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Effects of Instagram Feature Usage Patterns on Subjective Prospective Memory and Personality Traits

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ABSTRACT

As social media has become central to information acquisition and social interaction, increasing attention has been paid to how platform design and usage behaviors influence cognitive processes, particularly prospective memory. While short-form video platforms characterized by rapid context switching have been shown to impair prospective memory, empirical evidence regarding Instagram—an image-centered platform with diverse interactive features—remains limited.This study investigated Taiwanese Instagram users aged 20–40 to examine the relationships among usage behaviors, personality traits, and subjective prospective memory difficulties. Data were collected in December 2025 using a demographic questionnaire, an Instagram Usage Behavior Scale, the Prospective and Retrospective Memory Questionnaire (PRMQ), and the Big Five Inventory–10 (BFI-10). Analyses included reliability analysis, exploratory factor analysis, cluster analysis, one-way ANOVA, and Pearson correlation analysis.Results indicated that Instagram usage behaviors could be categorized into three latent factors: **Public Posting, Unidirectional Browsing**, and **Direct Messaging,** forming three user groups: **Responsive Maintenance Users, Socially Engaged Users**, and **Information-Interactive Users**. No significant differences in subjective prospective memory difficulties were observed among the usage groups. However, significant group differences emerged in extraversion and openness, with more interactive users demonstrating higher openness to experience. Additionally, frequent use of the Explore page and short-form video features was associated with higher levels of subjective memory difficulties. Correlation analysis further revealed a significant negative relationship between conscientiousness and prospective memory difficulties. Overall, the findings highlight that while general usage behavior types may not directly differentiate prospective memory performance, specific platform features and individual personality traits play a critical role in shaping users' subjective memory experiences.

Keywords: Prospective memory, Social media usage behavior, Big five personality traits

INTRODUCTION AND RESEARCH QUESTIONS

Social media has become a primary channel for information acquisition and social interaction in modern life (Raut & Patil, 2016). Previous studies suggest that different patterns of social media use may affect cognitive functions such as working memory and attention (Rozgonjuk et al., 2020).

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For example, heavy Facebook use has been associated with rapid information scanning and reduced deep memory processing (Frein et al., 2013), while excessive use of platforms such as TikTok or WhatsApp has been linked to decreased working memory among adolescents (Naik et al., 2025). However, inconsistent findings have also been reported regarding the relationship between social media use intensity and cognitive control (Lara & Bokoch, 2021).

Variations in social media usage may further influence prospective memory performance (Guazzini et al., 2022). Empirical evidence indicates that rapid context switching in TikTok significantly impairs users' prospective memory (Chiossi et al., 2023). Although Instagram is one of the world's major social media platforms and its Reels feature shares similar short-video characteristics, research on the relationship between Instagram usage behaviors and prospective memory remains limited. According to Meta advertising data (2025), Instagram has approximately 11.3 million users in Taiwan.

Rather than comparing differences across platforms, this study focuses on how the use of different functional features within Instagram shapes user behavior patterns. Five commonly used Instagram functions were operationalized as questionnaire dimensions to classify usage behaviors and examine differences among user groups and their influencing factors.

In addition, users with different personality traits exhibit distinct social media usage behaviors, which may in turn influence their prospective memory performance. Previous research indicates that extraverted individuals tend to prioritize social expansion, whereas individuals with higher conscientiousness typically adopt more effective planning and reminder strategies and are less likely to forget future intentions (Rummel et al., 2023). These findings suggest that personality traits may play a moderating role in the relationship between social media use and prospective memory.

Young and middle-aged adults constitute the primary user group of Instagram in Taiwan. Accordingly, this study focuses on users aged 20–40 who spend at least one hour per day on Instagram, examining the relationships among usage behaviors, commonly used features, Big Five personality traits, and subjective prospective memory difficulties.

Research objectives:

1. To examine the effects of Instagram usage behavior types on subjective prospective memory difficulties.
2. To investigate the effects of commonly used Instagram features on subjective prospective memory difficulties.
3. To examine the effects of daily Instagram usage duration per session on subjective prospective memory difficulties
4. To examine differences in Big Five personality traits across Instagram usage behavior types.
5. To examine the relationships between Big Five personality traits and PRMQ scores.

MATERIALS AND METHOD

Participants were Instagram users aged 20 to 40 years, recruited through Instagram Stories. Inclusion criteria required participants to use Instagram for at least one hour per day.

Questionnaire Survey Method

This study aims to examine the relationships among background factors, Instagram usage behaviors, and Big Five personality traits in relation to subjective prospective memory among adults aged 20–40. A questionnaire-based survey method was adopted, and the research instruments included:

1. **Demographic Information:** This section included age, gender, educational level, as well as Instagram usage habits, commonly used features, and preferred content types.
2. **Instagram Usage Behavior Questionnaire:** A self-developed questionnaire consisting of ten items was used to assess users' usage behavior characteristics across major Instagram functions. The questionnaire was designed based on five commonly used features—posts, Stories, Explore, Reels, and Live—as five core dimensions. Each dimension included items reflecting both active and passive usage behaviors. Participants rated their actual usage frequency using a five-point Likert scale. For example, for the Stories feature, an active item was "I frequently post Stories to share my daily life," while a passive item was "I frequently view other users' Stories."
3. **Prospective and Retrospective Memory Questionnaire(PRMQ) (Smith et al., 2000):** This questionnaire consists of 16 items corresponding to two types of memory failures: Prospective Memory (PM) and Retrospective Memory (RM), with eight items in each category. Participants rated each item on a five-point Likert scale based on their experiences over a recent period, allowing assessment of subjective difficulties in both prospective and retrospective memory. The PRMQ has been widely used in cognitive and neuropsychological research and has demonstrated good reliability and validity.
4. **Big Five Inventory-10 (BFI-10) (DeYoung et al., 2007):** This scale is a shortened version of the Big Five Inventory and consists of 10 items designed to reduce participant fatigue. It measures the five personality dimensions—extraversion, agreeableness, conscientiousness, emotional stability (the reverse of neuroticism), and openness—with each dimension represented by two items reflecting its core characteristics. Participants responded to each item using a five-point Likert scale based on their personal trait tendencies.

Statistical Analysis

Statistical analyses were conducted using **SPSS** software. The analysis procedures were as follows:

1. **Reliability and Factor Analysis:** Cronbach's α was calculated to assess the internal consistency of the Instagram usage behavior scale, followed by exploratory factor analysis to examine its factor structure.
2. **Cluster Analysis:** Based on factor scores derived from the Instagram usage behavior scale, a K-means cluster analysis was performed to classify users into distinct groups. The clusters were then named according to their characteristic usage patterns.
3. **One-Way ANOVA:**
   (1) The effects of Instagram usage behavior types on subjective prospective memory difficulties.
   (2) The effects of daily Instagram usage duration per session on subjective prospective memory difficulties
   (3) The effects of Instagram feature usage on subjective prospective memory difficulties.
   (4) The effects of Instagram usage behavior types on Big Five personality traits
4. **Pearson Correlation Analysis:** To examine the relationships between Big Five personality traits and PRMQ scores.

RESULTS

This study was conducted in December 2025, during which the questionnaire was distributed over a one-month period through Instagram Stories. A total of 210 valid responses were collected.

1. **Gender Distribution:** A total of 129 participants were female, accounting for 61.4% of the sample, while 81 participants were male, representing 38.6%.
2. **Age Distribution:** Participants were primarily aged 20–24 years (n = 137, 65.2%) and 25–29 years (n = 54, 25.7%). Smaller proportions were aged 30–34 years (n = 13, 6.2%) and 35–40 years (n = 6, 2.9%).
3. **Educational Background:** The majority of participants held a junior college or university degree (n = 143, 68%), followed by a graduate (master's) degree (n = 65, 31%). Only 1% of participants had a senior high school or vocational high school education.

Instagram Usage Behavior Questionnaire Instagram-Reliability Analysis and Factor Analysis

The Instagram usage behavior questionnaire demonstrated acceptable reliability, with an overall Cronbach's alpha of 0.724. The KMO value was 0.686, indicating that the data were suitable for factor analysis (Kaiser, 1974).

Instagram Usage Behavior Questionnaire Instagram-Factor Analysis

A total of 10 items were developed to assess Instagram usage activities. Exploratory factor analysis identified three representative latent factors—public posting, viewing behavior, and direct messaging—which were named and interpreted based on item content. The factor structure of the Instagram usage behavior questionnaire is presented in Table 1.

Table 1: Factor analysis instagram usage behavior questionnaire instagram.

Item	Component		
	1	2	3
7. I frequently upload my own Instagram Stories.	.783		
3. I frequently post Reels video content.	.703		
9. I frequently go live on Instagram to interact with others.	.650		
1. I frequently post and share daily life content on Instagram.	.570		
2. I frequently watch other users' Instagram Stories.		.652	
4. I frequently watch Reels video content on Instagram.		.612	
10. I frequently watch other users' live streams on Instagram.		.612	
8. I frequently spend time browsing posts on Instagram.		.570	
6. I frequently use direct messages to chat with friends.			.860
5. I frequently use direct messages to share others' Stories or Reels with friends.			.745

1. **Public Posting (Factor 1)**:This factor included items 1, 3, 7, and 9, all of which relate to content sharing and self-presentation. These items indicate that users engage with Instagram as a social platform for public expression; therefore, this factor was labeled Public Posting.
2. **Unidirectional Browsing (Factor 2):** This factor comprised items 2, 4, 8, and 10, which focus on viewing content posted by others. These items reflect users' tendency to browse and consume content on Instagram, and thus this factor was labeled Unidirectional Browsing.
3. **Direct Messaging (Factor 3):** This factor included items 5 and 6, both of which relate to private message communication. These items indicate interpersonal interaction through Instagram's messaging function; therefore, this factor was labeled Direct Messaging.

Instagram User Cluster Analysis Instagram

After confirming the latent factors of Instagram usage behavior through factor analysis, cluster analysis was conducted on the 210 participants. Hierarchical cluster analysis was first performed using Ward's method with squared Euclidean distance as the clustering criterion. Based on the dendrogram shown in Figure 1, the appropriate number of clusters for Instagram usage behavior types was determined.

From the dendrogram (see Figure 1), the results indicate that dividing the participants into three clusters is appropriate. The Instagram usage behavior clusters are defined as follows:

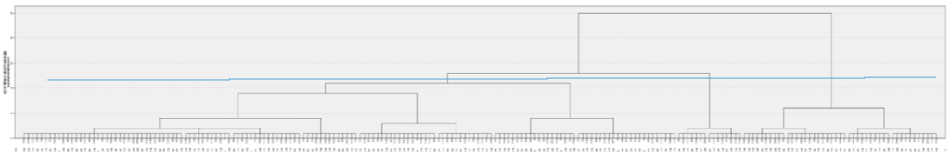

Figure 1: Dendrogram of instagram usage behavior clusters.

1. **Responsive Maintenance Users (Cluster 1):** This group showed the highest scores on Unidirectional Browsing, followed by Direct Messaging, and the lowest scores on Public Posting. Users in this cluster preferred content viewing and were less inclined to actively post or publicly interact, but they did engage in private communication through direct messaging. This cluster consisted of 101 participants.
2. **Socially Engaged Users (Cluster 2):** This group exhibited the highest levels of Public Posting, followed by Unidirectional Browsing, and the lowest levels of Direct Messaging. These users represented the most actively engaged group, with the highest levels of content sharing and public interaction. Although they also browsed content, their use of direct messaging was relatively low. This cluster included 38 participants.
3. **Information-Interactive Users (Cluster 3):** This group scored highest on Unidirectional Browsing, followed by Public Posting, and lowest on Direct Messaging. Overall interaction levels were relatively low, with users primarily engaging in content viewing, occasional public posting, and minimal use of direct messaging. This cluster comprised 71 participants.

One-Way ANOVA - Effects of Instagram Usage Behavior Clusters on PRMQ Scores

Levene's test indicated that all PRMQ measures met the assumption of homogeneity of variances, allowing for one-way ANOVA. Based on Table 2, the ANOVA results showed that differences among the clusters across all three PRMQ measures did not reach statistical significance, indicating no significant differences in subjective memory performance among the clusters.

One-Way ANOVA - Effects of Daily Usage Duration Per Session on PRMQ Scores

Levene's test confirmed homogeneity of variances across all three PRMQ measures (all $p > .05$), allowing for one-way ANOVA. Scheffé post hoc tests showed that longer daily short-form video viewing per session was associated with higher PRMQ scores, with users viewing more than one hour reporting the greatest memory difficulties. As shown in Table 3, mean scores for prospective memory, retrospective memory, and overall PRMQ followed the same pattern: more than 1 hour > 1 hour > 30 minutes > less than 10 minutes. These results indicate that prolonged short-form video use is associated with increased subjective memory difficulties.

Table 2: Factor analysis of the instagram usage behavior questionnaire.

PRMQ		Responsive Maintenance Users	Socially Engaged Users	Information-Interactive Users	Test for Homogeneity of Variance	ANOVA	
					P	F	P
PRMQ total score	Average score	2.81	2.80	2.59	.478	1.93	.148
	SD	.73	.80	.84			
Prospective Memory total score	Average score	2.60	2.50	2.45	.148	.477	.621
	SD	.70	.74	.80			
Retrospective Memory total score	Average score	2.70	2.63	2.52	.164	1.152	.318
	SD	.63	.71	.80			

Table 3: Effects of daily usage duration per session on PRMQ scores.

PRMQ		Less Than 10 Minutes	30 Minutes	1 Hour	More Than 1 Hour	Test for Homogeneity of Variance	ANOVA		Scheffe's Test
						P	F	P	
PRMQ total score	Average score	2.60	2.82	3.0	3.23	.616	3.456	.017	4>3>2>1
	SD	.80	.72	.90	.70				
Prospective Memory total score	Average score	2.40	2.60	2.72	3.0	.633	2.981	.032	4>3>2>1
	SD	.73	.70	.90	.53				
Retrospective Memory total score	Average score	2.50	2.70	2.90	3.10	.341	3.647	.014	4>3>2>1
	SD	.72	.66	.81	.44				

One-Way ANOVA - Effects of Most Frequently Used Instagram Features on PRMQ Scores

Based on Table 4, the results indicated significant differences among usage features in both prospective memory total scores and overall PRMQ scores ($p < .05$). The results of the Scheffé post hoc tests further revealed that:

1. **Prospective Memory Total Score:** Significant differences were observed among different Instagram features ($p = .011$). Scheffé post hoc analysis indicated that subjective memory difficulties increased in the following order: Explore > Reels > Stories > Direct Messaging > Posts, with Posts showing the lowest level of memory difficulties.
2. **PRMQ Total Score:** Significant differences were also found among usage features for the overall PRMQ score ($p = .029$). Scheffé post hoc results showed that subjective memory difficulties increased in the following order: Explore > Reels > Direct Messaging > Posts.

Table 4: Effects of most frequently used instagram features on PRMQ scores.

PRMQ		DMs	Posts	Stories	Reels	Explore	Test for Homogeneity of Variance	ANOVA		Scheffé's Test
							P	F	P	
Retrospective Memory total score	Average score	2.60	2.42	2.60	2.90	3.20	.438	3.353	.011	5>4>3>1>2
	SD	.80	.91	.70	.80	1.0				
Prospective Memory total score	Average score	2.50	2.23	2.40	2.63	2.71	.360	1.743	.142	-
	SD	.80	1.0	.70	.70	.90				
PRMQ total score	Average score	2.50	2.32	2.50	2.80	2.94	.347	2.758	.029	5>4>1>3>2
	SD	.74	.91	.64	.70	.90				

This result suggests that different Instagram features impose varying levels of cognitive load, with information-dense and rapidly changing features such as the Explore page and Reels more likely to disrupt attention and impair memory performance.

One-Way ANOVA - Effects of Instagram Usage Behavior Clusters on Big Five Personality Traits

Based on Table 5, Levene's test for homogeneity of variances indicated that the relevant personality dimensions met the assumption of homogeneity, allowing for subsequent ANOVA to examine differences among the clusters.

Table 5: Instagram effects of instagram usage behavior clusters on big five personality traits.

Big Five Personality Trait		Responsive Maintenance Users	Socially Engaged Users	Information-Interactive Users	Test for Homogeneity of Variance	ANOVA		Scheffé's Test
					P	F	P	
Extraversion	Average score	2.74	3.43	2.53	.592	8.341	.000	2 > 1 > 3
	SD	1.11	1.04	1.14				
Conscientiousness	Average score	2.84	2.90	2.90	.675	.074	.929	-
	SD	.81	.82	.82				
Agreeableness	Average score	3.31	3.32	3.30	.282	.025	.976	-
	SD	.80	.70	.80				
Neuroticism	Average score	3.52	3.40	3.40	.461	1.723	.181	-
	SD	.61	.60	.53				
Openness	Average score	3.80	4.18	3.81	.304	3.410	.035	2 > 3 > 1
	SD	**.90**	**.73**	**.80**				

One-way ANOVA revealed significant differences among clusters in extraversion ($p < .001$), with scores highest for Socially Engaged Users, followed by Responsive Maintenance Users, and lowest for Information-Interactive Users. Openness also differed significantly across clusters ($p = .035$), with Socially Engaged Users showing the highest levels, followed by Information-Interactive Users, and Responsive Maintenance Users.

Pearson Correlation Analysis between Big Five Personality Traits and PRMQ Scores

Based on Table 6 (Pearson Correlation Analysis between Big Five personality traits and PRMQ scores), conscientiousness showed significant negative correlations with prospective memory ($r = -0.407$, $p < .01$), retrospective memory ($r = -0.309$, $p < .01$), and the overall PRMQ score ($r = -0.382$, $p < .01$), indicating that higher levels of conscientiousness were associated with fewer self-reported memory difficulties. In contrast, extraversion, agreeableness, openness, and neuroticism were not significantly correlated with any PRMQ measures.

Table 6: Pearson correlation analysis between big five personality traits and PRMQ scores.

Big Five Personality Trait	Prospective Memory Total Score	Retrospective Memory Total Score	PRMQ Total Score
Openness	−0.062	−0.040	−0.054
Agreeableness	−0.067	−0.079	−0.077
Conscientiousness	−0.407	−0.309	−0.382
Extraversion	0.000	−0.078	−0.040
Neuroticism	0.065	0.012	0.042

CONCLUSION

This study examined the relationships between different Instagram usage behavior patterns and prospective memory. Overall, the findings indicate that the effects of social media use on prospective memory are not linear but are jointly moderated by usage context, platform features, and individual differences:

The results of this study indicate that the three main Instagram usage factors—Public Posting, Unidirectional Browsing, and Direct Messaging—as well as the user groups derived from these factors, did not show significant differences in subjective prospective memory, retrospective memory, or overall PRMQ scores. These findings suggest that categorizing social media users solely based on usage behaviors is insufficient to explain individual differences in everyday subjective memory difficulties. This result is consistent with previous research showing that heavy Facebook users performed slightly worse than light users on free recall tasks, although the difference was not statistically significant (Frein et al., 2013).

Regarding usage duration, this study found that longer daily short-form video viewing per session was associated with higher levels of subjective memory difficulties in both prospective and retrospective memory. This suggests that prolonged immersion in short-form video content may adversely affect memory processes. These findings are consistent with recent experimental research indicating that the rapid context switching and continuous stimulation characteristic of short-form video platforms increase cognitive load and impair prospective memory performance (Barton & Smyth, 2025).

Further analysis showed that prospective memory difficulties differed significantly across Instagram features, with users of algorithm-driven, information-dense, and rapidly changing short-form video functions reporting higher memory difficulties. This finding aligns with research from the University of Bristol indicating that fast-paced, context-switching video content impairs the retention of future intentions (Barton & Smyth, 2025). These results suggest that such features are more likely to induce attentional dispersion and cognitive overload, thereby disrupting prospective memory performance.

The observed differences may also be related to content familiarity. Compared with the Explore page and short-form video features, which predominantly present unfamiliar and unanticipated information, functions such as direct messaging, Stories, posts, and live streams primarily involve familiar contacts or previously followed creators. Familiar content provides greater predictability and may reduce the extent to which external stimuli capture attention (Cleary et al., 2025). In perceptual environments, the detection of familiarity may serve as an important trigger for shifting attention inward. Familiarity detection refers to the ability to sense that an object or situation has been previously encountered, even in the absence of conscious recollection. Although this mechanism has traditionally been examined within memory research rather than attentional frameworks, recent studies suggest that familiarity detection may play a broader and underexplored role in guiding attentional focus (Cleary et al., 2023; Cleary et al., 2025). In contrast, usage contexts centered on posts or direct messaging involve clearer interaction targets and goal structures, which may reduce the disruptive effects of random information switching on attention and prospective memory processes.

Regarding personality traits, this study found that only conscientiousness was significantly and negatively correlated with prospective memory difficulties, indicating that individuals with higher conscientiousness reported fewer memory-related problems. This finding is consistent with systematic review evidence identifying conscientiousness as a key predictor of everyday memory failures and cognitive complaints (Aschwanden et al., 2020). Individuals high in conscientiousness typically demonstrate stronger self-regulation, planning abilities, and behavioral monitoring strategies, which may help reduce prospective memory failures.

Taken together, these findings suggest that the effects of social media use on memory are neither linear nor universal, and cannot be explained solely by usage frequency or interaction style. Differences in memory performance

are likely shaped by the joint influence of multiple factors, including platform characteristics (e.g., active vs. passive features) and individual personality traits.

Several limitations should be noted. First, the cross-sectional design precludes causal inference. Second, prospective memory was assessed using self-report measures rather than objective behavioral indicators. Finally, some usage categories were unevenly distributed—for example, only eight participants reported using short-form video features for more than one hour per session—which may reduce statistical stability and limit the generalizability of the findings.

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