Social Media Use, Sleep Quality, Academic Stress, and Academic Performance Among University Students

A Quantitative Analysis of Predictors and Mediating Mechanisms

Keywords: social media use, sleep quality, academic stress, academic performance, resilience, mediation analysis

Sample size: $N = 248$

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Abstract

This study examined how social media use, sleep quality, academic stress, and resilience relate to self-rated academic performance in a sample of 248 university students. The analysis was designed not only to identify whether these factors were associated with performance, but also to clarify which mechanism appeared most consequential within a single explanatory model. A cross-sectional survey design was employed, with composite scales measuring social media use (3 items), sleep quality (3 items), academic stress (4 items), and resilience and support (4 items). Multiple regression analysis revealed that the overall model significantly predicted academic performance ($R^2 = .088$, $F(3, 244) = 7.88$, $p < .001$), with academic stress emerging as the only significant unique predictor ($\beta^* = -.235$, $p = .002$). Bootstrap mediation analysis further indicated that academic stress significantly mediated the relationship between social media use and academic performance (indirect effect $= -0.178$, 95% CI $[-0.307, -0.066]$), suggesting that digital habits may matter academically insofar as they intensify overload, worry, and attentional strain. The hypothesized moderation effect of resilience and support on the stress–performance link did not reach statistical significance ($p = .895$). Overall, the findings position academic stress as the central leverage point in the social media–performance pathway and suggest that higher-education interventions should prioritize stress reduction, digital self-regulation, and evidence-based wellbeing support rather than relying on broad anti-technology messaging alone.

Keywords: social media use; sleep quality; academic stress; academic performance; resilience; university students; mediation analysis

1 Introduction

University students today navigate an increasingly complex digital environment in which social media platforms compete with coursework, deadlines, and sleep for limited time and attention. Prior research has linked intensive social media use with lower academic performance, weaker self-regulation, and more fragmented learning behavior, particularly when online engagement becomes habitual, emotionally salient, and difficult to disengage from (Junco, 2012; Rosen, Carrier, & Cheever, 2013). At the same time, student wellbeing has become a major institutional concern because academic success increasingly depends not only on cognitive ability, but also on the ability to sustain attention, recover physiologically, and cope with recurring stress over prolonged periods (Eisenberg, Golberstein, & Hunt, 2009; Richardson, Abraham, & Bond, 2012; Pascoe, Hetrick, & Parker, 2020).

Sleep quality and academic stress represent two especially plausible intermediary processes. Poor sleep, often exacerbated by late-night screen exposure and compulsive checking behavior, has been associated with diminished cognitive functioning, reduced emotional regulation, and weaker next-day academic engagement (Cain & Gradisar, 2010; Levenson et al., 2016). Similarly, academic stress—stemming from coursework overload, deadline pressure, role conflict, and performance anxiety—can impair concentration, lower motivation, and erode confidence in one's own academic capacity. Reviews of student adjustment have consistently shown that stress is linked to lower academic effectiveness and poorer psychological wellbeing, making it a theoretically credible mechanism through which digital habits may translate into academic costs (Pascoe et al., 2020).

Despite a growing body of research on each of these constructs in isolation, fewer studies have examined social media use, sleep quality, academic stress, and academic performance within a single explanatory framework. This matters because the policy implications differ depending on whether digital behavior exerts a stable *direct* effect on performance or operates primarily through more proximal mechanisms such as stress and depleted recovery. Social media use may not undermine academic functioning only through time displacement; it may also heighten perceived overload, social comparison, nocturnal rumination, and difficulty disengaging from task-irrelevant cues. Likewise, resilience and social support may shape how students cope with these pressures, even when their effects are not always strong enough to emerge as statistically significant moderators in compact multivariable models.

This gap limits the ability of educators, advisors, and student-support teams to identify the most actionable leverage points for intervention. If academic stress is the principal mechanism through which social media habits influence academic functioning, then

interventions focused on stress management, digital self-regulation, and healthier recovery routines may be more effective than broad discouragement of platform use. The present study addresses this gap by testing a structured model in which social media use, sleep quality, and academic stress jointly predict self-rated academic performance among university students, while also evaluating mediation through academic stress and the potential buffering role of resilience and support. In this sense, the study is designed not only to describe correlations, but also to generate a more decision-relevant account of where universities may achieve the greatest practical impact.

2 Theoretical Framework and Hypotheses

Social cognitive theory and the conservation of resources framework provide the theoretical foundation for this study. Social cognitive theory posits that environmental stimuli—such as notifications, peer comparison cues, and intermittent reward signals—shape self-regulatory behavior and influence downstream performance. When students repeatedly allocate attentional resources to social media, fewer cognitive and motivational resources remain available for sustained academic work. This logic is consistent with prior evidence showing that heavier social media engagement can coincide with weaker academic outcomes, poorer concentration, and more fragmented studying behavior (Junco, 2012; Rosen et al., 2013). Accordingly, we hypothesize:

H1: Higher social media use is associated with lower self-rated academic performance among university students.

Sleep quality has been recognized as a critical resource for cognitive restoration. According to the conservation of resources model, students who maintain adequate sleep possess greater cognitive reserves for learning, emotion regulation, and exam preparation. Conversely, poor sleep depletes these reserves and undermines academic functioning. Reviews of adolescent and young-adult media behavior have suggested that evening media use is associated with shorter sleep duration and more disturbed sleep, providing a plausible mechanism by which digital habits may spill over into academic life (Cain & Gradisar, 2010; Levenson et al., 2016). Thus:

H2: Higher sleep quality is associated with higher self-rated academic performance among university students.

Academic stress, encompassing feelings of being overwhelmed, worry about falling behind, and difficulty managing deadlines, directly consumes cognitive and emotional resources that could otherwise support academic engagement. Broader reviews of student wellbeing have shown that academic-related stress is associated with reduced learning capacity, lower motivation, sleep difficulties, and poorer educational outcomes (Pascoe et al., 2020). The demand–resource imbalance created by chronic stress is therefore

expected to impair performance:

H3: Higher academic stress is associated with lower self-rated academic performance among university students.

Beyond its direct effect, social media use may also exert an indirect influence on academic performance through academic stress. Excessive social media engagement can heighten awareness of peers' achievements, create time pressure, and generate additional sources of worry, thereby elevating stress levels. This stress, in turn, may impair performance. We therefore propose a mediation pathway:

H4: Academic stress mediates the relationship between social media use and self-rated academic performance.

Resilience and social support are recognized protective factors that may attenuate the detrimental impact of stress on performance. Students with higher resilience and stronger support networks may cope more effectively with academic pressures, appraise setbacks as more manageable, and preserve motivation under strain. In the student-success literature, supportive environments are often associated with better academic adjustment and more favorable wellbeing outcomes, even when the exact pathway varies across contexts (Eisenberg et al., 2009). Accordingly:

H5: Resilience and support moderates the negative relationship between academic stress and self-rated academic performance, such that the effect is weaker for students with higher resilience.

Finally, academic performance may vary across academic levels (e.g., freshman through graduate) due to differences in course difficulty, accumulated skills, and adaptation to university life:

H6: Self-rated academic performance differs significantly across academic levels.

Table 1 Hypothesis Summary

Hypothesis	Statement	Method	Result
H1	Higher social media use is associated with lower self-rated academic performance.	Regression	**Partially supported**
H2	Higher sleep quality is associated with higher self-rated academic performance.	Regression	**Partially supported**
H3	Higher academic stress is associated with lower self-rated academic performance.	Regression	✓ **Supported**

Hypothesis	Statement	Method	Result
H4	Academic stress mediates the social media use–performance relationship.	Mediation	✓ **Supported**
H5	Resilience and support moderates the stress–performance relationship.	Moderation	× **Not Supported**
H6	Academic performance differs across academic levels.	ANOVA	× **Not Supported**

3 Research Methods

3.1 Sample Description

A total of 248 university students participated in this cross-sectional survey. The sample spanned five academic levels (coded 1–5, representing freshmen through graduate students; $M = 2.97$, $SD = 1.43$) and six fields of study ($M = 3.47$, $SD = 1.69$). Gender identity was measured on a four-category scale ($M = 2.53$, $SD = 1.13$). No responses were removed during data cleaning, resulting in a complete dataset of 248 valid cases. On average, participants reported 4.40 hours ($SD = 1.13$) of daily social media use and 4.88 hours ($SD = 1.16$) of study time on the previous day. Taken together, the sample offers a useful snapshot of contemporary student life in which digital engagement, study behavior, and wellbeing-related factors coexist in ways that are analytically meaningful for institutional decision-making.

3.2 Measures

All Likert-type items used a 5-point scale (1 = Strongly Disagree to 5 = Strongly Agree) unless otherwise noted.

Social media use was measured with three items (e.g., "I check social media immediately after waking up," "Social media distracts me while studying," "I feel uneasy when I cannot check social media"). A composite score was computed as the mean of the three items.

Sleep quality was assessed with three items (e.g., "I slept well over the past two weeks," "I woke up feeling rested," "I kept a regular sleep schedule"). The composite score was the item mean.

Academic stress was captured by four items (e.g., "I feel overwhelmed by coursework," "I worry about falling behind," "Deadlines feel difficult to manage," "I often

think about academic pressure at night"). The composite score was the item mean.

Resilience and support was measured with four items (e.g., "I recover quickly after setbacks," "I know where to seek help when stressed," "My friends or peers are supportive," "I can stay calm under pressure"). The composite score was the item mean.

Self-rated academic performance was assessed with a single item asking students to rate their academic performance this semester on a 1–5 scale.

Additional single items captured overall wellbeing, likelihood to recommend campus wellbeing resources, whether social media had affected sleep, and frequency of using campus wellbeing resources. No skip-logic was applied.

3.3 Analytical Procedure

Data analysis proceeded in several stages. Descriptive statistics and Cronbach's α reliability coefficients were computed for all composite scales. Pearson bivariate correlations examined associations among the key variables. To evaluate H1–H3 in a way that distinguished zero-order associations from unique multivariable effects, two regression steps were used. First, three simple linear regressions were estimated separately to test the directional associations of social media use, sleep quality, and academic stress with self-rated academic performance. Second, a simultaneous multiple regression model was estimated with self-rated academic performance as the dependent variable and social media use, sleep quality, and academic stress entered together as predictors in order to assess their relative explanatory power after adjustment for one another.

Mediation analysis (bootstrap method with 5,000 resamples) tested the indirect effect of social media use on academic performance through academic stress. Moderation analysis examined whether resilience and support buffered the stress–performance relationship via an interaction term. A one-way ANOVA tested differences in academic performance across academic levels. All analyses used $\alpha = .05$ as the significance threshold. In interpreting the findings, greater weight was assigned to the simultaneous multiple-regression model for statements about unique predictor effects, whereas the simple regressions were used to describe directional bivariate support for the predictor hypotheses.

4 Results

4.1 Descriptive Statistics

Table 2 presents the descriptive statistics for the composite scale scores and the dependent variable. On average, students reported moderate social media use ($M = 3.38$, $SD = 0.82$) and relatively high sleep quality ($M = 3.80$, $SD = 0.64$). Academic

stress was below the scale midpoint ($M = 2.08$, $SD = 0.72$), suggesting that the sample experienced mild to moderate stress. Resilience and support scores were above the midpoint ($M = 3.42$, $SD = 0.71$). Self-rated academic performance was slightly below the midpoint ($M = 2.63$, $SD = 0.96$).

Table 2 Descriptive Statistics for Key Variables

Variable	N	Mean	SD	Min	Max
Social media use	248	3.38	0.82	1.33	5.00
Sleep quality	248	3.80	0.64	1.67	5.00
Academic stress	248	2.08	0.72	1.00	4.50
Resilience and support	248	3.42	0.71	1.25	5.00
Self-rated academic performance	248	2.63	0.96	1.00	5.00

4.2 Reliability Analysis

Table 3 displays Cronbach's α coefficients for each composite scale. The academic stress scale demonstrated acceptable reliability ($\alpha = .706$). The social media use ($\alpha = .669$) and resilience and support ($\alpha = .641$) scales showed marginal internal consistency. The sleep quality scale exhibited poor reliability ($\alpha = .506$), indicating that the three sleep items did not cohere strongly; composite scores for this scale should be interpreted cautiously.

Table 3 Reliability Analysis

Scale	Items	α	Assessment
Social media use	3	.669	Marginal
Sleep quality	3	.506	Poor
Academic stress	4	.706	Acceptable
Resilience and support	4	.641	Marginal

4.3 Group Difference Tests

A one-way ANOVA was conducted to test whether self-rated academic performance differed across academic levels (H6). The analysis revealed no significant differences ($F(4, 243) = 0.722$, $p = .578$, $\eta^2 = .012$). The effect size was negligible. Group means ranged from 2.51 (Level 4) to 2.75 (Level 2), but these differences were well within sampling variability. Accordingly, **H6 was not supported**.

No other group difference tests yielded statistically significant results at $p < .05$.

4.4 Correlation Analysis

Table 4 presents the bivariate Pearson correlations among the key study variables. Academic stress showed the strongest negative association with academic performance ($r = -.279$, $p < .001$). Sleep quality was positively correlated with academic performance ($r = .212$, $p < .001$), while social media use was negatively correlated with performance ($r = -.174$, $p = .006$). Social media use was positively associated with academic stress ($r = .570$, $p < .001$) and negatively associated with sleep quality ($r = -.432$, $p < .001$), consistent with the proposed theoretical model. Resilience and support showed a modest positive correlation with academic performance ($r = .130$, $p < .05$) but was essentially unrelated to social media use ($r = -.004$, $p > .05$) and academic stress ($r = -.040$, $p > .05$).

Table 4 Correlations Among Key Variables

Variable	1	2	3	4
1. Social media use	—			
2. Sleep quality	$-.432^{**}$	—		
3. Academic stress	$.570^{**}$	$-.427^{**}$	—	
4. Resilience & support	$-.004$	$.160^{*}$	$-.040$	—
5. Academic performance	$-.174^{**}$	$.212^{**}$	$-.279^{**}$	$.130^{*}$

Note. $^{*}p < .05$; $^{**}p < .01$.



Figure 1 Correlation Matrix Heatmap

4.5 Regression Analysis

A simultaneous multiple regression was conducted with self-rated academic performance as the dependent variable and social media use, sleep quality, and academic stress as predictors. The overall model was statistically significant ($F(3, 244) = 7.88$, $p < .001$, $R^2 = .088$, $\bar{R}^2 = .077$, $f^2 = 0.097$). The effect size was small according to Cohen's conventions.

As shown in Table 5, academic stress was the only significant individual predictor ($B = -0.313$, $\beta^* = -.235$, $t = -3.07$, $p = .002$), indicating that each one-unit increase in academic stress was associated with a 0.31-point decrease in self-rated academic performance, holding other predictors constant. Sleep quality did not reach statistical significance in the full model ($B = 0.172$, $\beta^* = .116$, $p = .099$), although its bivariate correlation with the dependent variable was significant. Social media use was not a significant predictor in the simultaneous model ($B = 0.012$, $\beta^* = .010$, $p = .894$), suggesting that its bivariate association with performance was largely accounted for by academic stress. All variance inflation factors were below 2.0, indicating no multicollinearity concerns.

Taken together, the regression findings indicate a differentiated pattern of support across H1–H3. In simple regressions, each predictor was associated with academic performance in the hypothesized direction (H1: $B = -0.203$, $p = .006$; H2: $B = 0.315$,

$p < .001$; H3: $B = -0.371$, $p < .001$). However, in the simultaneous model, only academic stress retained statistical significance. Accordingly, **H3 was fully supported**, whereas **H1 and H2 received only partial support**: their directional bivariate associations were present, but they did not demonstrate unique predictive effects once the shared variance among the predictors was taken into account.

Table 5 Multiple Regression Results: Predictors of Academic Performance

Predictor	B	β^*	SE	t	p	VIF
Social media use	0.012	.010	0.090	0.133	.894	1.58
Sleep quality	0.172	.116	0.104	1.654	.099	1.31
Academic stress	−0.313	−.235	0.102	−3.067	.002	1.58

Note. $R^2 = .088$; $\bar{R}^2 = .077$; $F(3, 244) = 7.88$, $p < .001$; $f^2 = 0.097$.

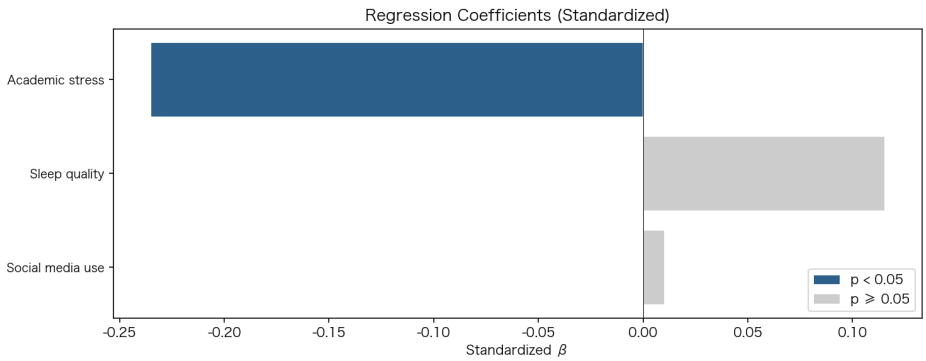


Figure 2 Regression Coefficient Plot (standardized β^*)

4.6 Mediation and Moderation Analysis

Mediation. Bootstrap mediation analysis (5,000 resamples) was used to test whether academic stress mediated the relationship between social media use and academic performance (H4). The path from social media use to academic stress (path a) was significant ($B = 0.501$), and the path from academic stress to academic performance controlling for social media use (path b) was also significant ($B = -0.354$). The indirect effect was -0.178 (95% CI $[-0.307, -0.066]$). Because the confidence interval did not contain zero, the mediation effect was statistically significant. The direct effect of social media use on academic performance after accounting for the mediator (path c') was reduced to -0.026, suggesting near-complete mediation. **H4 was supported.**

Moderation. Moderation analysis tested whether resilience and support moderated the relationship between academic stress and academic performance (H5). The interaction term (Academic stress × Resilience and support) was not statistically significant ($\beta = 0.014$, $p = .895$, $\Delta R^2 < .001$, $f^2 < .001$). Adding the interaction term produced

a negligible change in explained variance. Resilience and support did not buffer the negative effect of academic stress on academic performance in this sample. **H5 was not supported.**

5 Discussion

This study investigated the roles of social media use, sleep quality, and academic stress in predicting self-rated academic performance among university students, with particular attention to mediation and moderation mechanisms. The findings paint a nuanced but practically coherent picture in which academic stress emerges as the most consequential factor.

The evidence did not support a simplistic conclusion that all three predictors exert equally robust direct effects on performance. Instead, the results suggest a layered structure. In bivariate analyses, social media use, sleep quality, and academic stress all displayed statistically significant associations with academic performance in the expected directions. Yet once these predictors were modeled simultaneously, academic stress was the only one that retained a unique significant coefficient. This pattern indicates that academic stress is not merely one predictor among several; it appears to be the most proximal explanatory mechanism within the present model. From a practical standpoint, this distinction matters. Institutions often react to student concerns by targeting visible behaviors such as screen time, but the present results suggest that the more decision-relevant target may be the stress process through which those behaviors become academically consequential.

The mediation analysis (H4) reinforced this interpretation. Academic stress significantly mediated the relationship between social media use and academic performance, with a confidence interval for the indirect effect that excluded zero. The direct effect of social media use on performance was reduced to near zero once academic stress was accounted for, indicating near-complete mediation in the present sample. This finding is consistent with the theoretical proposition that excessive social media engagement heightens academic stress—through time displacement, social comparison, attentional fragmentation, and difficulty disengaging from digital cues—which in turn erodes academic performance. In this respect, the present results align more closely with process-oriented accounts of student adjustment than with a simple "more social media equals lower grades" narrative.

The hypothesized buffering effect of resilience and support (H5) was not supported ($p = .895$). Although resilience and support showed a modest positive bivariate correlation with academic performance ($r = .130$), it did not attenuate the stress–performance relationship. This null finding may reflect the limited variance in resilience scores,

the marginal reliability of the resilience scale ($\alpha = .641$), or the possibility that resilience operates through pathways not captured by a simple interaction term in this model. It is also plausible that support functions more strongly as a general background resource for adjustment than as a direct statistical buffer within a narrowly specified stress–performance equation.

The ANOVA testing differences across academic levels (H6) also yielded non-significant results ($F = 0.722$, $p = .578$). Academic performance did not differ meaningfully across freshmen, sophomores, juniors, seniors, and graduate students. This may indicate that the stressors and protective factors influencing performance are relatively constant across academic stages, or that the sample lacked sufficient between-group variability. For a university audience, this is a useful message in itself: support strategies centered on stress reduction and healthier academic routines may have broad relevance across student cohorts rather than being useful only for one narrow subgroup.

An important interpretive caveat concerns scale reliability. The sleep quality composite exhibited poor internal consistency ($\alpha = .506$), and the social media use and resilience scales were only marginal. Measurement error attenuates observed relationships and may have contributed to the non-significance of sleep quality in the full regression model. This caution is especially important when translating findings into practice: the current results support continued attention to sleep hygiene as a plausible wellbeing target, but the present sleep measure was not strong enough to justify overly confident claims about sleep as a unique predictor after adjustment. Future research should therefore employ more established, multi-item instruments with demonstrated psychometric properties. More broadly, the study illustrates why universities benefit from combining behavioral, psychological, and contextual indicators in one analytic framework: isolated signals can look important on their own, but a multivariable model clarifies which mechanisms remain most actionable once overlap among predictors is taken seriously.

6 Conclusions and Implications

Based on the present findings, the following conclusions can be drawn:

1. Academic stress is the most potent predictor of self-rated academic performance in this sample, both as a direct predictor and as a mediator of the social media use–performance pathway. Interventions targeting stress management are therefore likely to yield the greatest returns for academic functioning.
2. Social media use is negatively associated with academic performance at the bivariate level, but this relationship appears to operate primarily through academic stress rather than through a stable direct pathway in the adjusted model. The findings therefore point to stress-inducing patterns of use, rather than mere platform

exposure, as the more consequential concern.

3. Sleep quality is positively associated with academic performance at the bivariate level, but its unique predictive contribution is attenuated once academic stress is controlled. Given the weak reliability of the sleep scale in the present dataset, this finding should be interpreted cautiously rather than as definitive evidence of an independent sleep effect.
4. Resilience and support did not moderate the stress–performance relationship in the current sample, suggesting that background psychosocial resources may matter more for general adjustment than as a strong statistical buffer in this specific model.
5. Taken together, the results favor an intervention logic centered on upstream stress reduction, intentional digital habits, and supportive recovery routines rather than single-factor explanations of student underperformance.

Three practical recommendations emerge from these findings:

1. **Implement structured stress management programs.** Universities should offer accessible workshops on time management, cognitive reappraisal, deadline planning, and exam-period coping, given that academic stress is the primary pathway linking digital habits to academic decline.
2. **Promote digital literacy and intentional social media use.** Rather than discouraging social media entirely, institutions should help students develop self-regulatory strategies that minimize stress-inducing patterns such as compulsive checking, multitasking while studying, and late-night scrolling.
3. **Strengthen sleep hygiene education cautiously.** Sleep remains theoretically relevant and was related to academic performance at the bivariate level, but the present sleep measure showed weak internal consistency. Sleep-hygiene initiatives are therefore best framed as a complementary wellbeing strategy rather than as a conclusively validated unique predictor in this specific analysis.

7 Limitations and Future Research

Several limitations should be acknowledged. First, the cross-sectional design precludes causal inference; the direction of effects among social media use, academic stress, and performance cannot be definitively established. Longitudinal or experience-sampling designs would provide stronger evidence for the proposed pathways.

Second, all measures were self-reported, introducing the possibility of common method variance. In particular, self-rated academic performance may not correspond precisely to objective performance indicators such as GPA. Future studies should incorporate institutional records or standardized test scores.

Third, the internal consistency of the sleep quality ($\alpha = .506$) and resilience and

support ($\alpha = .641$) scales was suboptimal. This measurement noise may have attenuated observed relationships and contributed to non-significant results. Researchers should employ validated instruments with established reliability.

Fourth, the sample of 248 students from a convenience sample limits generalizability. While the sample size was adequate for the analyses conducted, replication across diverse institutional contexts and cultural settings would strengthen the conclusions.

Finally, the moderation analysis yielded a negligible effect, but this should not be taken as evidence that resilience is unimportant. Alternative model specifications—such as resilience as a mediator, social support as a contextual predictor, or more refined measures of coping strategies—may reveal protective mechanisms that the current design could not detect. Future research should explore these possibilities using more comprehensive assessment tools, larger and more heterogeneous samples, and, ideally, longitudinal designs that can better capture how digital routines and stress processes unfold over time.

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