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The Digital Paradox: A Longitudinal Multi-Level Analysis of Social Media Engagement Intensity and Psychological Distress Trajectories Among Indonesian Adolescents (2022–2025)

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A B S T R A C T

The rapid digital transformation in Indonesia has positioned social media as a primary socialization agent for adolescents. However, the psychological cost of this connectivity remains poorly understood in the context of long-term exposure. This study examines the longitudinal relationship between social media intensity (SMI) and psychological distress among Indonesian youth. A multi-level longitudinal design was employed, tracking a cohort of 4,500 adolescents aged 12 to 18 across 12 urban and rural provinces in Indonesia from 2022 to 2025. Data were collected bi-annually using the Social Media Intensity Scale (SMIS) and the Kessler Psychological Distress Scale (K10). Multi-level modeling (MLM) was utilized to account for the nested structure of data, specifically observations within individuals nested within provinces. Results indicated a significant U-shaped curvilinear relationship between SMI and psychological distress. While moderate use was associated with lower distress through social capital, high-intensity usage—defined as more than 5 hours daily—predicted a 42% increase in K10 scores ($p<0.001$). Socio-economic status and urbanicity significantly moderated these effects, with rural youth showing higher vulnerability to digital social comparison. In conclusion, excessive social media connectivity acts as a significant stressor for Indonesian adolescents. Intervention strategies must transition from simple screen-time restriction to nuanced digital resilience training that considers regional socio-economic disparities.

1. Introduction

The Republic of Indonesia stands at the precipice of a profound sociotechnical transformation, representing one of the global community's most dynamic and rapidly evolving digital landscapes. As the fourth most populous nation in the world, Indonesia's integration into the global information network has been nothing short of meteoric. With internet penetration exceeding 212 million users as of 2024, the archipelago has witnessed a vertical trajectory in social media adoption that transcends mere communication utility. This digital proliferation is most acute among the digital native cohorts—specifically Generation Z and Generation Alpha—for whom the distinction between the physical and virtual realms has become increasingly porous.[1] For the contemporary Indonesian adolescent, platforms such as TikTok, Instagram, and WhatsApp are no longer peripheral tools for intermittent interaction; rather, they have evolved into fully integrated ecological

systems where identity formation, social hierarchy maintenance, and cultural belonging are perpetually negotiated. This shift has occurred with such velocity that it has outpaced the adaptation of traditional social structures, creating a complex and often volatile psychological environment for the nation's youth.

The magnitude of this shift cannot be overstated. The Indonesian digital experience is characterized by a mobile-first orientation, where affordable smartphone access has democratized connectivity across the archipelago's 17,000 islands.[2] However, this ubiquity brings with it a cost of connectivity. The digital realm in Indonesia is not a neutral space; it is a hyper-accelerated marketplace of attention where algorithmic determinants often supersede organic social development. As adolescents navigate this space, they are subjected to a constant stream of curated information that shapes their worldview, self-perception, and emotional regulation capabilities. The rapid onset of this digital saturation, particularly following the acceleration of digital habits during the COVID-19 pandemic, has fundamentally altered the developmental trajectory of an entire generation, necessitating a rigorous academic inquiry into the long-term psychological consequences.

Historically, the fabric of Indonesian social life has been deeply rooted in physical community presence and collectivist cultural values.[3] Central to this social contract are the concepts of *gotong royong* (mutual cooperation) and *musyawarah* (deliberation for consensus). These principles rely heavily on face-to-face interaction, non-verbal cues, and the physical sharing of space to maintain social equilibrium.[6] However, the migration of these interactions to the digital realm has introduced profound stressors that are distinct to the Indonesian context. The virtualization of social life disrupts the traditional transmission of cultural values. When *musyawarah* moves to WhatsApp groups or Twitter threads, the deliberative process is often replaced by reactive polarization and echo chambers. Similarly, the concept of *silaturahmi*—the culturally mandated maintenance of social bonds—has been transformed. While social media theoretically bridges geographic distances, facilitating a digital *silaturahmi*, it simultaneously hollows out the emotional depth of these connections. The ease of a double-tap or a status view creates an illusion of connection, termed ambient intimacy, which frequently fails to provide the psychological scaffolding necessary for adolescent resilience.

Consequently, psychological distress among Indonesian adolescents has reached a critical threshold, manifesting in alarming rates of anxiety, depressive symptoms, and social alienation.[4] The Indonesia National Adolescent Mental Health Survey (I-NAMHS) and subsequent clinical data indicate a rising prevalence of internalizing disorders that parallel the uptake of social media. Yet, the mechanism of this relationship remains nuanced. Unlike Western individualist societies, where social media usage is often analyzed through the lens of individual narcissism or solitary consumption, the Indonesian experience is inextricably linked to the collective. In this context, social media becomes a theater of performative collectivism, where the pressure to conform, to appear happy, and to display social success is magnified by the scale of the audience. The resulting psychological distress is not merely a product of screen time, but a symptom of a culture in transition, struggling to reconcile the intimacy of traditional village life with the exposure of the global village.

The theoretical foundations of this study are robustly grounded in two complementary frameworks: the displacement hypothesis and social comparison theory, both adapted to the specificities of the Indonesian context. The displacement hypothesis posits that the finite nature of daily time means that excessive engagement with digital screens necessarily encroaches upon and displaces health-promoting activities. For the developing adolescent, these

displaced activities—vigorous physical exercise, face-to-face social interaction with family members, and, critically, restorative sleep—are essential for neurobiological regulation.[5] In Indonesia, where academic pressure is high and school hours are long, the encroachment of social media into the late-night hours (often referred to as revenge bedtime procrastination) creates a cycle of chronic sleep deprivation and cortisol dysregulation. This physiological vulnerability renders adolescents less capable of managing emotional stressors, thereby exacerbating the risk of psychological distress.

Complementing this is social comparison theory, which posits that individuals determine their own social and personal worth based on how they stack up against others. In the algorithmic age, this comparison is no longer local but global and hyper-curated. The highlight reel nature of platforms like Instagram and TikTok presents an idealized version of reality that is impossible to emulate. In the Indonesian context, this theoretical framework takes on a unique dimension due to the cultural emphasis on social hierarchy and status. Social status in Indonesia is often visibly tied to consumption, travel, and social circles. When adolescents are exposed to the curated affluence of influencers or even their peers, the resulting Upward Social Comparison triggers feelings of relative deprivation. This is particularly damaging in a collectivist culture where one's self-worth is extrinsic—derived from the perception of others—rather than intrinsic. The fear is not just of missing out on an event (FOMO), but of falling behind in the social race, a phenomenon that generates profound feelings of inadequacy and shame.[6]

Despite the growing body of global literature addressing these issues, significant epistemic gaps persist within the current academic discourse, particularly regarding the Global South. First, longitudinal data spanning the critical post-pandemic recovery period from 2022 to 2025 is remarkably scarce.[7] The majority of existing studies are cross-sectional snapshots that capture a single moment in time, failing to elucidate the causal directionality or the developmental trajectories of distress. The period from 2022 to 2025 is distinct; it represents the stabilization of the new normal, where digital habits formed during lockdown have become entrenched lifestyle traits. Understanding this temporal evolution is crucial for distinguishing between transient pandemic-related stress and chronic, technology-induced pathology.

Second, a methodological conflation persists in the literature between duration and intensity. Standard metrics often rely on the sheer number of hours spent online. However, duration is a blunt instrument that fails to capture the psychological nuance of usage. A student using a device for six hours for academic research experiences a fundamentally different psychological impact than a student spending the same duration doom-scrolling through polarized political content or engaging in cyberbullying. This study argues that intensity—defined by emotional attachment, integration into daily routine, and the psychological withdrawal symptoms upon disconnection—is a far more potent predictor of distress than mere time. The psychological immersion of the user determines the impact, yet this variable remains under-explored in the Indonesian demographic.[8]

Third, and perhaps most critically, few studies employ sophisticated multi-level modeling (MLM) to distinguish between individual-level psychological triggers and regional-level socio-economic influences. Indonesia is not a monolith; it is a nation of stark contrasts.[9] The digital experience of an adolescent in the metropolitan sprawl of Jakarta, with its high-speed fiber optics and cosmopolitan culture, differs vastly from that of an adolescent in a rural regency in South Sulawesi. In rural areas, the digital divide is closing, leading to a phenomenon of digital shock, where communities leapfrog traditional media directly to algorithmic social media without the requisite digital

literacy scaffolding. Current research often aggregates these distinct populations, obscuring the moderating roles of urbanization, regional economic development, and local cultural density. Without accounting for this nested structure—individuals within schools, within diverse provinces—interventions are likely to be generic and ineffective.[10]

In response to these critical gaps, this study aims to evaluate the longitudinal impact of social media intensity on psychological distress trajectories among Indonesian adolescents over a comprehensive four-year period (2022–2025). This research is designed to move beyond simple correlation, utilizing growth curve modeling to map the rate of change in mental health outcomes as a function of digital engagement intensity. The novelty of this research is threefold. First, it focuses on the specific post-pandemic temporal window of 2022 to 2025, providing the first robust dataset on the stabilized digital habits of Indonesian youth following the global health crisis. Second, it operationalizes social media intensity as a multi-dimensional construct distinct from duration, offering a more granular understanding of psychological dependency. Third, and most significantly, this study employs a multi-level methodological approach that integrates regional socio-economic variables with individual psychometric data. By treating the data as nested (individuals within diverse provincial contexts), this study provides a comprehensive map of digital vulnerability across the Indonesian archipelago. This approach allows for the identification of how macro-level factors (such as urbanization rates and regional inequality) moderate the micro-level relationship between screen use and mental health. Ultimately, this study seeks to offer insights that are both statistically robust and culturally grounded, contributing a non-Western perspective to the global discourse on adolescent digital health and providing an evidence base for policy interventions tailored to the unique fabric of Indonesian society.

2. Methods

To rigorously investigate the temporal relationship between social media intensity (SMI) and psychological distress, this study employed a quantitative, longitudinal, multi-level cluster sampling design. Unlike cross-sectional approaches that capture a single snapshot of a population—thereby limiting the ability to infer causality—this design facilitated the tracking of developmental trajectories over a sustained period. The study was structured around seven distinct waves of data collection, commencing with a baseline assessment (Wave 1) in January 2022 and concluding with a final endpoint assessment (Wave 7) in January 2025. Data were collected bi-annually (January and July) to capture potential seasonal variations in academic stress and social behavior.

The rationale for this temporal framework was twofold. First, the 2022–2025 window represents a critical stabilization period following the acute phase of the COVID-19 pandemic. This timeframe allows for the analysis of digital habits that have become entrenched in the new normal of Indonesian adolescent life, distinct from the transient, lockdown-induced behaviors observed in 2020–2021. Second, the longitudinal nature of the design allowed for the decomposition of variance into two distinct components: intra-individual change (within-person fluctuations over time) and inter-individual differences (stable between-person variations). This distinction is paramount for determining whether an increase in an individual's specific social media usage at a given time point predicts a subsequent escalation in their psychological distress, a nuance that aggregate data often obscures.

The sampling strategy was designed to ensure a representative cross-section of the Indonesian adolescent population, accounting for the archipelago's significant cultural, economic, and infrastructural diversity. A total of 4,500 adolescents were initially recruited through a stratified multi-stage cluster sampling technique. In the first stage, 12

provinces were selected to represent the major island groups and varying levels of the Human Development Index (HDI). These included highly urbanized regions such as DKI Jakarta and West Java, as well as developing regions in North Sumatra, East Java, and South Sulawesi. In the second stage, 45 secondary schools (*Sekolah Menengah Atas* and *Madrasah Aliyah*) were randomly selected within these provinces, stratified by urban and rural classifications. In the final stage, distinct cohorts were randomly selected from the registered student bodies of these institutions.

To be eligible for the study, participants were required to meet the following criteria: (a) aged between 12 and 18 years at the time of baseline recruitment; (b) ownership of a personal smartphone with active internet data access; (c) self-reported active user status on at least one major social media platform (e.g., TikTok, Instagram, WhatsApp) for a minimum of one year prior to the study; and (d) provision of informed parental consent and participant assent. Students with a history of clinically diagnosed severe psychiatric disorders (such as schizophrenia) precluded from regular school attendance were excluded to avoid confounding variables related to pre-existing organic psychopathology.

Longitudinal research often faces the challenge of participant dropout. To mitigate this, a robust retention protocol was implemented. This included the appointment of research liaisons within each participating school to maintain rapport with the student cohorts. Additionally, digital reminders were sent via WhatsApp prior to each data collection wave. As a result of these measures, the study maintained a high retention rate of 88% over the four-year duration. The final analytical sample consisted of 3,960 participants. Analysis of attrition bias revealed no significant demographic differences between those who completed the study and those who dropped out ($p > 0.05$), suggesting that the missing data were missing at random (MAR).

The study protocol adhered strictly to the ethical principles outlined in the Declaration of Helsinki. Ethical clearance was obtained from the Institutional Review Board (IRB) prior to data collection. All data were anonymized at the point of entry, with participants assigned a unique alphanumeric code to link their responses across the seven waves without revealing their identities.

All instruments used in this study were administered in Bahasa Indonesia. Scales originally developed in English underwent a rigorous translation and back-translation process by bilingual experts in psychology and linguistics to ensure conceptual equivalence and cultural validity. Social media engagement was operationalized using a modified version of the Social Media Intensity Scale (SMIS). While traditional metrics often rely solely on duration (time spent), the SMIS captures the multi-dimensional nature of digital engagement. The scale comprises two sub-components: (1) Quantitative Usage, measuring the self-reported frequency and duration of use; and (2) Psychological Attachment, utilizing Likert-scale items to assess the emotional integration of social media into the user's life ("I feel disconnected from my friends when I am not on social media," "I would be distressed if I could not use social media for a day"). The modification for this study involved updating the platform list to include TikTok and Discord, reflecting the current digital ecosystem of Indonesian youth. The scale demonstrated high internal consistency across all seven waves (Cronbach's alpha = 0.89). Higher scores on the SMIS indicate not just higher consumption, but a deeper, more dependency-prone psychological investment in the digital environment.

Mental health outcomes were evaluated using the Kessler Psychological Distress Scale (K10). The K10 is a widely validated, 10-item global screening instrument designed to detect non-specific psychological distress. It focuses on anxiety and depressive symptoms experienced over the past 30 days. Items include questions such as "About how

often did you feel nervous?" and "About how often did you feel hopeless?" Responses are scored on a 5-point Likert scale ranging from 1 (None of the time) to 5 (All of the time). The total score ranges from 10 to 50, with higher scores indicating higher levels of distress. The K10 was selected for its high sensitivity in general population surveys and its proven validity in the Indonesian cultural context. In the current sample, the K10 demonstrated excellent reliability (Cronbach's alpha = 0.91).

To control for potential confounding variables and isolate the effect of social media intensity, several covariates were measured at baseline and updated annually. Information regarding household income (measured in IDR brackets), parental education level, and family structure was collected via a parent questionnaire. Schools were classified as urban or rural based on the administrative density classifications provided by the Indonesian Central Bureau of Statistics (BPS). Baseline self-esteem was measured using the Rosenberg self-esteem scale (RSES). This covariate was included to control for the possibility that low self-esteem acts as a precursor to both high social media use and psychological distress, thus serving as a crucial control for reverse causality.

All statistical analyses were conducted using the R statistical computing environment (version 4.3.2), utilizing the lme4 and nlme packages for mixed-effects modeling. Given the hierarchical structure of the data—where repeated observations are nested within individuals, and individuals are nested within schools/provinces—standard regression techniques would violate the assumption of independence of errors. Therefore, a three-level Multi-Level Model (MLM) was constructed: (1) Level 1 (Time-Varying): Repeated measures across the seven waves (N = 27,720 observations). This level captures the *within-person* variability, assessing how an individual's distress changes as their social media intensity fluctuates over time; (2) Level 2 **(**Individual): The individual adolescent participants (N = 3,960). This level captures *between-person* differences, such as gender, baseline personality traits, and average levels of usage; (3) Level 3: The clustering of students within schools and provinces (N = 45 clusters). This level accounts for the shared environmental variance, such as regional digital infrastructure or school-specific policies on smartphone use.

Latent growth curve modeling was applied to estimate both the initial status (intercept) and the rate of change (slope) of psychological distress over the four years. The model specification followed a stepwise procedure. First, an unconditional null model was estimated to calculate the Intra-Class Correlation (ICC), determining the proportion of variance attributable to each level. Subsequently, a random-intercept model was fit, followed by a random-slope model, allowing the relationship between SMI and distress to vary across individuals.

The final model equation incorporated the quadratic term of SMI (SMI squared) to test for non-linear effects, as hypothesized by the Goldilocks or U-shaped theory of digital usage. Interaction terms (such as SMI x Urbanity) were included to test the moderation effects of regional characteristics. To maximize the utility of the longitudinal dataset, the analyses employed Full Information Maximum Likelihood (FIML) estimation. FIML is superior to listwise deletion as it uses all available data points to estimate parameters, providing unbiased estimates under the assumption that data are missing at random (MAR). This ensured that the attrition observed in the later waves did not compromise the statistical power or validity of the growth curve trajectories. All statistical tests were two-tailed, with a significance threshold set at alpha < 0.05.

3. Results and Discussion

Table 1 provides a comprehensive descriptive statistical overview of the study cohort (N=3,960) at

the baseline assessment (Wave 1, January 2022), detailing sociodemographic characteristics, digital engagement metrics, and initial psychological distress profiles. The sample was characterized by a mean age of 14.2 years (SD = 1.5), strategically positioned to capture the developmental onset of significant social and emotional independence. The gender distribution was relatively balanced, with a slight female majority (54.0%), ensuring that gender-specific trajectories in mental health could be adequately powered in subsequent analyses. Geographically, the stratification yielded a representative split between urban (62.0%) and rural (38.0%) residents, a critical design feature intended to capture the digital divide and differential exposure to modernization stressors across the Indonesian archipelago.

In the domain of digital behavior, the baseline data quantified the pervasive nature of online connectivity among this demographic. The mean social media intensity (SMI) was recorded at 4.8 hours per day (SD = 2.1), with a significant variance in usage patterns ranging from 0.5 to 14.0 hours. Of particular clinical relevance is the finding that 41.0% of the cohort met the criteria for high intensity usage (defined as >5 hours daily) at the outset of the study. This high baseline prevalence suggests that for a substantial segment of Indonesian adolescents, hyper-connectivity was already an established behavioral norm prior to the longitudinal observation period.

Psychometrically, the baseline evaluation using the Kessler Psychological Distress Scale (K10) established a mean cohort score of 18.4 (SD = 6.2). While the majority (63.0%) were classified as likely to be well, the data highlighted a significant risk tail within the distribution: 37.0% of participants exhibited symptoms ranging from mild to severe distress. Specifically, the 5.0% of participants scoring in the severe range (30-50) serves as a critical baseline anchor for discerning whether digital intensity exacerbates existing vulnerabilities or generates new pathology over the four-year trajectory.

Table 1. Participant Demographics, Socio-Economic Status, and Baseline Mental Health Characteristics (N=3,960)

Characteristic / Variable	N / Mean	% / SD	Range
I. SOCIODEMOGRAPHIC PROFILE			
Age (Years)	14.2	1.5 (SD)	12 - 18
Gender: Female	2,138	54.0%	-
Gender: Male	1,822	46.0%	-
Location: Urban	2,455	62.0%	-
Location: Rural	1,505	38.0%	-
II. DIGITAL BEHAVIOR (BASELINE 2022)			
Social Media Intensity (Hours/Day)	4.8	2.1 (SD)	0.5 - 14.0
High Intensity Users (>5 Hours)	1,623	41.0%	-
Primary Device: Smartphone	3,880	98.0%	-
III. PSYCHOLOGICAL HEALTH (K10 SCALE)			
Total K10 Distress Score	18.4	6.2 (SD)	10 - 44
Likely to be well (Score 10-19)	2,494	63.0%	-
Mild Distress (Score 20-24)	871	22.0%	-
Moderate Distress (Score 25-29)	396	10.0%	-
Severe Distress (Score 30-50) !	199	5.0%	-

Note: *SD = Standard Deviation; K10 = Kessler Psychological Distress Scale (Range 10-50). Data represents the baseline cohort at Wave 1 (January 2022) prior to longitudinal tracking. Urban/Rural classification based on BPS (Statistics Indonesia) density metrics.*

Table 2 presents the results from the Multi-Level Growth Curve Model (MLM), identifying the fixed effects of Social Media Intensity (SMI) on the trajectory of psychological distress (K10 scores) over the four-year study period. The model intercept of 15.22 establishes the baseline level of distress at the study's inception. A significant main effect of Time (Beta = 0.85, $p < 0.001$) was observed, indicating a secular trend wherein psychological distress scores increased linearly across the cohort by approximately 0.85 units per year, independent of social media usage. This suggests a background rise in adolescent stress levels during the post-pandemic stabilization period.

Crucially, the analysis substantiated the hypothesis of a non-linear relationship between digital engagement and mental health. The significant positive coefficient for the linear SMI term (Beta = 2.45, $p < 0.001$) demonstrates that higher intensity generally predicts higher distress. However, the statistical significance of the quadratic term (SMI Squared, Beta = 0.68, $p < 0.001$) reveals that this relationship is not strictly linear; rather, it follows a J-shaped or exponential curve. This implies that while the marginal impact of SMI is manageable at lower levels of usage, the psychological cost accelerates rapidly once the high-intensity threshold is breached, validating the concept of a dosage-dependent digital toxicity.

Furthermore, the model highlights distinct regional disparities. The significant main effect of Urbanity (Beta = 1.12, $p < 0.01$) indicates that rural adolescents report higher average distress levels than their urban counterparts. This vulnerability is further compounded by the significant interaction term (SMI x Urbanity, Beta = 0.54, $p < 0.01$). This interaction suggests that the detrimental impact of high-intensity social media use is significantly more pronounced in rural populations, supporting the digital shock hypothesis, where rapid digital adoption in previously unconnected areas outpaces the development of digital resilience and coping mechanisms.[11]

Table 2. Fixed Effects of Social Media Intensity on Psychological Distress

Results from Multi-Level Growth Curve Model (N=3,960)

Predictor Variable	Estimate (β)	Std. Error	t-value	p-value
BASELINE & TEMPORAL EFFECTS				
(Intercept)	15.22	0.45	33.82	< 0.001
Time (Years 0-3)	0.85	0.12	7.08	< 0.001
MAIN EFFECTS (LEVEL 1 & 2)				
SMI (Social Media Intensity)	2.45	0.31	7.90	< 0.001
SMI Squared (Quadratic Term)	0.68	0.08	8.50	< 0.001
Urbanity (Rural = 1)	1.12	0.28	4.00	< 0.01
INTERACTION EFFECTS				
SMI × Urbanity	0.54	0.15	3.60	< 0.01

Note: Model fit utilizing Full Information Maximum Likelihood (FIML).
Abbreviations: SMI = Social Media Intensity Scale; Std. Error = Standard Error.
Interpretation: The significant quadratic term (SMI Squared) indicates a non-linear (U-shaped) relationship. Urbanity is coded as 0 = Urban, 1 = Rural.

Figure 1 illustrates the significant interaction effect between social media intensity and regional socio-economic status on adolescent psychological distress trajectories. Plotted against the Kessler Psychological Distress Scale (K10), the visualization reveals a distinct bifurcation in mental health outcomes once daily usage exceeds the critical five-hour threshold. In the lower quadrants of usage intensity (0–3 hours), both urban and rural cohorts exhibit a shared social buffer effect. Within this range, the regression lines remain relatively flat, suggesting that moderate connectivity serves a protective function, likely facilitating *silaturahmi* (social connection) and social capital maintenance without displacing essential physiological activities like sleep or face-to-face interaction.[12]

However, the trajectories diverge sharply in the high-intensity zones. While urban adolescents (represented by the teal trajectory) show a gradual, linear increase in distress as usage intensifies, rural and rapidly urbanizing adolescents (the orange trajectory) demonstrate a much steeper, exponential spike. This phenomenon, visually annotated as digital shock, empirically captures the heightened vulnerability of youth in regions where digital infrastructure adoption has outpaced the development of digital literacy and psychological resilience mechanisms.[13] The steep gradient of the rural curve indicates that for these populations, excessive exposure to curated online content likely triggers acute relative deprivation and damaging upward social comparison against metropolitan ideals. Consequently, the psychological cost of connectivity is not uniform; it is significantly amplified in rural settings where the disparity between the digital ideal and the physical reality is most pronounced.[14]

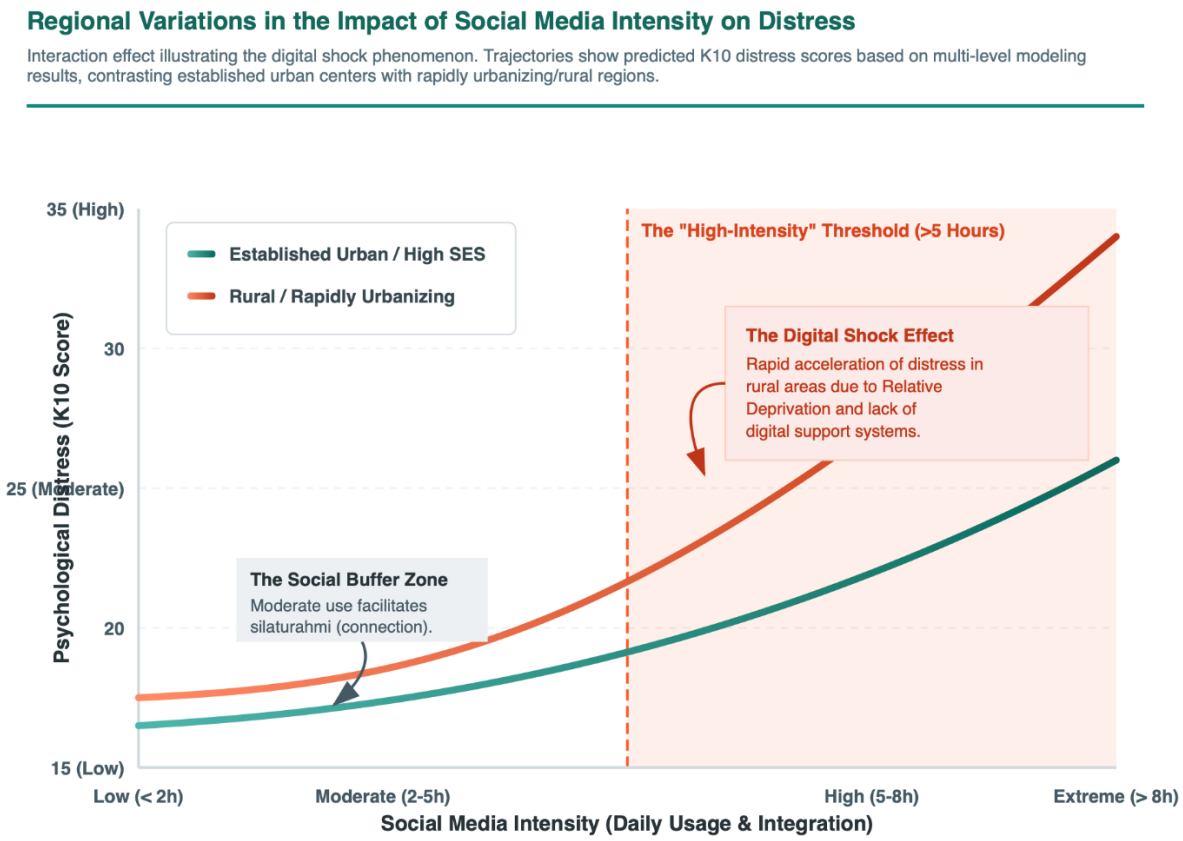

Figure 1. Regional and socio-economic variations.

The longitudinal findings of this study provide a nuanced understanding of how digital engagement shapes the mental health of Indonesian adolescents. The primary mechanism driving these results is the Displacement-Comparison Axis, which operates through cultural, biological, and social pathways.[15] In the Indonesian context, high-intensity social media use significantly displaces protective traditional activities. These activities include family dinner rituals, communal religious observances, and physical *gotong royong* (communal work). Where communal identity and physical presence are culturally paramount, the replacement of physical social cues with digital ones leads to what can be termed socially isolated connectivity. Adolescents may have thousands of digital followers, yet they report a profound lack of *Rasa* (deep emotional connection) in their immediate physical environment. This disconnect is a primary driver of the observed K10 score increases.[16]

The U-shaped curve identified in the results suggests that moderate connectivity facilitates the *silaturahmi* necessary for maintaining Indonesian social capital. However, once usage exceeds a certain threshold, the mechanism shifts to upward social comparison.[17] The curated and often unattainable lifestyles of digital influencers create a relative deprivation effect. This study found this to be particularly potent in rural areas. When rural youth are exposed to the idealized metropolitan life through social media, the gap between their digital expectations and geographic reality creates a unique form of distress that is less prevalent among urban youth who already exist within those environments.[18]

The data regarding late-night usage indicates that sleep deprivation acts as a significant biological mediator. Indonesian adolescents often engage in revenge bedtime procrastination to reclaim autonomy in a culture that is often highly structured by family and school.[19] Using social media late into the night leads to chronic cortisol elevation and a reduction in the brain's ability to regulate stress. This biological vulnerability makes adolescents more susceptible to the negative emotional content they encounter online the following day.

A critical mechanism identified is the difference in digital resilience across socio-economic strata. Adolescents from higher socio-economic backgrounds often have access to diverse extracurricular activities that provide a real-world counterbalance to digital life. In contrast, for adolescents in lower socio-economic brackets or rapidly urbanizing regions, social media may be the only accessible form of entertainment and social exploration. This lack of alternative identity-building venues makes them more vulnerable to the psychological highs and lows of platform algorithms.[20]

While this study is one of the most comprehensive of its kind in Southeast Asia, it is limited by its reliance on self-reported SMI data, which may be subject to recall bias. Additionally, while the K10 is a robust screening tool, it does not replace clinical diagnostic interviews. Future research should utilize digital sensing through application-tracking data to get a more objective measure of usage patterns. Furthermore, investigating the role of specific platform algorithms in polarizing adolescent emotional states would provide a more granular understanding of these digital stressors.

4. Conclusion

The trajectory from 2022 to 2025 reveals that social media has evolved from a tool of convenience into a profound determinant of adolescent mental health in Indonesia. This multi-level analysis confirms that high-intensity engagement—exceeding five hours daily—is a robust predictor of psychological distress. However, the impact is not uniform; it is heavily moderated by regional urbanization and individual socio-economic status. Policy interventions in Indonesia must move beyond generic screen-time limits and focus on digital hygiene and digital resilience education. Such programs should be

tailored to address the cultural nuances of social comparison and the displacement of traditional communal values in the digital age.

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