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The impact of privacy authorization framing in mobile apps on privacy disclosure: a regulatory focus approach

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Abstract

Purpose. In the digital age, the tension between mobile app users obtaining personalized services and granting privacy permissions has become increasingly pronounced. The behavioral drivers and mechanisms influencing privacy disclosure in the context of privacy permissions require further investigation. By focusing on users' privacy disclosure intentions, this study aims to assist app platforms in designing privacy permission content that aligns with consumers' diverse privacy preferences and psychological needs, providing theoretical guidance and references for efficient platform operation.

Method. The study integrates the framing effect theory and regulatory focus theory, utilizing a 2 (gain frame vs. loss frame) × 2 (promotion focus vs. prevention focus) between-subjects design with 120 participants. It investigates the interactive effects of privacy authorization framing and regulatory focus on privacy disclosure intentions and examines the mediating roles of perceived value and anticipated regret in this relationship.

Results. The interaction between privacy authorization framing and regulatory focus has a significant impact on consumers' privacy disclosure intentions.

Conclusions. When privacy authorization framing aligns with an individual's regulatory focus, it enhances perceived value and reduces anticipated regret, thereby further reinforcing privacy disclosure intentions.

Introduction

Mobile apps play a critical role in facilitating interactions between consumers and businesses in the digital age. By obtaining user consent for privacy permissions and applying data mining techniques, app providers can deliver personalized recommendations and targeted marketing. However, concerns about privacy violations have raised significant apprehension among users (Acquisti et al., 2020). To address this, app providers must strike a balance between leveraging data and protecting privacy within a regulatory framework by developing appropriate privacy consent strategies. Users' decisions to grant privacy permissions are influenced by how information is presented—this is known as the framing effect (Bandara et al., 2020). The framing effect can be categorized into two types: gain framing, which highlights the benefits of taking a particular action, and loss framing, which emphasizes the negative consequences of not doing so (Levin et al., 1998). In the privacy context, businesses can leverage the framing effect to enhance how they collect user data, thereby encouraging users to disclose personal information (Shore, 2022). However, current research rarely examines privacy disclosure behavior from the perspective of privacy permissions, particularly regarding how the framing of privacy consent impacts user decisions. Privacy disclosure refers to the act of users sharing personal information, and its underlying motivations can be better understood through regulatory focus theory. According to this theory, users' privacy decisions are often influenced by either a promotion focus, which emphasizes the potential benefits of sharing information (e.g., personalized services or enhanced user experiences), or a prevention focus, which prioritizes protecting information to avoid risks (Hung et al., 2024). Yet, the interaction between an individual's regulatory focus and privacy framing, and how this dynamic affects privacy disclosure behavior, remains an underexplored area that warrants further investigation.

To address the aforementioned research gaps, this study introduces the framing effect into the domain of privacy permissions, analysing how the interaction between individuals' regulatory focus and information framing influences their intentions to disclose personal information. Additionally, the study explores the mediating roles of perceived value and anticipated regret in this process. The findings aim to provide insights for mobile app providers on balancing data utilization with privacy protection, enhancing user engagement on platforms, and improving user retention.

Hypothesis development

The effect of matching authorization frame and regulatory focus on privacy disclosure intentions

According to framing effects theory, information frames can be categorized into gain frames and loss frames. Gain framing encourages proactive decision-making, while loss framing emphasizes strategies to avoid losses (Kim, 2023). However, consumer preferences and choices vary based on psychological tendencies, with individual sensitivity to information framing being influenced by regulatory focus (Zhang et al., 2022). When the information frame aligns with an individual's regulatory focus, its persuasive effect is enhanced. Specifically, in the context of privacy permissions, a gain frame in privacy authorization appeals to promotion-focused consumers by presenting high-quality services, which fosters a sense of self-fulfilment and encourages them to adopt a more accepting approach to privacy consent notifications. Conversely, a loss frame in privacy authorization influences prevention-focused consumers by highlighting potential losses from refusing to grant permissions, thereby eliciting a risk-averse response, and leading to greater acceptance of privacy consent notifications. Based on this, the following hypotheses are proposed:

> **H1.** The interaction between authorization framing and regulatory focus significantly affects consumers' privacy disclosure intentions.

H1a. Promotion-focused consumers exhibit higher privacy disclosure intentions in response to a gain frame compared to prevention-focused consumers.

H1b. Prevention-focused consumers exhibit higher privacy disclosure intentions in response to a loss frame compared to promotion-focused consumers.

The mediating role of perceived value and anticipated regret

Perceived value refers to consumers' psychological assessment of a product's benefits versus its costs, influenced by individual needs, expectations, and psychological states (Porter, 1985; Yang et al 2023). The level of perceived value directly affects individuals' motivation and decision-making (Zhu et al., 2020). Hayashi and Sasaki (2022) noted that aligning information framing with individuals' regulatory focus characteristics can influence decision-making strategies and subsequently enhance perceived value (Hayashi & Sasaki, 2022; Peng et al., 2021). In the context of privacy disclosure, users' decisions to disclose personal information involve a trade-off between the anticipated benefits and potential risks (Yang et al 2020). Therefore, this study considers perceived value as a measure of the balance between the app service experience and privacy disclosure risks, and proposes the following hypothesis:

H2. The perceived value of consumer information processing is higher when the authorization framing aligns with the consumer's regulatory focus.

H2a. Promotion-focused consumers exhibit a higher perceived value in response to gain frames compared to prevention-focused consumers, leading to an increased willingness to disclose privacy.

H2b. Prevention-focused consumers demonstrate a higher perceived value in response to loss frames compared to promotion-focused consumers, resulting in a greater willingness to disclose privacy.

Anticipated regret is a negative emotion arising from the expectation of future adverse outcomes or missed opportunities (Loomes & Sugden, 1982). It drives individuals to choose options that align with their goals to minimize regret during the decision-making process (García & Curras-Perez, 2019). Research indicates that promotion-focused consumers aim to maximize benefits, while prevention-focused consumers strive to minimize negative outcomes, with both seeking to reduce anticipated regret (Lim & Hahn, 2020). In the context of privacy authorization, anticipated regret is influenced by either a gain or loss frame, affecting consumers' privacy disclosure intentions through the interaction between privacy authorization framing and regulatory focus. For instance, promotion-focused consumers, when presented with a gain frame, are more inclined to agree to privacy permissions to achieve positive outcomes and thus experience lower anticipated regret, which enhances their motivation to disclose personal information. Based on this, the study proposes the following hypothesis:

H3. Consumer information processing yields lower anticipated regret when authorization framing matches the consumer's regulatory focus.

H3a. Promotion-focused consumers experience lower anticipated regret in response to gain frames, which leads to a higher willingness to disclose privacy compared to prevention-focused consumers.

H3b. Prevention-focused consumers experience lower anticipated regret in response to loss frames, which leads to a higher willingness to disclose privacy compared to promotion-focused consumers.

Based on the above hypotheses, the theoretical model for this study is proposed, as illustrated in Figure 1.

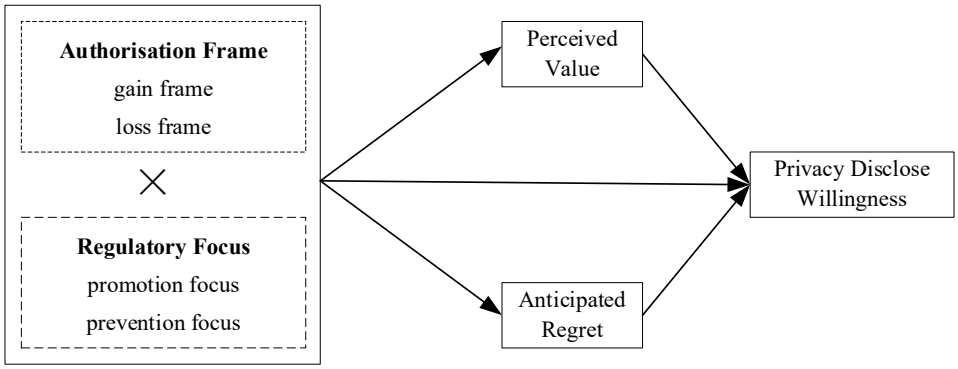

Figure 1. The theoretical model

Experimental design

Preliminary experiment 1

Preliminary experiment 1 aimed to identify the mobile app and type of privacy authorization to be used in the main experiment. First, social apps were selected based on their download numbers and ratings from the App Store and Google Play, as well as consumer preferences on social media platforms, focusing on apps with high user familiarity and clear core functionalities. Next, the privacy information requested by high-download and high-usage apps was analysed. Five types of privacy permissions commonly requested by social apps were identified: location, camera, photo library, microphone, and contacts. Finally, a survey was conducted with 102 university students (58 males, 44 females) who rated the perceived relevance of these five privacy permissions to the core functionalities of the apps using a 7-point Likert scale. The results showed that the contacts permission had the highest relevance, followed by photo library, microphone, camera, and location. Based on these results, the microphone permission was selected as the primary permission for mobile app requests in the main experiment to minimize the impact of the specific privacy permission on consumers' willingness to disclose personal information.

To eliminate the effects of participants' trust in existing apps and brand recognition on their willingness to disclose privacy (Bansal et al., 2016), this study designed a virtual social app named ‘Wetalk’. Two types of microphone authorization notifications were created: one emphasizing the benefits of using the microphone (gain frame) and the other highlighting the potential losses of not granting authorization (loss frame). As illustrated in Figures 2 and 3, the authorization notifications were presented as images in a uniform style at the bottom of the screen to simulate a real usage scenario and eliminate influences from location and style. Before the experiment began, participants were informed of the background setting: they were to assume they were interested in and had downloaded the ‘Wetalk’ social app, and upon preparing to use it, a privacy permission request would pop up on the screen.

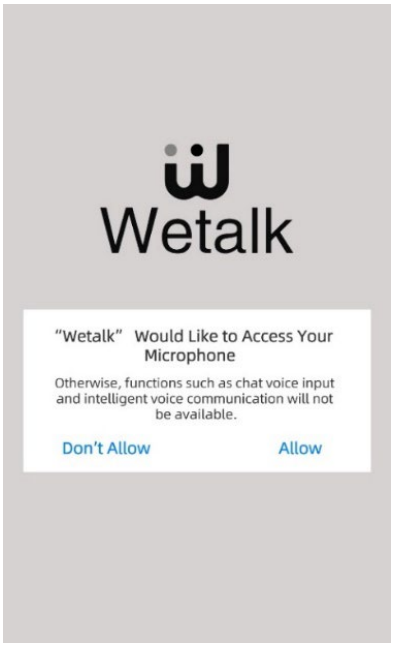

Figure 2. Gain frame

Figure 3. Loss frame

Preliminary experiment 2

Preliminary experiment 2 aimed to validate the effectiveness of the experimental stimuli in manipulating framing effects and regulatory focus. First, 60 students (33 males, 27 females) were randomly divided into two groups and shown the 'Wetalk' microphone permission authorization notifications framed either as a gain frame or a loss frame. After reading the authorization notifications, students rated the effectiveness of the framing. ANOVA analysis revealed significant differences between the two groups (P=0.000), with mean scores of 3.8 and 3.87, respectively, indicating that the framing manipulation was effective. Next, 112 students (54 males, 48 females) were randomly assigned to promotion-focused and prevention-focused experimental groups. Their regulatory focus was manipulated through questionnaire responses and short essay writing. ANOVA analysis showed that the scores for regulatory focus were significantly higher in both groups (P=0.000), with a mean score difference of 3.32 for the promotion-focused group and 3.25 for the prevention-focused group, demonstrating effective manipulation of regulatory focus. These manipulations provided effective experimental stimuli for the subsequent main experiment.

Formal experimental procedure

This study employed a 2 (gain frame vs. loss frame) × 2 (promotion focus vs. prevention focus) between-subjects design, involving a formal experiment with 120 students (63 males, 57 females) from a comprehensive university. Participants were randomly assigned to one of four experimental groups: gain frame - promotion focus, gain frame - prevention focus, loss frame - promotion focus, and loss frame - prevention focus. The mobile app 'Wetalk' and the validated microphone permission from preliminary experiment 1 were used as the privacy permission materials. The manipulation of framing effects and regulatory focus followed the validated methods from preliminary experiment 2. The experiment had two objectives: first, to examine the interactive effects of framing effects and regulatory focus on consumers' privacy disclosure intentions; and second, to test the mediating effects of perceived value and anticipated regret on consumers' privacy disclosure behavior.

In the formal experiment, a situational manipulation method was used, and participants were briefed on the experimental background before starting. First, the framing effects were manipulated by having participants view two types of authorization interfaces for the 'Wetalk'

microphone permission: gain frame and loss frame. Participants then evaluated the framing attributes of these interfaces. Next, the manipulation of regulatory focus was initiated through a '*short essay task*,' which included completing the Regulatory Focus Questionnaire and responding to items related to either promotion focus or prevention focus, as well as filling out a general regulatory focus measurement questionnaire. Finally, participants were asked to complete scales measuring their privacy disclosure intentions, perceived value, and anticipated regret based on their genuine responses. Additionally, information on their gender, age, educational background, and other individual characteristics was collected.

Measurement item design

To ensure the reliability and validity of the questionnaire measurements, this study drew on previous research and made appropriate modifications to the measures for privacy disclosure intentions, perceived value, and anticipated regret according to the specific research context. The experiment used a 7-point Likert scale (1 = Strongly Disagree, 7 = Strongly Agree) to collect responses, with higher scores indicating a greater alignment with the survey items. For privacy disclosure intention, the measurement items included (Gabisch, & Milne, 2013; Wang et al., 2016): '*I am very likely to disclose my personal information to the mobile app*', '*I am willing to disclose my personal information to the mobile app*', and '*It is unlikely that I would disclose my personal information to the mobile app for the product's services*' (reverse-coded item). For perceived value, the measurement items included (Pham et al., 2023): '*disclosing my personal information to the mobile app would bring significant value*', '*the benefits of disclosing my personal information to the mobile app are highly attractive*', and '*disclosing my personal information to the mobile app is a good deal.*' For anticipated regret, the measurement items included (García, & Curras-Perez, 2019; Pham et al., 2023): '*if I refuse to disclose my personal information to the mobile app, I would regret missing out on the corresponding services*', '*once I make a decision, I don't look back*' *(reverse-coded item)*, and '*whenever I make a choice, I wonder what would happen if I had chosen differently.*' Finally, to control for individual characteristics that might influence privacy disclosure intentions, variables such as gender, age, and educational background were included as control variables.

Results

Main effect test

ANOVA was conducted to test Hypothesis H1. The results indicate that the interaction between authorization framing, and regulatory focus significantly affects privacy disclosure intentions. When the app requests user authorization under the gain frame, promotion-focused consumers (M=5.589, SD=0.615, F (1,118) = 234.342) and prevention-focused consumers (M=2.794, SD=0.653, F (1,118) = 234.342) show significant differences in their privacy disclosure intentions (P=0.000). This suggests that promotion-focused consumers exhibit higher privacy disclosure intentions compared to prevention-focused consumers within the gain frame. When the app requests user authorization under the loss frame, prevention-focused consumers (M=5.206, SD=0.653, F (1,118) = 267.522) and promotion-focused consumers (M=3.183, SD=0.701, F (1,118) = 267.522) also show significant differences in their privacy disclosure intentions (P=0.000). This indicates that prevention-focused consumers have higher privacy disclosure intentions compared to promotion-focused consumers within the loss frame. The impact of the alignment between information framing and regulatory focus on privacy disclosure intentions is illustrated in Figure 4, supporting Hypothesis H1.

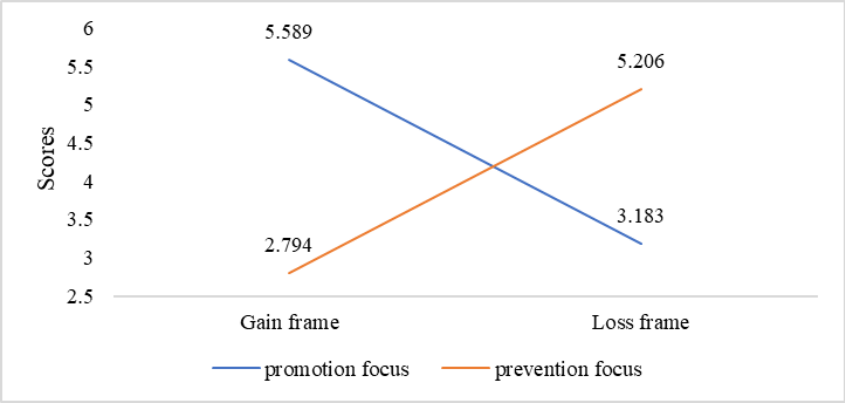

Figure 4. Effect of matching information framing and regulatory focus on willingness to disclose privacy

Mediation effect test

This study employed PROCESS to test the mediation effects. Bootstrap analysis results showed that for promotion-focused consumers, when the app requests authorization information under the gain frame, the confidence interval (BootLLCI = 0.5086, BootULCI = 0.9552) at a 95% confidence level does not include 0. This indicates that perceived value mediates the interaction between framing effects and privacy disclosure intentions. Similarly, for prevention-focused consumers, when the app requests authorization information under the loss frame, perceived value also serves as a mediator (BootLLCI = 0.1339, BootULCI = 0.4270). Additionally, ANOVA further confirmed that under the gain frame, promotion-focused participants (M=5.16, SD=0.612, F (1,118) = 26.189) reported higher perceived value compared to prevention-focused participants (M=4.55, SD=0.680, F (1,118) = 26.189) (P=0.000). Under the loss frame, prevention-focused participants (M=4.96, SD=0.552, F (1,118) = 125.139) reported higher perceived value compared to promotion-focused participants (M=3.53, SD=0.689, F (1,118) = 158.139) (P=0.001). The mean scores for perceived value under both gain and loss frames are illustrated in Figure 5, confirming Hypothesis H2.

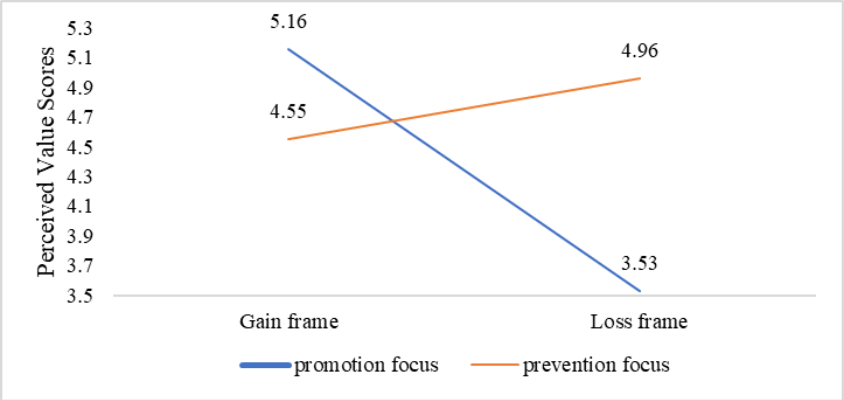

Figure 5. Perceived value scores

Next, the study analysed the mediating effect of anticipated regret within the gain and loss frames. Bootstrap analysis results indicated that for promotion-focused consumers, when the app requests authorisation information under the gain frame, the confidence interval (BootLLCI = 0.720, BootULCI = 0.4193) at a 95% confidence level does not include 0. This suggests that anticipated regret mediates the interaction between framing effects and privacy disclosure intentions. Similarly, for prevention-focused consumers, anticipated regret also serves as a mediator when the app requests authorization information under the loss frame (BootLLCI = 0.0621, BootULCI = 0.3045). Furthermore, ANOVA results showed that under the gain frame, promotion-focused participants (M=3.00, SD=0.559, F (1,118) = 235.104) reported lower anticipated

regret compared to prevention-focused participants (M=5.21, SD=0.968, F (1,118) = 235.104) (P=0.000). Under the loss frame, prevention-focused participants (M=3.17, SD=0.475, F (1,118) = 561.526) reported lower anticipated regret compared to promotion-focused participants (M=5.60, SD=0.635, F (1,118) = 561.526) (P=0.000). The mean scores for anticipated regret under both gain and loss frames are illustrated in Figure 6, confirming Hypothesis H3.

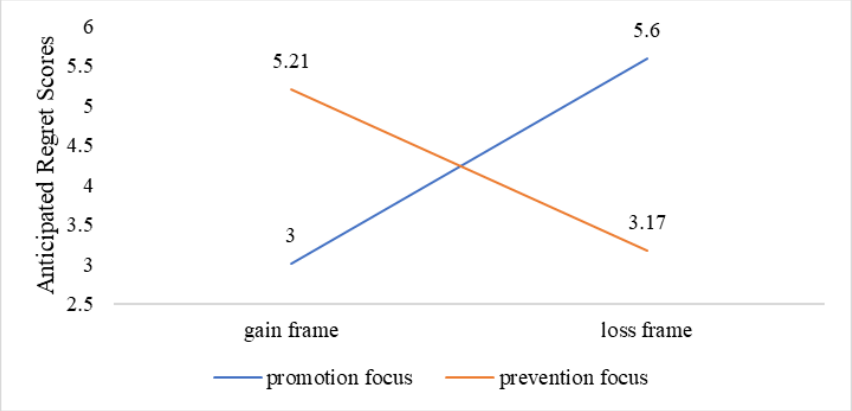

Figure 6. Anticipated regret scores

Conclusion

This study incorporates the framing effect into the field of privacy authorization to explore how the interaction between privacy authorization framing and consumers' regulatory focus influences privacy disclosure behavior. It also examines the mediating roles of perceived value and anticipated regret. The findings reveal that the interaction between privacy authorization framing, and regulatory focus significantly affects consumers' privacy disclosure intentions. When privacy authorization framing aligns with an individual's regulatory focus, it results in higher perceived value and lower anticipated regret, thereby strengthening privacy disclosure intentions. By offering a fresh perspective on how different descriptions of privacy authorization information impact user privacy disclosure intentions, this research expands the study of framing effects in mobile app privacy contexts.

This study also holds significant managerial implications. First, enterprises should refine the management of privacy authorization design by integrating user behavior and psychological analyses to optimize information presentation. This approach can enhance users' perceived value, reduce anticipated regret, and strengthen trust in privacy disclosure. Meanwhile, regulators could consider establishing dynamic oversight mechanisms to regularly assess and review privacy authorization practices, ensuring alignment with data protection standards while promoting innovation in privacy protection technologies. Furthermore, diverse feedback channels should be developed to encourage user participation in refining privacy frameworks, ensuring that privacy measures remain up-to-date and responsive to user needs. These measures will help safeguard user privacy, promote transparency, security, and user-friendliness in the mobile app industry, and support the healthy growth of the digital economy.

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