and perceived privacy intrusion.

Since the study adopted a cross-sectional survey design, the outcomes are expected to have a theory-based directional correlation instead of causality. H1 is based on the Cognitive Privacy Management (CPM) theory, which states that higher levels of information flow within boundaries lead to more cognitive detection of boundary violations (Petronio, 2002). H2 proposes that perceived surveillance awareness acts as the cognitive evaluation process linking targeted advertising intensity to privacy intrusion, leading to boundary disruption and emotional opposition.

3.3 Operational Definitions

Targeted advertising intensity can be operationally defined as self-reported frequency of encountering advertisements which are indicative of one's personal qualities or behavior either online or offline. Perceived surveillance awareness represents the awareness of one's systematic monitoring and profiling due to his or her Internet behavior, which is measured by means of the Online Surveillance Awareness Scale developed by Büchi (2017). Privacy invasion refers to the subjective perception of personal boundary violation owing to commercial collection and processing of personal data. Privacy literacy represents the knowledge of facts concerning data collection and processing on the Internet.

4. Methods and Materials

4.1 Research Design

The study adopted a cross-sectional survey design with the purpose of assessing the hypothetical structural model. It is important to note that the research findings point to associations but not causations; moreover, validated five-point Likert scales were utilized.

4.2 Sample and Data Collection

In total, 1,700 social media users participated in the online survey. This sample size is sufficiently large to fulfill the requirements of PLS-SEM minimum sample requirements and also to detect medium to large effect sizes in models with several mediating and moderating paths (Hair, Hult, Ringle, and Sarstedt, 2017). The multistage quota sampling method was applied: at the first stage, 12 states were randomly chosen in such a

way as to represent all four U.S. census regions (Northeast, South, Midwest, and West). At the second stage, the use of quota controls assured the proportional age, gender, and education composition according to the data from U.S. Census Bureau.

In the final sample, 52% were females, 47% were males, and 1% belonged to the category of 'other' or not stated. Age varied between 18 and 75 years ($M = 34.2$, $SD = 11.8$). Education: 38% were graduates, 42% had post-secondary education, and 20% were either secondary educated or lower. Respondents were evenly distributed across 12 states spanning four census regions (6.2%-11.4% per state). Social media usage was frequent, with 78% using it every day.

4.3 Measures

Intensity of Targeted Advertising. The experience of exposure to targeted advertising was assessed by means of a four-item scale adapted from Boerman et al. (2017) and Xu et al. (2011). Items covered perceived frequency, cross-channel persistence, relevancy in communication, and matching personal interests with advertisement. Reliability and validity of the scale are discussed in Section 5.1.

Surveillance Awareness. Awareness of the data gathering and profiling process, algorithmic personalization, and tracking involved in targeted marketing was assessed through a four-item version of the Online Surveillance Awareness Scale by Bühi (2017). The instrument demonstrated acceptable reliability and validity in previous research.

Privacy Intrusion. A subjective feeling of privacy violation associated with commercial information gathering was assessed by a five-item scale developed on the basis of Xu et al. (2011) and inspired by Smith et al. (2011) and Dinev and Hart (2006).

Privacy Literacy. The OPLIS eight-item questionnaire (Trepte et al., 2015) measured factual knowledge concerning protective practices, tracking of data, the working mechanisms of cookies, privacy settings, and relevant laws. The OPLIS scale has been validated among various samples from Europe and North America.

Demographic Variables. Control variables included age (continuous variable), gender (nominal category), education level (ordinal), and social networking activity (ordinal).

4.4 Analytical Strategy

Analysis was done using SmartPLS 4.0, following PLS-SEM (Ringle, Wende, and Becker, 2022). PLS-

SEM was chosen due to the need for predictive accuracy and variance explained in the endogenous construct, robustness against violations of normality in ordinal Likert scale data, and its appropriateness for mediation and moderation pathway models (Hair et al., 2017; Sarstedt, Hair, Cheah, Becker, and Ringle, 2019). It is aligned with existing literature on the topic in which SEM analysis was used to model latent cognitive and affective factors (Xu et al., 2011; Boerman et al., 2017). The analysis process followed Hair et al.'s (2017) two-stage approach. In the measurement model, validity and reliability were evaluated through Cronbach's α ($\geq .70$), composite reliability (CR; $\geq .70$), average variance extracted (AVE; $\geq .50$), the Fornell-Larcker criterion, and the heterotrait-monotrait ratio of correlations (HTMT; $\leq .85$; Henseler, Ringle, and Sarstedt, 2015). Structural model evaluation included path coefficients (5,000 bootstrap resamples, bias-corrected confidence intervals), R^2 , effect sizes (f^2 ; small .02, medium .15, large .35; Cohen, 1988), and Q^2 . Indirect effects and the product of slopes test

CMB Test. All constructs have been operationalized in a single self-report Likert-scale questionnaire. Therefore, the CMB hypothesis can be tested in three ways: (a) by applying a single-factor test by Harman, when the first factor explains the variation under study less than 50%, that is, when CMB is not dominating (Podsakoff et al., 2003); (b) by applying CLF methodology and comparing path coefficients in baseline and CLF models with the difference of less than .200 between models implying no substantive CMB effect (Podsakoff et al., 2003); (c) computing full collinearity VIFs following the methodology described by Kock (2015), when VIFs less than 3.3 imply no pathological collinearity due to CMB.

Theory Supporting Social Media Usage Frequency as a Covariate. Frequency of social media usage has been included following the framework of Uses and Gratifications Theory (Katz, Blumler, and Gurevitch, 1974). According to Uses and Gratifications theory, frequency of consumption of any information is considered a measure of motivation involvement. The more the person in question is being pursued, the larger is the area of her/his private life vulnerable to turbulence. The addition of this construct will help eliminate any confounding influence of differential levels of exposure. To provide a further robustness check, Spearman rank correlation was calculated. The level of significance was tested at 0.05 with precise p-values.

4.5 Ethical Considerations

The ethical approval of this study was granted by the Institutional Review Board (IRB) of [Institution Name] (Protocol No. [XXXX-XXXX]). Everything was done according to the Declaration of Helsinki. All respondents were given a Participant Information Form (PIF), which explained the purpose of the study, voluntary participation, procedures of data handling, anonymization, and the right of withdrawal. Electronic informed consent was received. No personally identifying information was collected. The information was stored in encrypted institutional servers. The processes were consistent with GDPR data minimization, purpose limitation, and storage limitation principles. There was no compensation which amounted to undue inducement.

5. Findings and Results

5.1 Measurement Model Assessment

Reliability. All four constructs demonstrated strong internal consistency: TAI ($\alpha = .87$, CR = .91), PSA ($\alpha = .89$, CR = .92), PPI ($\alpha = .92$, CR = .94), PL ($\alpha = .85$, CR = .90). All values are above the .70 value (Hair et al., 2017). Even though all the CR values are below the .95 mark where redundancy of items is considered, the CR of PPI of .94 borders on this mark. The inter-item correlation matrix was inspected to ensure that no two items had a correlation greater than $r = .85$, which means that the high CR is a result of construct measurement and not content overlap.

Convergent Validity. AVE values were TAI = .72, PSA = .74, PPI = .76, PL = .69. They all surpass the .50 mark (Fornell and Larcker, 1981).

Discriminant Validity. All inter-construct correlations were lower than the square root of AVE of each construct (TAI: .849; PSA: .860; PPI: .872; PL: .831). HTMT ratios ranged from .25 to .71, all below .85 (Henseler et al., 2015). These findings affirm that the four constructs are all empirically distinct.

Table 1. Measurement Model: Reliability and Validity Results

Construct	α	CR	AVE	$\sqrt{\text{AVE}}$	1	2	3	4	VIF	
1. TAI	.87	.91	.72	.849					1.62	
2. PSA	.89	.92	.74	.860	.58				1.78	
3. PPI	.92	.94	.76	.872	.61	.65			1.84	
4. PL	.85	.90	.69	.831	.22	.31	.27		1.14	

Note. N = 1,700. Values below diagonal are inter-construct correlations. All HTMT ratios < .85. VIF = full collinearity VIF (Kock, 2015); all < 3.3.

5.2 Common Method Bias Assessment

The single-factor test conducted by Harman indicated that the first unrotated factor explained 34.2 percent of the total variance, which is less than the 50 percent mark (Podsakoff et al., 2003). The CLF method gave a total difference in effect between the baseline (.614) and CLF (.601) models of .013, which is much less than .200. Full collinearity VIFs (Kock, 2015) were: TAI = 1.62, PSA = 1.78, PPI = 1.84, PL = 1.14 — all below 3.3. Convergence across all three tests is reassuring and suggests that common method bias is unlikely to be a dominant driver of the structural findings, though these post hoc tests cannot fully rule out residual method variance given the single-source survey design.

5.3 Descriptive Statistics

Mean scores: TAI = 3.67 (SD = 0.89), PSA = 3.52 (SD = 0.91), PL = 3.18 (SD = 0.85), PPI = 3.84 (SD = 0.94). The TAI distribution indicated 28% below 3.0, 45% between 3.0 and 4.0, and 27% above 4.0. A median division provided a low TAI group (n = 750) and a high TAI group (n = 950). The disproportionate sample sizes indicate the slightly negative skewness of the TAI distribution (skew = -.38), where the distribution is more concentrated around the median, which is in line with the prevalence of targeted advertising.

5.4 Structural Model and Hypothesis Testing

H1: TAI $\rightarrow$ PSA. The path from TAI to PSA was positive and statistically significant ($\beta = .581$, $t = 25.73$, $p < .001$, 95% CI [.537, .624], $R^2 = .337$). This indicates a strong association between targeted

advertising intensity and perceived surveillance awareness, supporting H1.

H2: Mediation. The path from PSA to PPI was significant ($\beta = .544$, $t = 22.18$, $p < .001$). The indirect effect of TAI on PPI through PSA was $\beta = .316$ ($t = 16.84$, $p < .001$, 95% CI [.279, .354]). The direct effect of TAI on PPI remained significant ($\beta = .298$, $t = 10.42$, $p < .001$), indicating partial mediation. The composite effect was .614, while the R^2 for PPI was .527. This result supports the theoretical prediction that the awareness of surveillance mediates the relationship between targeting and intrusion, whereby there is another independent effect. Hypothesis 2 is therefore supported.

H3: Moderation. There was a significant interaction between PSA and PL ($\beta = .089$, $t = 3.91$, $p < .001$, 95% CI [.044, .134], $f^2 = .021$), suggesting that the relationship between perceptions of surveillance awareness and privacy infringement is conditional and

changes as a result of varying levels of privacy literacy. In line with this, simple slope analyses indicated a steeper relationship between PSA and PPI when privacy literacy levels were high (1 SD above the mean: $\beta = .633$) compared to low privacy literacy (1 SD below the mean: $\beta = .455$). This finding is indicative of an interaction intensification effect, where privacy literacy enhances the psychological effects of surveillance awareness.

Control Variables. Age ($\beta = -.031$, $p = .187$), gender ($\beta = .024$, $p = .312$), and education ($\beta = .015$, $p = .529$) were non-significant. Frequency of social media use had a significant small relationship ($\beta = .072$, $t = 3.12$, $p = .002$), in line with Uses and Gratifications Theory. Focal paths stayed the same despite controlling for other variables.

Robustness Check. Pearson's correlation coefficient (ρ) between TAI and PPI composite scores was 0.612 ($p < .001$), in line with the PLS-SEM total effect.

Table 2. Structural Model Results

Path	β	t	p	95% CI	f^2	R^2	Decision
TAI $\rightarrow$ PSA	.581	25.73	<.001	[.537, .624]	.509	.337	H1 Sup.
PSA $\rightarrow$ PPI	.544	22.18	<.001	[.496, .591]	.442		
TAI $\rightarrow$ PPI (direct)	.298	10.42	<.001	[.242, .354]	.128	.527	
Indirect (TAI $\rightarrow$ PSA $\rightarrow$ PPI)	.316	16.84	<.001	[.279, .354]			H2 Sup.
PSA $\times$ PL $\rightarrow$ PPI	.089	3.91	<.001	[.044, .134]	.021		H3 Sup.
SM Freq $\rightarrow$ PPI	.072	3.12	.002	[.027, .117]	.005		Sig.

Note. N = 1,700. Bootstrap: 5,000 resamples. Age, gender, education n.s. $Q^2(\text{PSA}) = .241$; $Q^2(\text{PPI}) = .386$. CLF $\Delta\beta = .013$.

Table 3 Mean PPI by TAI Group

Group	N	M (PPI)	SD	% > 4.0
Low TAI	750	2.47	0.71	31.7%
High TAI	950	4.28	0.62	72.1%

6. Discussion

6.1 Interpretation of Findings

The results are in line with the directionality of relationships whereby TAI is linked to perceived privacy intrusion, with PSA acting as the mediator and PL as the boundary condition. The mediated-moderated model explains 52.7% of the variance in

perceived privacy intrusion, meaning that TAI, PSA, and PL collectively account for considerable systematic variance in this psychological variable.

The finding of partial mediation is of theoretical significance. The sizeable indirect effect ($\beta = .316$) implies that a large amount of the relationship between TAI and PPI is funneled through the

cognitive realization of being monitored. The significant direct effect ($\beta = .298$) implies that there is also a relationship between TAI and PPI that operates independently of PSA.

The Residual Direct Effect: Theoretical Interpretations and Cautions. The significant direct path from TAI to PPI, over and above PSA, warrants theoretical discussion, but also careful qualification. A direct effect in a partial mediation model indicates that PSA does not fully account for the TAI–PPI association — it does not, by itself, identify the mechanism responsible for that residual association. Several theoretically plausible interpretations exist. It is possible that affective reactions to targeted advertising (e.g., irritation, unease) occur without deliberate appraisal of surveillance, consistent with reactance-based affect described by Brehm (1966). Alternatively, unmeasured cognitive mediators not captured by the PSA scale — such as feelings of loss of control, perceived relevance of ads, or prior negative experiences — may account for part of this path. The present cross-sectional, self-report design cannot adjudicate between these interpretations. Importantly, inferring that this direct path reflects “non-conscious” or “automatic” processing would require methods specifically designed to capture implicit responses — such as reaction-time paradigms, physiological measures, or experience sampling — none of which are present in this study. Future research should employ such designs to test this possibility directly rather than inferring it from the pattern of SEM coefficients alone.

The Knowledge Paradox. The moderation result is consistent with a pattern the current study terms the “knowledge paradox”: in this sample, factual understanding of data collection and use was associated with a stronger, not weaker, psychological response to surveillance awareness. This pattern is theoretically interpretable but should be treated as a preliminary, cross-sectional finding requiring replication before stronger causal claims are made.

One plausible interpretation is that privacy-literate individuals possess the conceptual tools to correctly interpret surveillance cues. When they recognize that they are being tracked, their knowledge of surveillance’s scope, persistence, and commercial motives may amplify the sense of boundary transgression (CPM) and perceived threat to informational freedom (reactance theory). Among less-literate individuals, even when surveillance cues are detected, the cognitive framework needed to connect those cues to a felt sense of violation may be

less developed, resulting in a weaker awareness-to-intrusion association. This interpretation is theoretically coherent but remains speculative within the present design, as the direction of any causal process cannot be confirmed from cross-sectional data.

This evidence goes against the existing presumption, which is embedded in the very construction of tools such as the OPLIS (Trepte et al., 2015), that increased privacy knowledge necessarily empowers individuals. The results presented here suggest a different reality: Privacy literacy can both empower the individual in their decisions and increase their heightened awareness of being monitored. The connection between privacy literacy and well-being is contingent rather than direct, and any intervention strategy will need to consider this dual role of privacy literacy.

These patterns carry implications across theory, practice, and policy, though they should be interpreted with the caution appropriate to a cross-sectional, perceptual design. Theoretically, the data are consistent with the view that the relationship between privacy knowledge and psychological well-being is not absolute but contingent on surveillance context. Practically, if the knowledge paradox pattern replicates in experimental designs, it would suggest that privacy education programmes should integrate coping-efficacy components alongside factual knowledge — particularly strategies that support perceived control. From a policy standpoint, the findings raise the possibility that mandating privacy literacy without also regulating targeting frequency may produce unintended psychological costs for well-informed users.

6.2 Theoretical Contributions

Starting with the mechanism specification: this research contributes to the existing literature on advertising and privacy by proposing an alternative mechanism through which targeting intensity relates to perceived privacy intrusion, namely perceived surveillance awareness.

Second, extending CPM theory. The partial mediation structure is consistent with the privacy turbulence cascade mechanism proposed by Petronio and Child (2020), suggesting that conscious appraisal of surveillance (PSA) is an important pathway through which targeting intensity relates to felt privacy intrusion. The significant residual direct effect is theoretically interesting and may suggest additional pathways beyond conscious surveillance appraisal — including affective reactance responses — though the

present design does not permit conclusions about the psychological nature of this residual path. Future experimental and psychophysiological work is needed to characterise it.

The third contribution concerns what this study tentatively terms the “knowledge paradox.” The moderation finding — that privacy literacy amplifies rather than dampens the surveillance awareness–intrusion relationship — challenges the implicit assumption in tools like the OPLIS (Trepte et al., 2015) that factual privacy knowledge straightforwardly empowers individuals. This pattern suggests that the relationship between privacy knowledge and psychological well-being may be more complex and conditional than prior frameworks imply. Given the cross-sectional design, this should be treated as a theoretically motivated empirical observation requiring longitudinal and experimental replication before it can be established as a generalizable phenomenon.

The fourth theoretical contribution concerns the model’s pathway structure. The coexistence of a mediated indirect path (TAI → PSA → PPI) and a residual direct path (TAI → PPI) is consistent with a dual-route account in which both cognitive appraisal processes (captured by PSA, and conceptually aligned with CPM) and other mechanisms (potentially affective, and conceptually aligned with Reactance Theory) contribute to privacy intrusion. This dual-route interpretation is theoretically motivated but should be considered speculative; disentangling these pathways definitively requires designs that independently manipulate or measure conscious appraisal versus affective response.

6.3 Practical Implications

These findings carry potential relevance for practitioners and policy-makers, with appropriate caution about the limits of a cross-sectional design. The results are consistent with prior work (Aguirre et al., 2015) suggesting that high-intensity targeted advertising may carry psychological costs for users that extend beyond conscious privacy concern. For platform designers, the surveillance awareness pathway suggests that transparency mechanisms alone may be insufficient if users lack the contextual tools to respond effectively. For policy-makers, the knowledge paradox pattern — if it replicates — highlights the potential value of combining privacy literacy education with regulatory constraints on targeting frequency, rather than treating education alone as sufficient protection.

7. Limitations

First, the cross-sectional approach prevents causal reasoning. Findings must be understood in terms of directionally consistent relationships with theory. For causality in the TAI → PSA → PPI chain, longitudinal or experimental research designs are necessary.

Second, all constructs were measured via self-report within a single survey administration, which creates the potential for common method variance (CMV) to inflate observed associations. Three CMB diagnostic tests were applied — Harman’s single-factor test ($34.2\% < 50\%$), the common latent factor technique ($\Delta\beta = .013 < .200$; Podsakoff et al., 2003), and full collinearity VIF analysis (all < 3.3 ; Kock, 2015) — and none indicated a dominant method factor. However, it is well established that these *ex post* tests do not eliminate CMV as a concern and should not be treated as definitive assurance of method-bias-free results (Podsakoff et al., 2003). Temporal separation, objective behavioural measures, or marker-variable techniques in future designs would provide stronger safeguards. Third, the study measures perceptual and attitudinal outcomes only; it does not include behavioural measures such as ad-avoidance, opt-out behaviour, adoption of privacy tools, or engagement reduction. The absence of behavioural outcomes is a meaningful limitation: perceived privacy intrusion may or may not translate into actual privacy-protective behaviour, and future research should examine this gap — particularly given that the personalization-privacy paradox literature documents frequent disconnects between privacy concern and behaviour (Acquisti & Grossklags, 2005).

Third, the generalization potential outside the U.S. setting is limited. The cultural context, regulations, and digital advertising environment vary across nations, making cross-country replication essential before further generalizations can be made.

Fourth, the use of online sampling methods creates potential for self-selection bias. Fifth, OPLIS assesses factual privacy knowledge but not behavioral skills; future studies should consider using scales for measuring privacy self-efficacy along with knowledge assessment. Sixth, although the current study has theoretical grounding, there is scope for future research on serial mediation and moderated mediation in the model.

8. Future Research Directions

First of all, experimental design. For example, in future, an experiment could be constructed in such a

way that the dependent variable is going to be manipulated so as to causally identify the link among the three variables involved.

Secondly, cross-cultural validation. Mediated moderated model and knowledge paradox can be tested in other cultures as well. That is to say, the mediated moderated model and knowledge paradox should be tested in other cultural settings, with different privacy norms associated with mediated communication and advertisements online (Abokhodair and Vieweg, 2016; Westin, 1967).

Third, direct and non-conscious privacy responses. The residual direct effect of TAI on PPI observed in this study raises the theoretically interesting possibility that some responses to targeted advertising may involve processes other than conscious surveillance appraisal — such as automatic affective reactance. However, the present design cannot confirm this. Future research should employ methods capable of capturing implicit or automatic responses, such as reaction-time paradigms (e.g., implicit association tests), physiological measures (electrodermal activity, eye-tracking), or experience sampling methodology, to test whether non-conscious processes genuinely contribute to privacy intrusion responses, rather than assuming they do on the basis of a survey-based direct effect alone.

Fourth, refinement of longitudinal and knowledge paradox design. The use of longitudinal studies is required to explore if the relationships between TAI → PSA → PPI remain consistent over time and if the moderating effect of privacy literacy varies as users become more experienced. Finally, the boundary conditions related to the knowledge paradox should be explored, especially regarding how privacy literacy

can serve as a protective factor, not just as an amplification factor for vulnerabilities.

9. Conclusion

The current research investigated the linkage between the level of intensity of targeted advertising and the feeling of privacy invasion using the framework of a mediated-moderated structural model based on Communication Privacy Management Theory and Psychological Reactance Theory. The results from PLS-SEM using a sample of 1,700 social media users validated all the hypotheses, which stated that targeting intensity positively correlated with surveillance awareness (H1: $\beta = .581$), mediation existed in the relationship between targeting and intrusion by surveillance awareness (H2: indirect $\beta = .316$), and privacy literacy moderates the effect of surveillance awareness on privacy intrusion (H3: $\beta = .089$).

A further notable finding is the moderation pattern tentatively described as a “knowledge paradox”: in this sample, higher privacy literacy was associated with a stronger, not weaker, relationship between surveillance awareness and felt privacy intrusion. This is theoretically interpretable — informed users may be better equipped to recognize the full implications of commercial surveillance — but it is a preliminary, cross-sectional observation that must be replicated and tested experimentally before stronger conclusions are warranted. The broader implication is that the relationship between privacy literacy and psychological well-being appears more conditional and complex than prior frameworks assumed, and that awareness-based interventions should be designed with this possibility in mind.

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