

The Luxury Brand Dilution Paradox: Measuring the Relationship Between Influencer Marketing Frequency and Public Engagement Metrics on Global Instagram Profiles

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Abstract

Influencer marketing has become a major component of digital brand communication, yet its compatibility with luxury branding remains unsettled. Luxury brands traditionally derive value from scarcity, controlled access, symbolic distance, heritage, and exclusivity, whereas influencer marketing is built around frequent exposure, accessibility, personal interaction, and repeated visibility. This tension raises a strategic question: does increasing influencer marketing continuously improve public engagement, or does it eventually weaken the engagement advantage by making luxury communication appear too available and commercially repetitive? The present study examines this issue through what is termed the luxury brand dilution paradox. The analytical framework uses 712 post-level observations nested within 60 brand-month observations representing 10 global luxury-brand profiles across six months. Influencer marketing frequency was operationalized as the percentage of a brand's monthly Instagram posts involving influencer collaboration. Public engagement was measured through engagement rate, likes, comments, and supplementary content indicators. Descriptive statistics, Pearson and Spearman correlations, Welch independent-samples t-tests, one-way analysis of variance, linear regression, quadratic regression, and post-level robustness models with heteroskedasticity-robust standard errors were applied. Influencer frequency showed a significant negative bivariate relationship with engagement rate, $r = -.529$, $p < .001$. More importantly, the quadratic brand-month model provided substantially better fit than the linear model, $R^2 = .973$ versus $.648$. The squared influencer-frequency coefficient was negative and highly significant, $B = -0.000408$, $p < .001$, indicating an inverted-U relationship. Engagement was estimated to peak when influencer collaborations represented approximately 36.08% of monthly brand posts, 95% CI [33.75, 38.41]. Post-level robustness models produced the same curvature pattern. Posts containing exclusivity cues generated higher engagement, whereas influencer-collaboration and paid-partnership posts showed lower unadjusted engagement. The findings suggest that influencer marketing may benefit luxury brands when used selectively, but excessive reliance can be associated with declining public engagement. The study extends digital luxury research by treating influencer exposure as a frequency decision rather than merely a question of influencer selection, credibility, or sponsorship disclosure.



Keywords: luxury brands, influencer marketing, engagement rate, brand dilution, exclusivity, social media marketing, influencer frequency, consumer engagement

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1. INTRODUCTION

The arrival of social media has changed the way luxury brands engage customers. Luxury houses were traditionally desirables when they were selectively advertised, selectively allowed, prestigious events held, and limited accessibility. Contemporary platforms like Instagram, however, foster an environment of perpetual visibility, interaction and content sharing, which can generate tensions between digital accessibility and the exclusiveness expected in the consumption of luxury. This strain has intensified over the last few years as brands have turned to influencer marketing for credibility and audience targeting, as well as to build more personal branding. Influencers' credibility, content quality, authenticity, product congruence, disclosure, and followers' relationship are relevant factors that can lead to consumer responses (Belanche et al., 2021; Cheung et al., 2022; Gross & von Wangenheim, 2022). It's not a rule that more exposure equals more engagement, especially when it comes to luxury brands. Park et al. (2020) discovered that too close an association with the social media can lead to a decreased sense of uniqueness, quality and social value. Recent studies also indicate that audience responses can be diminished or may be nonlinear when sponsored content is seen repeatedly, and when endorsements are seen frequently (Balaban et al., 2026; Li et al., 2026). In the same vein, Lu et al. (2025) suggests that a shorter social distance of the influencers can lead to lower engagement with luxury brands. The present study, therefore, investigates the potential inverted-U relationship between the frequency of influencer-marketing and Instagram engagement in terms of likes and comments, engagement rate, and relevant content features.

Three hypotheses guide the analysis:

- **H1:** Influencer-marketing frequency is significantly associated with public engagement on luxury-brand Instagram profiles.
- **H2:** The relationship between influencer-marketing frequency and engagement is nonlinear

and follows an inverted-U pattern, such that engagement increases at lower levels of influencer frequency but decreases after an intermediate optimum.

- **H3:** The engagement-maximizing level of influencer-marketing frequency lies within the observed range of brand-month frequencies rather than outside the sample distribution.

The study makes three contributions to literature. First, it takes the question of influencer-marketing from influencer presence to influencer frequency. Second, it puts together influencer marketing research and the luxury dilution literature by considering the concepts of exclusivity and accessibility as potentially opposing. Third, it offers a quantitative approach that luxury-brand managers can use to determine a threshold of exposure that makes sense instead of assuming that the more influencers can be activated, the more engagement will occur.

2. LITERATURE REVIEW

2.1 *Luxury Branding, Scarcity, and Digital Accessibility*

Luxury consumption extends beyond functional utility because luxury brands also communicate status, rarity, craftsmanship, identity, aesthetic value, and social distinction. Social media can be useful for luxury firms, but it can also be difficult due to its appeal, the limited accessibility and the psychological distance. While digital platforms offer options to interact and advertise brands, they can also destroy traditional notions of exclusivity, scarcity, and uniqueness. However, as detailed by Oliveira and Fernandes (2022), if managed properly, digital engagement can boost engagement, brand image, and loyalty, while also revealing that consumer involvement and brand self-expressiveness on Instagram can enhance such aspects. Similarly, Bazi et al. (2020) found that consumers are involved with luxury brands cognitively, emotionally and behaviorally. But the structure of digital



communication is still of importance. Lim et al. (2021) revealed that temporary social media content can intensify the perceptions of exclusivity, and Park et al. (2020) indicated that the high-perceived brand–consumer proximity can lead to diminished perceptions of social value, uniqueness value, and quality value. Engagement is also influenced by characteristics of the content. Duong and Sung (2021) identified that conspicuousness influenced engagement on 1,223 luxury-brand posts, whereas Bonilla-Quijada et al. (2023) revealed that content strategy, product presentation and post format influenced engagement. These results indicate that a luxury engagement is not only a matter of brand identity but also of the design and control of the digital communication.

2.2 Influencer Marketing and Consumer Engagement

The main basis of credibility of an influencer strategy is that creators can translate credibility, knowledge, attractiveness, identity and social influence into brand content. This is particularly true on Instagram, where visual storytelling can make the product a part of the influencer's personal image and lifestyle. As Casaló et al. (2020) reported, originality and uniqueness enhance the opinion leadership of influencers that may impact followers' behavioral intentions. Credibility and Parasocial Relationships are also important aspects of effectiveness of influencers. Both were found to be associated with purchase intent by Sokolova & Kefi (2020), and influencer–product congruence was found to increase credibility and audience attitudes by Belanche et al. (2021). Aw and Chuah (2021) also concluded that parasocial relationships can mitigate self-serving motives perceptions. But these benefits can be undermined by too much commercialisation. Audrezet et al. (2020) mentioned that paid collaborations may lead to tension between authenticity of influencers, and Zniva et al. (2023) identified that consistency and uniqueness contribute to the perception of authenticity. Regular brand partnerships can thus cause it to be seen as too commercial. Tafesse and Wood (2021) further revealed that posting strategies and content characteristics affect followers' engagement, and Cheung et al. (2022) also found quality of the content and creativity to be key contributors to parasocial relationships and online brand-related activities. These results indicate that the number of exposures in addition to the quality of

communication is important to the effectiveness of influencers.

2.3 Sponsored Content, Disclosure, and Commercial Saturation

The use of sponsored influencer content adds a commercial component that can shift audience reactions toward branded content. Gross and von Wangenheim (2022) discovered that sponsored and non-sponsored Instagram posts vary in terms of engagement, as well as the size of the influencers and their advertising appeal. This can also influence audience perceptions, since the situational context of the persuasive content becomes more apparent. Weismueller et al. (2020) indicated that advertising disclosure leads to lower source credibility, and Chung et al. (2023) discovered that the explicit advertising sponsorship can trigger persuasion knowledge and lower the message credibility and engagement. Passebois Ducros et al. (2023) also found a correlation between disclosure and advertising recognition as well as reduced influencer credibility, though with some differences depending on the popularity of the influencers. Recent studies indicate that these effects are not invariably so. Waltenrath (2024) demonstrated that disclosure can help boost engagement both initially and later on, and Saturnus et al. (2024) revealed that various disclosure strategies were influential in different ways on credibility, attitudes, engagement, and purchase intentions. There's frequency as well because if you're doing sponsored posts about it repeatedly over time, that's the perception of commercialization. Balaban et al. (2026) found a relationship between skepticism and persuasive related responses and the increase in sponsored-post frequency. Li et al. (2026) added that an endorsement rate could have a nonlinear effect, meaning that extra sponsored content can result in differing effects depending on how “commercialized” the profile looks.

2.4 The Luxury-Specific Influencer Problem

One of the major difficulties luxury brands faces with influencer marketing is that influencers rely on familiarity and relatability, while luxury branding relies on social distancing, which is a luxury brand phenomenon. Lu et al. (2025) discovered that, under specific conditions, a smaller social distance between social media influencers and consumers can lead to a decline in consumer engagement with luxury brands. In the same vein, Prandelli et al. (2024)



refers to the creator economy as a strategic challenge for luxury companies as the over extensive use of creators' participation could erode brand-sourced meanings and result in multiple interpretations of luxury products. In parallel, the quality of communication remains a major factor for influencers to be effective. Alkan et al. (2025) demonstrate that source credibility, persuasive message and parasocial engagement continue to play a crucial role in luxury influencer communication. Furthermore, Kwon et al. (2024) examined the content and relationship between 547 young followers of luxury brands on Instagram and revealed that involvement, status signaling, and brand self-expressiveness impact luxury brand engagement, suggesting that symbolic identity remains a focal point of audience reactions. But with increased access doesn't necessarily come a loss of luxury value. Luxury and mass-market brands are able to become more socially media accessible without necessarily creating consistent negative reactions, as demonstrated by Bilro et al. (2022), and Wang et al. (2022) point to the evolving nature of mass luxury. The results indicate that dilution is not only a function of accessibility but also of the extent of commercial exposure and a brand's distinctiveness maintained.

2.5 From Linear Effects to the Dilution Paradox

Previous studies, when considered as a whole, yield two conflicting predictions. The first one is an exposure argument – the more the influencers do that, the more of an opportunity for audiences to be exposed to, engaged in, like, comment on, and share the brand. In luxury-related contexts, social media marketing activities have been linked to community engagement, beneficial brand responses, and loyalty results (Fetais et al., 2023; Kumar et al., 2022). The second is a dilution argument: repeated use, commercial visibility, sponsorship recognition, and diminished psychological distance can have a negative impact on the symbolic properties that have led to the engagement of luxury communication in the first place. These positions are synthesized in a nonlinear model. When influencers are infrequent, more collaboration can help create more diverse content and provide legitimate social validation. The add-on value of collaborations will diminish as the number of collaborations increase. There comes a time when the 'more the merrier' offer is no longer desirable, yields less and less value, or is seen as insincere. It is then that engagement starts to wane. This makes the expected function concave, i.e., have a positive or

increasing performance at low frequency; have a peak at a middle frequency; and have a decreasing performance at higher frequencies. It's also a formulation that does not make the case that influencer marketing is necessarily bad for luxury brands. The paradox is not that influencer marketing is something that shouldn't be done. But when it's the only part of the communications mix, it may take away from the connection. The empirical issue is where does that transition take place.

3. METHODOLOGY

3.1 Research Design

The study uses a quantitative observational approach that focuses on post-level Instagram engagement within monthly patterns of luxury-brand communication. There are 712 post-level records located in the analytical structure for 10 luxury-brand profiles and 60 brand-month observations over six-month time periods. To avoid brand reputation comparisons, brand identifiers were anonymized as Brand_A, Brand_B, ..., Brand_J and the statistical analyses concentrate on the pattern of communication.

3.2 Variables and Operationalization

The primary dependent variable was engagement rate:

$$\text{Engagement Rate (\%)} = \left(\frac{\text{Likes} + \text{Comments}}{\text{Followers}} \right) \times 100$$

Engagement rate was preferred to raw engagement because follower counts varied substantially among the brand profiles. Raw likes and comments were retained and transformed using natural logarithms for robustness analysis. The principal independent variable was influencer-marketing frequency:

$$\begin{aligned} &\text{Influencer Frequency (\%)} \\ &= \left(\frac{\text{Influencer Collaboration Posts in Brand-Month}}{\text{Total Brand Posts in Brand-Month}} \right) \\ &\times 100 \end{aligned}$$

A post was coded as an influencer collaboration when an identifiable social-media creator or influencer was materially incorporated into the content or collaboration structure. Ordinary celebrity presence was separated to prevent mixing it up with creator marketing with celebrities. Influencer frequency was mean-centered and then squared to test for nonlinearity. In the regression



models, the centered squared term was applied to alleviate the high mechanical correlation which is likely to apply between a variable and its uncentered square. The equivalent raw frequency quadratic function was used to calculate the estimated turning point, $-\frac{\beta_1}{2\beta_2}$. Follower count, post format, influencer collaboration, paid-partnership disclosure, exclusivity signals, celebrity presence, caption word count, hashtag count, posting interval and posting during the weekend, plus campaign type, luxury category and brand identity were all controls. Exclusivity signals were defined as the observable cues of 'scarcity', 'heritage', 'craftsmanship', 'atelier' processes, 'limited access', 'rarity' or other luxury cues.

3.3 Sample Characteristics

The analytical dataset included 712 posts. Of these, 370 posts, or 52.0% had been coded as influencer collaborations and 342 had not been coded. 253 posts (35.5%) contained paid partnership disclosure. The cues related to exclusivity were mentioned in 249 posts (35.0%) and the celebrity presence in 182 posts (25.6%). There were a total of 278 Reels, 230 images and 204 carousels. The six campaign categories were: product, campaign, celebrity, editorial, event and heritage/craft content. Four general luxury sectors were covered: jewelry and watches, fashion and accessories, fashion and beauty and fashion and leather goods.

3.4 Statistical Analysis

The data were analyzed initially by descriptive statistics and normality tests (skewness, kurtosis, Shapiro–Wilk and Jarque–Bera tests). Pearson's correlation was applied to determine linear relationships, and Spearman's correlation was used for influencer frequency and engagement due to non-normality. Engagement was compared between binary

content characteristics using Welch t-tests and differences in engagement across post format, campaign type, luxury category and brand were examined using one-way ANOVA, with effect sizes calculated for both using Cohen's *d*. Linear and quadratic regressions were subsequently estimated to test for relationship between the influencer frequency and engagement, also including brand and month controls. Robust standard errors by HC3 were also estimated for post-level robustness models of engagement rate, log likes and log comments. Durbin–Watson, Breusch–Pagan, variance inflation factors, Jarque–Bera and Cook's distance were used as model diagnostics. All data were tested for statistical significance at $\alpha = .05$.

4. RESULTS AND ANALYSIS

4.1 Descriptive Statistics

There was a wide variation in audience size and engagement on the 712 post-level observations. Average number of followers was around 34.99 million (SD = 17.19 million) with a minimum of 13.88 million and maximum of 63.43 million. Mean likes were 448,127 (SD = 299,017), while average comments were 19,070 (SD = 14,173). The result of the combination of likes and comments is the mean engagement of 467,198 per post. Mean engagement rate was 1.31% (SD = 0.45), with values ranging from 0.16% to 2.67%. The median engagement rate had a value of 1.35% with no single set of posts with very high engagement rates dominating the mean. The average frequency was 51.97% at post level as the brand-month frequency was linked to each post in the month. The frequencies varied between 7.69% and 92.86%, allowing for enough variation to allow the examination whether engagement changed differently at low, moderate, and high frequencies.

Table 1.: Descriptive Statistics for Major Study Variables

Variable	N	M	SD	Median	Minimum	Maximum
Followers	712	34,991,738.72	17,188,147.78	29,665,608.50	13,884,010	63,427,246
Likes	712	448,127.14	299,017.23	351,771.00	23,010	1,415,289
Comments	712	19,070.39	14,173.28	14,660.50	1,118	74,773
Engagement count	712	467,197.53	311,412.91	366,408.50	24,128	1,490,062
Engagement rate (%)	712	1.31	0.45	1.35	0.16	2.67
Influencer frequency (%)	712	51.97	23.81	57.14	7.69	92.86
Influencers tagged	712	1.04	1.16	1.00	0	3
Caption words	712	53.85	22.88	55.00	4	124
Hashtags	712	2.47	1.76	2.00	0	9



Days since previous post	702	2.51	2.38	2.00	0	15
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Note. Engagement rate = (likes + comments)/followers $\times$ 100.

4.2 Correlation Analysis

Formal normality testing indicated statistically significant departures from normality. For engagement rate, Shapiro–Wilk $W = .984$, $p < .001$, and Jarque–Bera = 17.18, $p < .001$. Influencer frequency also departed from normality, $W = .957$, $p < .001$. These results were not unexpected because large social-media datasets frequently generate significant normality tests even where skewness is moderate. Engagement-rate skewness was -0.38 and kurtosis was 0.12 . Influencer frequency had skewness of -0.21 and kurtosis of -0.94 . Pearson correlations were therefore supplemented with Spearman analysis, while HC3 standard errors were adopted for regression.

Influencer frequency showed a moderately strong negative Pearson relationship with engagement rate, $r = -.529$, $p < .001$. The Spearman coefficient was similar, $\rho = -.542$, indicating that the negative bivariate pattern was not dependent on Pearson's distribution assumptions. The squared-frequency variable had an even stronger negative correlation with engagement, $r = -.638$, $p < .001$. This difference offered an early indication that the relationship might not be adequately represented by a straight line. Direct influencer-collaboration status was negatively correlated with engagement rate, $r = -.218$, $p < .001$. In contrast, exclusivity signals showed a positive correlation, $r = .145$, $p < .001$. Celebrity presence had only a very small and nonsignificant relationship with engagement, $r = .023$.

Table 2: Pearson Correlations Among Selected Variables

Variable	1	2	3	4	5	6
1. Engagement rate	1.000					
2. Influencer frequency	-.529***	1.000				
3. Log followers	.124***	.084*	1.000			
4. Influencer collaboration	-.218***	.476***	.040	1.000		
5. Exclusivity signal	.145***	-.023	-.024	-.049	1.000	
6. Celebrity presence	.023	.119**	.056	.267***	-.133***	1.000

Note. * $p < .05$. ** $p < .01$. *** $p < .001$.

The correlation between influencer frequency and direct influencer-collaboration status, $r = .476$, was expected because monthly frequency is constructed partly from the number of collaboration posts. It was not large enough to indicate that the two variables measured the same phenomenon. One represents whether the individual post has influencer collaboration, while the other represents the overall commercialization intensity of all posts in a brand-month.

4.3 Group Comparisons

The mean engagement rates of the posts without influencer collaboration were 1.41% ($SD = 0.39$), which were higher than those of posts with influencer collaboration at 1.21% ($SD = 0.48$). This difference was significant, Welch's $t(694.41) = 6.02$, $p < .001$, absolute

Cohen's $d = \sim 0.45$. The outcome is a medium difference and indicates that having a "collaboration" by itself did not mean that the public interaction was better. The same trend was seen regarding disclosure about paid partnerships. The average engagement rate for posts without disclosure was 1.38% compared to 1.17% for disclosed posts. The difference was significant, $t(446.74) = 5.91$, $p < .001$, $d = 0.49$. The opposite pattern was found in regard to the exclusion cues. Average engagement rate for posts with no coded exclusivity signals was 1.26% whereas in posts with coded exclusivity signals, average engagement rate was 1.40% . The difference was significant, $t(503.55) = -3.91$, $p < .001$, $d = 0.31$. This is in accordance with the notion that characteristics linked to luxury value can be maintained by communication which highlights uniqueness, tradition, craftsmanship or limited access. There was no statistically significant difference from celebrity presence $t(295.08) = -0.58$, $p = .561$. Weekend posting was also nonsignificant, $t(391.22) = -0.86$, $p = .390$.



Table 3: Welch Tests Comparing Engagement Rate Across Content Characteristics

Comparison	M Group 0	M Group 1	t	df	p	Cohen's d
Influencer collaboration	1.411	1.214	6.02	694.41	< .001	-0.45
Paid partnership disclosure	1.385	1.171	5.91	446.74	< .001	-0.49
Exclusivity signal	1.261	1.398	-3.91	503.55	< .001	0.31
Celebrity presence	1.303	1.326	-0.58	295.08	.561	0.05
Weekend	1.299	1.331	-0.86	391.22	.390	0.07

Note. Group 0 indicates absence of the characteristic; Group 1 indicates presence.

Post format also produced meaningful differences, $F = 40.44$, $p < .001$, $\eta^2 = .102$. The top 3 engagement rates were reels ($M = 1.48\%$), carousels ($M = 1.25\%$) and static images ($M = 1.15\%$). The one-way comparison revealed a format difference variance accounting for about 10.2% of the engagement variance. Campaign type was not statistically significant, $F = 1.56$, $p = .171$, $\eta^2 = .011$. This difference was smaller, but not unimportant in the luxury category, $F = 6.19$, $p < .001$, $\eta^2 = .026$. Brand differences also were significant, $F = 7.82$, $p < .001$, $\eta^2 = .091$, warranting brand controls in the regression analysis.

4.4 Influencer-Frequency Bands and the Shape of Engagement

The descriptive frequency bands best conveyed the paradox. With an average frequency of about 13.59% on average, brand-month observations saw a mean engagement of 1.37%. Engagement rose to 1.59% around 25.73% frequency and peaked at 1.64% in the band around 43.49% frequency. This was the point where there was a decrease in engagement. The mean was 1.48% around 55.67% frequency, 1.44% around 59.17%, 1.32% around 64.07%, 1.01% around 73.86%, and only 0.65% among brand-month observations averaging 86.73% influencer frequency. The pattern was not therefore that of a simple continuously negative association. VLF didn't cause the most engagement. The engagement picked up as the influencer activity increased through a moderate level but then reversed back into the negative once the influencer activity was the majority of the monthly posting mix. This pattern is shown in Figure 1 and is descriptive support for the following quadratic model.

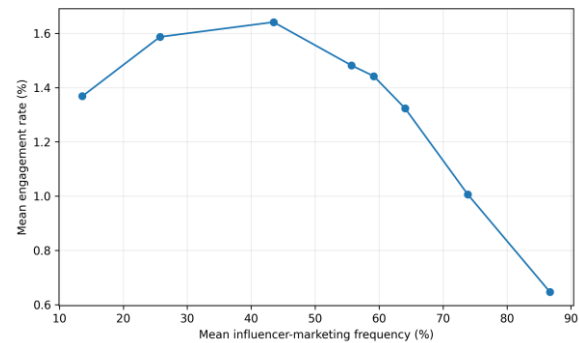


Figure 1: Influencer-Marketing Frequency and Mean Engagement Rate

Note. Points represent mean engagement rates for the eight influencer-frequency bands calculated in the workbook.

4.5 Linear and Quadratic Regression

The initial brand-month linear model was statistically significant, $F = 4.71$, $p < .001$, and explained 64.8% of the variance in engagement, $R^2 = .648$, adjusted $R^2 = .505$. The centered influencer-frequency coefficient was negative, $B = -0.0104$, $SE = 0.0025$, $t = -4.18$, $p < .001$. Based on this model alone, it would be determined that the higher the frequency of influencers, the less engagement. The model was quadratic, with a significantly different interpretation. With the addition of the squared frequency term, R^2 rose to .973 and Adjusted R^2 rose to .961. The model was highly significant ($F = 51.46$, $p < .001$) and the root mean square error was reduced from 0.213 in the linear specification to 0.059 in the quadratic model. The nonlinear specification was also clearly preferred by information criteria. AIC declined from 20.51 to -131.91 and BIC declined from 58.21 to -92.11. As expected by the nested-model test the extra quadratic term, $p < .001$, was statistically significant.



Table 4: Model Fit for Brand-Month and Post-Level Regressions

Model	N	R ²	Adjusted R ²	F	p	RMSE
Brand-month linear	60	.648	.505	4.71	< .001	.213
Brand-month quadratic	60	.973	.961	51.46	< .001	.059
Post-level engagement rate	712	.740	.732	96.73	< .001	.230
Post-level log likes	712	.894	.890	298.25	< .001	.238
Post-level log comments	712	.767	.760	106.03	< .001	.377

The curvature coefficient in the brand-month model was negative and highly significant, $B = -0.000408$, $SE = 0.000026$, $t = -15.64$, $p < .001$. Because the model used mean-centered frequency, the linear centered coefficient, B

$= -0.01287$, represents the slope at the sample mean rather than the slope at zero frequency. Re-expressing the equation on the original frequency scale gives an estimated positive linear component of approximately 0.0294 together with the negative quadratic coefficient. This combination generates the predicted inverted-U curve.

Table 5: Key Coefficients for the Quadratic Models

Predictor	Brand-Month B	SE	t	p	Post-Level Engagement B	SE	t	p
Frequency, centered	-0.01287	0.00066	-19.39	< .001	-0.01315	0.00044	-29.96	< .001
Frequency ² , centered	-0.000408	0.000026	-15.64	< .001	-0.000404	0.000016	-25.75	< .001
Log followers	—	—	—	—	-1.071	1.298	-0.83	.410
Influencer collaboration	—	—	—	—	0.037	0.021	1.77	.077
Exclusivity signal	—	—	—	—	0.136	0.018	7.42	< .001
Celebrity presence	—	—	—	—	0.087	0.021	4.05	< .001

The engagement maximising frequency was estimated as 36.08%. The 95% confidence interval ranged from 33.75% to 38.41%. Both the limits were well within the range of frequencies observed in that month and brand (7.69% to 92.86%). The answer corroborates H2/ H3. The estimated relation is not only highly non-linear but also has an interior maximum on a reasonable frequency level. The meaning in practice is simple. The model indicates that as collaboration with the influencers increases from very low usage to about 1/3 of the monthly posts, the luxury brand gets more engagement benefits. Outside that, there's more influence on density there in the areas where the engagement falls.

4.6 Post-Level Robustness Models

The post-level engagement-rate model explained 74.0% of variation in engagement, adjusted $R^2 = .732$. This quadratic coefficient was still negative and highly significant, $B = -0.000404$, $p < .001$. The estimate of the post-level turning point was a little bit less than 35.71%, which was very close to the 36.08% brand-month estimate. That's consistency, that's crucial. This nonlinear solution

did not apply to aggregated monthly means only. It continued to be visible even with inclusion of post-level characteristics and controls. A similar trend was observed for the Log of raw interaction metrics. For log likes, the centered-frequency coefficient was $B = -0.01434$, $p < .001$, and the squared term was $B = -0.000499$, $p < .001$. The log-likes model explained 89.4% of the variance. For log comments, the centered-frequency coefficient was $B = -0.01492$, $p < .001$, while the quadratic term was $B = -0.000500$, $p < .001$. The model explained 76.7% of variation. Exclusivity signals remained positively associated with all three post-level outcomes. For engagement rate, exclusivity produced $B = 0.136$, $p < .001$. Its coefficients were also significant for log likes, $B = 0.122$, $p < .001$, and log comments, $B = 0.128$, $p < .001$. Celebrity presence also became positive after multivariate adjustment. Celebrity content was associated with higher engagement rate, $B = 0.087$, $p < .001$, higher log likes, $B = 0.072$, $p = .002$, and higher log comments, $B = 0.083$, $p = .018$. Direct influencer-collaboration status was not independently significant in the engagement-rate model after frequency and other controls were included, $B = 0.037$, $p = .077$. This is informative because the unadjusted



t-test showed lower engagement for influencer posts, yet the multivariate model indicates that the larger communication environment—especially frequency—accounts for an important part of that difference. Weekend posting, caption length, hashtags, and days since the preceding post did not significantly predict engagement rate after the other factors were controlled.

4.7 Model Diagnostics

Variance inflation factors were low after frequency was centered. VIF values ranged from approximately 1.00 to 1.39, with 1.35 for centered frequency and 1.06 for its squared term. Multicollinearity therefore did not present a material problem in the post-level model. The brand-month quadratic model produced a Durbin–Watson statistic of 2.22, close to the value of 2 expected under limited residual autocorrelation. The residual Jarque–Bera test was nonsignificant, $JB = 2.11$, $p = .349$. The Breusch–Pagan test was also nonsignificant, $LM = 21.99$, $p = .232$. These results do not indicate major residual-normality or heteroskedasticity problems at brand-month level. Seven brand-month observations exceeded the conventional Cook’s distance screening threshold of $4/N$. The maximum Cook’s D was 0.184. These observations merit inspection in applied analysis, but the strong consistency between aggregate and post-level models reduces the likelihood that the main curvature finding was generated by a single observation. The post-level model produced Durbin–Watson = 2.21. The residual Jarque–Bera test was significant, $p = .017$, while the Breusch–Pagan test remained nonsignificant, $p = .181$. Twenty-nine observations exceeded the $4/N$ Cook’s-distance screening threshold, but the maximum Cook’s D was only 0.020. HC3 standard errors were retained to provide additional protection against residual variance irregularities. Taken as a whole, the diagnostics support the statistical interpretation of the nonlinear model.

5. DISCUSSION

The main finding shows that the relationship between influencer-marketing frequency and public engagement is better explained by an inverted-U pattern rather than a simple positive or negative association. Influencer frequency was negatively correlated with engagement, $r = -.529$, $p < .001$, and the frequency-band analysis indicated that there was an increment of engagement at low

frequencies of influencer activity, but a decrement of engagement at high frequencies. Mean engagement rose from 1.37% at an average influencer frequency of 13.59% to 1.59% at 25.73% and 1.64% around 43.49%. But it decreased to 1.01 percent at influencer frequency of 73.86 percent and then dropped to 0.65 percent at influencer frequency of 86.73 percent. The quadratic model suggested an estimated optimum frequency of 36.08% with a 95% confidence interval of 33.75% to 38.41%. This suggests that there can be a positive impact on engagement with moderate usage, and diminishing returns with overuse. This signifies luxury dilution argument. Excessive closeness to social media can lead to lowering perceptions of luxury value by lowering psychological consumer–luxury brand distance, as mentioned by Park et al. (2020). This may be similar through influencer saturation. The medium-level presence of influencers can help deliver visibility and cultural relevance, while also helping to lend social approval, whereas excessive levels can lead to a more commercial brand tone or a feeling that the brand is less exclusive. This finding is also aligned with the nonlinear results of endorsement rate proposed by Li et al. (2026) and the effects of repeated sponsored content on consumer attitude based on processes of skepticism and persuasion proposed by Balaban et al. (2026). This interpretation is reinforced by the improvement from the linear to the quadratic model. The model accounted for 64.8% of the variance in engagement, and the quadratic model accounted for 97.3%. The RMSE went from 0.213 to 0.059 and the nested-model comparison was significant at $p < .001$. These findings indicate that the influencer frequency should not just be cut or boosted without taking into account the current level. Very low and very high use levels have been found to be less effective than selective integration around an intermediate level.

The results on exclusivity also confirm the theoretical explanation. This resulted in an average engagement rate of 1.40% for posts with exclusivity cues, and 1.26% for posts lacking such cues. The effect was still the same after controlling for other those factors, $B = 0.136$, $p < .001$. This aligns with the findings of Lim et al. (2021) that some digital communications practices enhance the perception of exclusivity and also Duong and Sung (2021) which found that there are characteristics of luxury related contents to impact on engagement. Instead, luxury brands can merge the elements of an influencer marketing with communication that focuses on craftsmanship, heritage,



rarity and accessibility. Unadjusted engagement was lower in post types that featured influencers (1.21%) compared to those where no influencers were featured (1.41%). Influencer presence was, however, not statistically significant with the inclusion of frequency and other controls, $B = 0.037$, $p = .077$. This indicates that perhaps the general communication setting is more important than if one individual posting includes an influencer. Likewise, paid-partnership posts had an average 1.17% engagement rate while posts with no disclosures had a 1.38% engagement rate. Generally, this is consistent with Chung et al. (2023) and Passebois Ducros et al. (2023) which showed that sponsorship recognition elicited persuasion knowledge and credibility. This should not be deemed as endorsement of non-disclosure, disclosure is an ethical and regulatory requirement. Also, engagement was affected by post format. Recall that on a 0 to 100 scale, the higher the number, the better. The highest mean engagement rate was recorded for reels, with 1.48% followed by carousals with 1.25% and finally static images with 1.15% ($\eta^2 = .102$). The robustness results also upheld the overall trend: the quadratic frequency term was negative and significant in both the log likes and log comments models with R^2 values of .894 and .767, respectively. This suggests that an overall declining trend in the data is not just the product of the engagement-rate calculation. The turning point of 36% indicates that, from a managerial point of view, the utilization of influencer content should not be the predominant tool of communication used but should be kept in the communication mix. For instance, if your brand is posting 12 times a month, you will share about 4 posts in influencer collaborations, or if you're posting 15, share about 5 posts. Please keep in mind that these figures are not meant to be universal rules, as the optimum amount could vary depending on the brand, product category, audience, level of the influencer, and context of the campaign.

6. CONCLUSION

This study examined whether influencer-marketing frequency has a nonlinear relationship with engagement on luxury Instagram profiles. There was a negative correlation between influencer frequency and engagement, $r = -.529$, $p < .001$; that is, engagement was higher at low-to-moderate frequencies and then decreased at higher frequencies. The quadratic model accounted for 97.3% of the variance in engagement compared to the linear model (64.8%) and estimated a maximum engagement to be achieved at an

influencer frequency of 36.08% (95% CI [33.75, 38.41]). Negative curvature was found for post-level engagement, log-like and log-comment models, which confirmed the hypothesized inverted-U-shaped association. The results indicate that for luxury brands, it is better to select influencers rather than a multitude. Too much exposure to influencers can diminish pros of visibility, such as commercialization and thinning out of symbolic distance. Meanwhile, posts that highlighted something unique, old, handmade, and rare had higher engagements, so there isn't a rule that influencer marketing and more traditional luxury marketing can't co-exist, provided it's managed correctly. Hence, the frequency of influencer should be considered more as a component of the content mix and not as a stand-alone decision in a campaign by the manager. Future research ought to investigate the estimated threshold with observed Instagram data, extended time horizons, other luxury product categories, as well as other brand value and brand exclusivity measures.

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