



The Role of Social Media Exposure in Shaping Anxiety, Self-Esteem, And Emotional Regulation Among Adolescents: Implications for Clinical Intervention

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Abstract

This study examined the role of multidimensional social media exposure in shaping anxiety, self-esteem, and emotional regulation among adolescents within a quantitative framework. A cross-sectional survey was administered to 528 adolescents aged 13–18 years ($M = 15.42$, $SD = 1.67$). Hierarchical regression, mediation, and moderation analyses were conducted to assess direct and indirect relationships while controlling for demographic and psychosocial variables. Results indicated that passive exposure ($\beta = .18$, $p < .001$), feedback monitoring ($\beta = .14$, $p = .002$), and problematic use ($\beta = .29$, $p < .001$) were significant positive predictors of anxiety, with the full model explaining 35.6% of variance ($R^2 = .356$). For self-esteem, passive exposure ($\beta = -.17$, $p < .001$), feedback monitoring ($\beta = -.13$, $p = .004$), and problematic use ($\beta = -.21$, $p < .001$) were negatively associated, while active engagement showed a small positive association ($\beta = .09$, $p = .036$), with the model explaining 31.8% of variance ($R^2 = .318$). Emotional dysregulation significantly predicted anxiety ($\beta = .47$, $p < .001$) and self-esteem ($\beta = -.43$, $p < .001$) and partially mediated relationships between problematic use and both outcomes (indirect effect for anxiety = .12; 95% CI [.08, .17]). Moderation analyses revealed small but significant interaction effects involving stress and sleep quality. Findings supported a multidimensional exposure model in which evaluative and compulsive engagement patterns were more strongly associated with psychological vulnerability than general active use. Results underscore the importance of incorporating exposure quality and emotional regulation processes into adolescent mental health assessment and intervention frameworks.

Keywords

Adolescents, Social Media, Anxiety, Self-Esteem, Emotional Regulation.

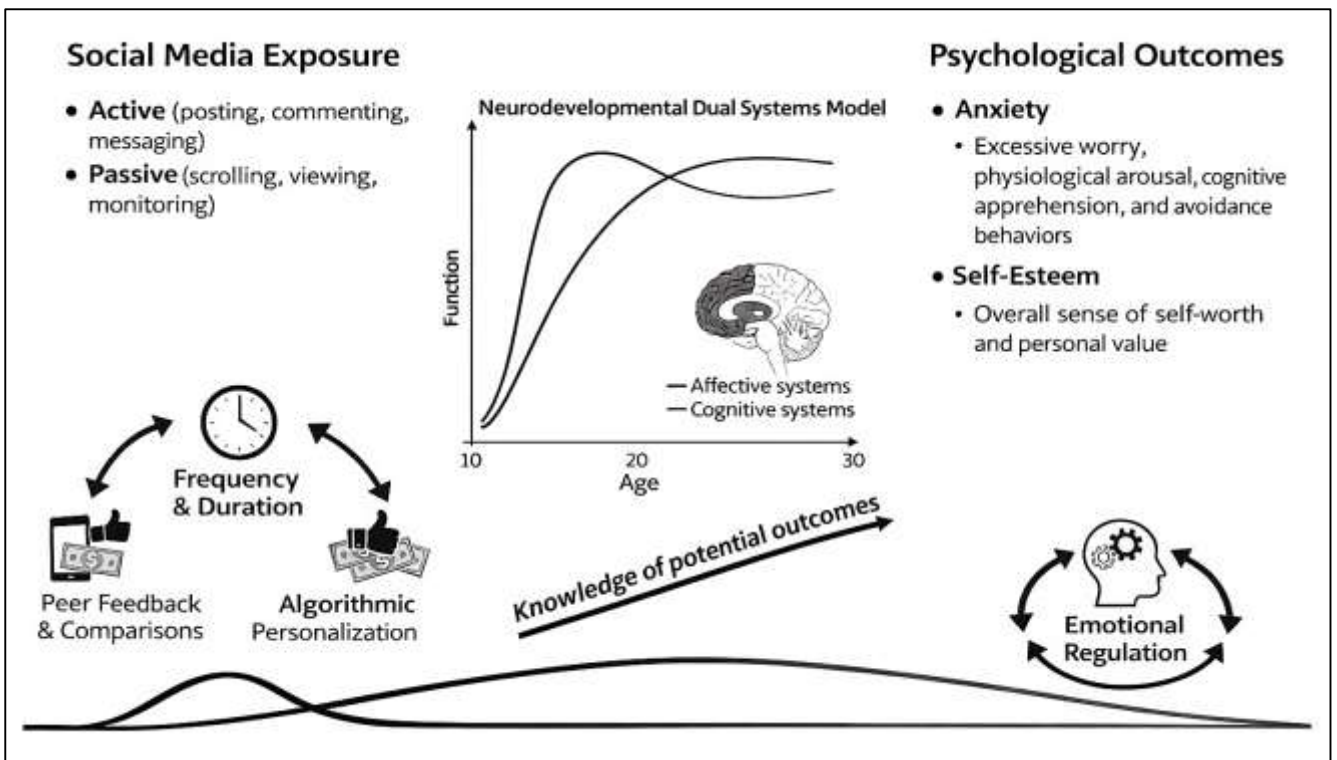
INTRODUCTION

Adolescence is commonly defined as the developmental stage spanning roughly ages 10 to 19, characterized by rapid biological maturation, expanding cognitive capacities, identity formation, and heightened sensitivity to peer evaluation (Jimenez et al., 2023). During this period, individuals undergo substantial neurobiological reorganization in systems associated with reward processing, emotional reactivity, and social cognition. Social media exposure can be defined as the frequency, intensity, duration, and qualitative nature of adolescents' engagement with digital social networking platforms, including both active behaviors such as posting, commenting, and messaging, and passive behaviors such as scrolling, viewing, and monitoring peer content. Exposure also includes the type of content encountered, the visibility of peer feedback metrics, and the degree of algorithmic personalization that shapes adolescents' informational environments. Anxiety refers to persistent patterns of excessive worry, physiological arousal, cognitive apprehension, and avoidance behaviors that interfere with daily functioning (Bolin et al., 2021). Self-esteem denotes an individual's global evaluation of self-worth and personal value. Emotional regulation describes the processes through which individuals monitor, evaluate, and modify emotional responses in order to meet situational demands and maintain psychological equilibrium. These constructs are developmentally interlinked in adolescence because peer feedback, social comparison, and identity exploration become central to self-definition. Internationally, adolescents represent one of the most digitally connected demographic groups, with social networking platforms embedded in educational, relational, and recreational domains. As a result, social media exposure constitutes a global psychosocial environment rather than a peripheral activity. The worldwide diffusion of smartphones and internet connectivity has created conditions in which adolescents across diverse socioeconomic and cultural contexts encounter continuous streams of peer-generated content, social evaluation cues, and emotionally charged information (Griffith et al., 2021). This international ubiquity elevates social media from a lifestyle variable to a significant contextual factor in adolescent mental health research. A quantitative investigation into how such exposure shapes anxiety, self-esteem, and emotional regulation is therefore grounded in the recognition that digital interaction forms a structural component of contemporary adolescent development.

Theoretical foundations provide structured explanations for why social media exposure may shape psychological outcomes. Social comparison processes are central during adolescence, when self-evaluations are increasingly informed by peer standards and perceived social rank. Digital platforms intensify opportunities for upward and downward comparisons by presenting curated images, achievements, and lifestyle portrayals that may not reflect everyday realities (Wilbrecht & Davidow, 2024). Repeated exposure to idealized content can recalibrate adolescents' internal benchmarks, influencing self-worth evaluations and perceived adequacy. Impression management dynamics also operate within digital environments. Adolescents become aware of invisible audiences and permanent digital traces, which can heighten self-consciousness and vigilance regarding peer judgment. The quantification of approval through likes, comments, and follower counts introduces measurable indicators of social validation that may reinforce external contingencies of self-worth. Uses-and-gratifications perspectives further explain that adolescents engage with social media for varied motives, including connection, entertainment, reassurance, and identity exploration (Tervo-Clemmens et al., 2023). These motives shape exposure patterns and psychological outcomes, indicating that intensity of use alone cannot capture the complexity of effects. Developmental neuroscience perspectives highlight heightened reward sensitivity and emotional reactivity during adolescence, suggesting that digital social feedback may activate reward circuits strongly and influence affective states. Emotional regulation frameworks add that social media contexts both elicit emotional responses and provide tools for managing them. Adolescents may use digital engagement to distract from stress, seek reassurance, or co-regulate emotions with peers. These interwoven theoretical lenses justify examining exposure as a multidimensional construct encompassing frequency, behavioral style, social evaluation intensity, and emotional engagement. A quantitative approach grounded in these frameworks enables the systematic modeling of pathways linking exposure to anxiety, self-esteem, and regulatory functioning (Kwon & Telzer, 2022).

Anxiety represents a salient outcome because adolescence is a developmental window in which internalizing symptoms often intensify. Social media environments contain numerous features capable of eliciting anticipatory worry and hypervigilance. Continuous peer connectivity can generate concerns about inclusion, popularity, and social standing. Visibility of peer interactions may amplify fear of exclusion or missing out on rewarding experiences. The persistence and public nature of digital communication can extend the temporal boundaries of social stressors, allowing interpersonal conflicts or ambiguous exchanges to remain cognitively salient (West et al., 2024). Exposure to negative feedback or cyberaggression may heighten physiological arousal and reinforce avoidance behaviors. Repetitive checking behaviors, driven by uncertainty regarding peer responses, may maintain cycles of reassurance seeking and apprehension. Sleep disruption associated with nighttime engagement can further intensify emotional reactivity and vulnerability to anxious rumination. From a quantitative standpoint, anxiety can be operationalized through validated symptom scales capturing cognitive worry, somatic tension, and behavioral avoidance (Garagiola et al., 2022). Social media exposure can be disaggregated into passive consumption, active posting, social comparison frequency, feedback monitoring, and exposure to interpersonal conflict. Modeling these dimensions allows examination of whether specific exposure types are associated with elevated anxiety levels after controlling for demographic and contextual variables. It also permits testing of mediating mechanisms such as rumination, fear of missing out, or perceived social evaluation threat. Through this lens, social media exposure becomes a context that interacts with developmental sensitivities to shape patterns of anxious cognition and affect (DiPiero et al., 2023).

Figure 1: Social media and Adolescent Mental Health

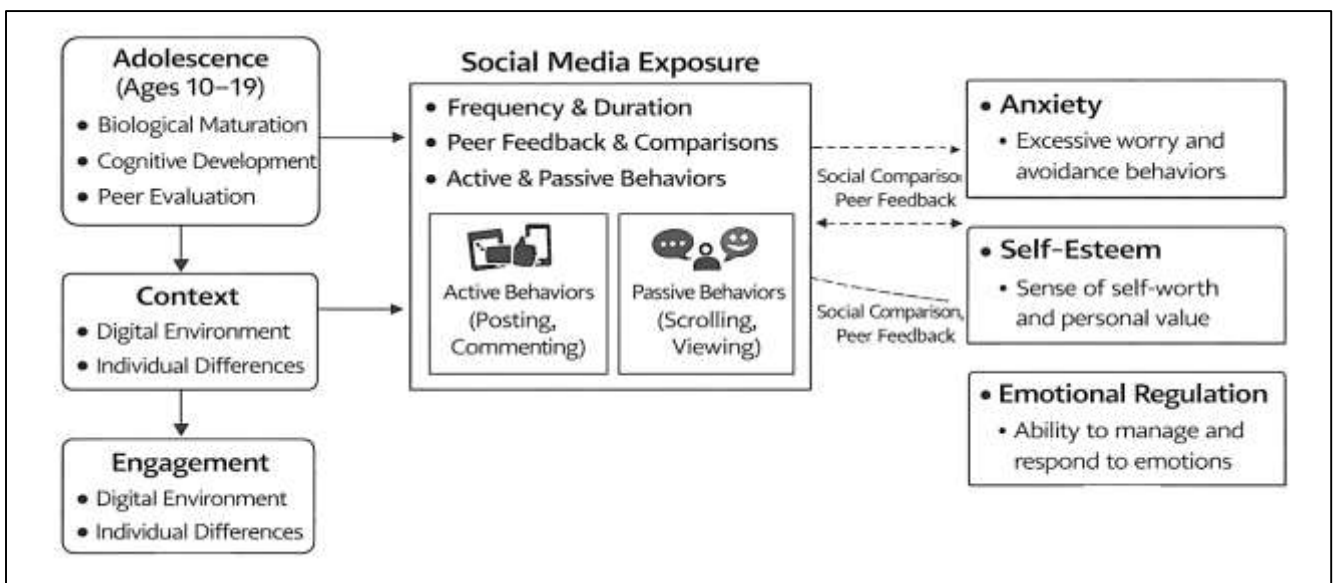


Self-esteem is deeply intertwined with peer appraisal during adolescence, making it particularly responsive to digitally mediated feedback. Global self-worth during this period is shaped by perceived acceptance, competence, attractiveness, and social belonging. Social media platforms provide continuous exposure to peers' curated self-presentations, potentially heightening upward comparison and self-scrutiny (Müller et al., 2023). When adolescents interpret peer content as indicative of superior achievement, attractiveness, or popularity, their own self-evaluations may decline. The presence of visible metrics quantifying approval can further tether self-worth to external validation. Adolescents who repeatedly evaluate their posts through engagement statistics may internalize fluctuating

feedback as indicators of personal value. Appearance-focused content can influence body-related self-perceptions, particularly in contexts emphasizing image sharing and aesthetic presentation. Quantitative measurement of self-esteem can differentiate between global trait self-worth and context-dependent state fluctuations following exposure episodes (Chan et al., 2023). Exposure variables can capture frequency of appearance comparison, posting for validation, and feedback sensitivity. Moderating factors such as gender, baseline body image concerns, and offline peer support can be incorporated to assess differential susceptibility. By specifying comparison processes and validation contingencies as mediators, quantitative models can clarify whether associations between exposure and self-esteem operate indirectly through evaluative mechanisms (Bansal, 2022). In this framework, social media exposure represents an arena where self-concept is repeatedly negotiated, reinforced, or challenged through visible peer interaction.

Emotional regulation serves as both an outcome and a mechanism linking exposure to anxiety and self-esteem. Regulation encompasses strategies such as cognitive reappraisal, suppression, distraction, problem solving, and interpersonal co-regulation (Uddin & Reyes, 2022). Digital environments present frequent emotionally evocative stimuli, including affirming feedback, exclusion cues, conflict, and exposure to distressing content. Adolescents must interpret and manage these stimuli in real time. Some may employ adaptive strategies, reframing negative feedback or limiting engagement during stress. Others may rely on suppression, rumination, or compulsive checking, which can intensify distress. Social media can function as a tool for mood management, offering distraction or immediate peer reassurance (Uddin & De Los Reyes, 2022). Repeated reliance on digital distraction may reduce opportunities to develop internal regulatory skills. Interpersonal regulation processes, including co-rumination and reassurance seeking, can strengthen perceived closeness while simultaneously maintaining negative affect. Quantitative assessment of emotional regulation can involve validated measures of strategy frequency, regulatory flexibility, and perceived effectiveness. Coupling these measures with detailed exposure metrics enables testing of whether certain engagement styles predict regulation difficulties or specific strategy profiles. Structural equation modeling can examine whether regulation mediates associations between exposure and anxiety or self-esteem (Hutton et al., 2024). This integrated perspective positions emotional regulation as a dynamic process shaped by digital interaction patterns and as a pathway through which psychological adjustment is influenced.

Figure 2: Adolescent Social Media Psychological Model



Contextual and individual difference variables refine understanding of these relationships. Adolescents vary in baseline vulnerability, including preexisting anxiety symptoms, self-criticism, and emotion regulation capacity. Social comparison orientation, rejection sensitivity, and reward responsiveness may alter how digital cues are interpreted (Dickson et al., 2020). Offline social support

can buffer negative experiences, while existing peer conflict may extend into digital spaces. Gender norms and cultural expectations influence the salience of appearance, popularity, and emotional expression. Socioeconomic conditions shape access, privacy, and parental mediation practices, altering exposure intensity and autonomy. Measurement precision is therefore essential. Time-based indicators alone compress diverse experiences into a single metric and obscure meaningful variation. Multidimensional exposure scales can differentiate active and passive engagement, content type, feedback dynamics, and stressor exposure. Longitudinal quantitative designs allow temporal ordering of exposure and outcomes, clarifying potential bidirectional relationships (Shapiro & Hartzell, 2023). Daily diary or experience sampling methods can capture within-person fluctuations in mood, self-evaluation, and regulation following specific exposure episodes. Including covariates such as sleep quality, academic stress, and family functioning strengthens causal inference by isolating unique contributions of social media exposure. Within a clinical assessment framework, anxiety symptoms, self-esteem levels, and emotion regulation capacities align with established diagnostic and therapeutic domains. Quantifying how digital exposure relates to these domains enhances conceptual clarity regarding adolescents' psychosocial ecology (Wood et al., 2024). Through systematic operationalization and statistical modeling, the role of social media exposure in shaping anxiety, self-esteem, and emotional regulation can be examined as a structured, measurable component of contemporary adolescent development.

The primary objective of this quantitative study is to systematically examine the extent to which multidimensional social media exposure predicts variations in anxiety symptoms, global self-esteem, and emotional regulation capacities among adolescents, while accounting for relevant demographic and psychosocial covariates. Specifically, the study seeks to operationalize social media exposure beyond simple time-based metrics by incorporating frequency of use, intensity of engagement, active versus passive participation, exposure to appearance-focused and peer-evaluative content, feedback monitoring behaviors, and experiences of online interpersonal stress. These exposure dimensions will be analyzed to determine their direct and indirect associations with anxiety levels, measured through standardized indicators of cognitive worry, physiological arousal, and avoidance tendencies; self-esteem, assessed through validated global self-worth scales; and emotional regulation, evaluated through established measures of strategy use, regulatory flexibility, and perceived effectiveness in managing affect. A central objective is to test whether emotional regulation functions as a mediating mechanism linking social media exposure to anxiety and self-esteem outcomes, thereby clarifying potential psychological pathways underlying observed associations. The study also aims to evaluate moderating variables such as gender, age, baseline psychological vulnerability, offline social support, and sleep quality to determine whether certain subgroups demonstrate heightened sensitivity to digital social environments. By employing multivariate statistical modeling, including regression and structural equation approaches, the research intends to quantify the relative contribution of distinct exposure components while controlling for confounding influences. An additional objective is to distinguish between adaptive and maladaptive patterns of engagement, identifying whether certain forms of social media interaction correspond with healthier emotional adjustment profiles. Through rigorous operationalization and statistical analysis, this study aims to generate empirically grounded evidence clarifying how contemporary digital exposure interfaces with core dimensions of adolescent mental health, thereby providing a structured foundation for clinically informed assessment and intervention frameworks without presupposing uniform effects across all adolescents.

LITERATURE REVIEW

The literature on adolescent social media exposure has expanded rapidly as digital platforms have become embedded in everyday peer interaction, identity work, and emotional coping. Within quantitative mental health research, this body of work has moved from broad "screen time" estimates toward more nuanced exposure models that distinguish active versus passive engagement, content domains (appearance-focused, social-interaction, entertainment), and interaction features (feedback metrics, messaging intensity, algorithmic feed exposure) (Rhaiem & Amara, 2021). At the same time, adolescent psychological outcomes most consistently examined in this area – anxiety symptoms, self-esteem, and emotion regulation – are not independent constructs; they operate as an interconnected system in which self-evaluative processes and regulatory capacities shape emotional vulnerability and

stress reactivity. A focused literature review is therefore needed to synthesize how different forms of social media exposure map onto anxiety and self-esteem, and how emotion regulation may function both as an outcome affected by exposure and as a pathway that statistically explains exposure-mental health associations (Yuan et al., 2021). This section organizes prior quantitative findings by clarifying core construct definitions and measurement practices, summarizing evidence on exposure-anxiety links, exposure-self-esteem links, and exposure-emotion regulation links, and then integrating these strands into a model-oriented synthesis that identifies mediators, moderators, and covariates commonly tested in adolescent samples. Emphasis is placed on methodological rigor—operationalization of exposure, sampling and age range definitions, psychometric properties of scales, and analytic strategies such as multivariate regression, mediation, moderation, and structural equation modeling—because these decisions strongly influence effect estimates and interpretability. The review also frames the clinical relevance of the evidence base by mapping empirical patterns to assessment-aligned constructs (e.g., worry, avoidance, contingent self-worth, rumination, suppression, reappraisal, reassurance seeking), establishing a structured foundation for the subsequent presentation of hypotheses and quantitative modeling decisions in the study (Westphal et al., 2021).

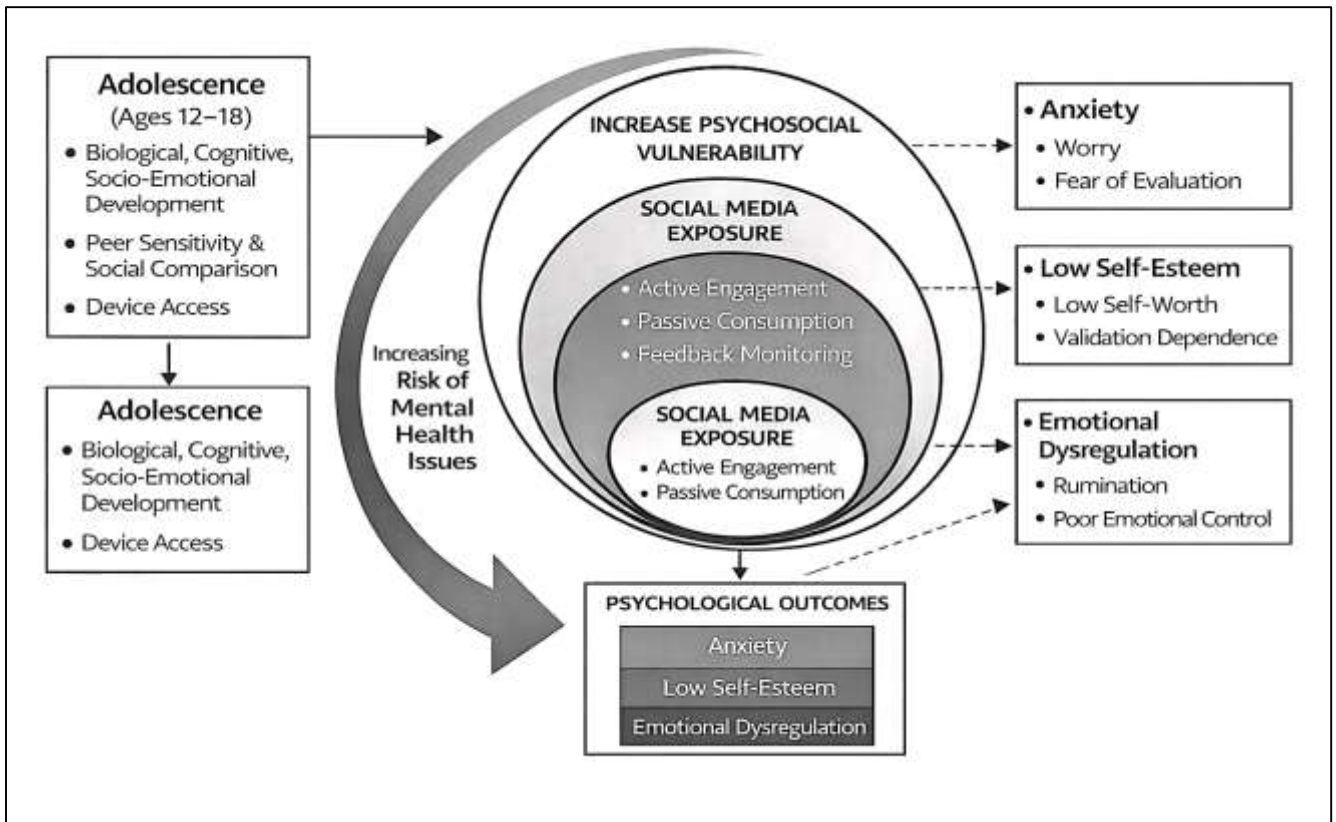
Adolescence

Adolescence is generally defined as the developmental period spanning approximately 12 to 18 years of age, corresponding with middle and secondary school enrollment and characterized by substantial biological, cognitive, and socio-emotional transformation (Galvan, 2023). This developmental window is marked by heightened sensitivity to peer evaluation, increased importance of social belonging, and intensified identity exploration. Neurodevelopmental changes during this stage contribute to amplified responsiveness to social reward and perceived rejection, positioning adolescents as particularly attuned to peer feedback and social comparison processes. For quantitative investigation, clearly defining adolescence as a bounded age group enhances internal validity by ensuring developmental comparability across participants. School enrollment status is often used as a practical inclusion criterion because peer networks within educational settings extend into digital spaces, creating continuity between offline and online social hierarchies (Halawa et al., 2020). Access to a personal smartphone or internet-enabled device is another essential inclusion requirement, as regular device access is strongly associated with exposure intensity and engagement patterns. Urban and rural residence may also shape digital behavior through differences in connectivity, parental mediation, and peer density; documenting such contextual factors strengthens interpretation of results. Establishing these sample boundaries ensures that social media exposure is examined within a cohort that is both developmentally sensitive to peer evaluation and structurally embedded in digital peer ecosystems (Reis et al., 2020). By grounding the study in a clearly delineated adolescent population with consistent schooling and device access criteria, the quantitative framework gains precision in examining how digital interaction interfaces with psychological development.

Social media exposure is conceptualized in contemporary quantitative research as a multidimensional construct encompassing intensity, behavioral style, content characteristics, feedback processes, interpersonal stress experiences, and problematic engagement patterns. Intensity is typically measured through self-reported average daily minutes or hours of use, as well as the number of platform checks per day, with frequency of checking often reflecting habitual engagement more accurately than total duration (Vawdon & Livingstone, 2020). Engagement style distinguishes active participation—such as posting content, commenting, and messaging—from passive consumption, including scrolling and viewing peers' profiles. Passive exposure has been associated with heightened social comparison, whereas active interaction may involve reciprocal communication and perceived support. Content domains further refine measurement by distinguishing exposure to appearance-focused imagery, peer-status indicators, conflictual exchanges, and supportive or affiliative interactions. Feedback processes capture adolescents' monitoring of likes, comments, and follower counts, as well as editing or deleting posts in response to engagement levels, reflecting the quantification of social approval. Interpersonal stress exposure includes experiences such as cyberbullying, exclusion, and public conflict, which introduce additional emotional strain (McClymont et al., 2020). Problematic use indicators assess compulsive checking, diminished control over use, and interference with daily functioning. Quantitative instruments commonly employ validated self-report scales, composite indices, and latent

variable modeling to represent these dimensions. This multidimensional operationalization improves precision by moving beyond generalized screen-time metrics and allowing differentiated analysis of how specific engagement patterns relate to psychological outcomes (Hamilton et al., 2021).

Figure 3: Adolescent Digital Exposure Risk Model



Anxiety, self-esteem, and emotional regulation are operationalized through established psychometric frameworks that distinguish between stable dispositions and situational responses. Anxiety is measured through scales capturing generalized worry, social evaluative fear, physiological arousal, and avoidance behaviors (Askar et al., 2021; Mosheur & Rebeka, 2021). In adolescent populations, social anxiety components are particularly relevant because peer visibility and public feedback mechanisms intensify concerns about judgment and acceptance. Self-esteem is typically assessed using global self-worth measures that evaluate overall perceptions of personal value, sometimes supplemented by indicators of contingent self-esteem reflecting dependence on external validation. Emotional regulation is measured through instruments assessing strategy use, including cognitive reappraisal, expressive suppression, and rumination, as well as broader indices of dysregulation and regulatory flexibility (Elangovan & Sundaravel, 2021; Faysal & Shamsunnahar, 2022). Measurement decisions often differentiate trait-based assessments, reflecting enduring tendencies, from state-based assessments capturing recent emotional experiences within defined time frames such as the past week or month. Daily diary or short-term recall methods can provide additional insight into within-person variability following specific exposure episodes (Habibullah & Zaheda, 2022; Siddique & Amin, 2022). Clear articulation of these measurement approaches ensures conceptual clarity and facilitates comparison across studies. By specifying how anxiety, self-esteem, and regulation are quantified, the review anchors psychological outcomes within standardized assessment domains that support robust statistical modeling (Fasey et al., 2021; Md & Islam, 2022).

The clinical relevance of this literature lies in its alignment with established assessment targets in adolescent mental health rather than prescriptive intervention strategies. Anxiety symptoms, especially those related to social evaluation and persistent worry, represent central features of internalizing conditions (Guenther et al., 2021). Disturbances in self-esteem are closely linked with vulnerability to mood and anxiety difficulties, particularly when self-worth is heavily contingent upon peer approval.

Emotional regulation deficits, including rumination and suppression, function as transdiagnostic risk factors across internalizing presentations. Quantitative mapping of social media exposure onto these domains enables examination of whether specific engagement patterns correspond with symptom severity, maladaptive coping tendencies, and instability in self-evaluative processes (Mosheur & Rebeka, 2022; Mostafa & Tohidul, 2022; Toronto & Remington, 2020). By integrating digital exposure variables into broader psychosocial models that include sleep quality, peer relationships, and academic stress, research clarifies the relative contribution of social media within adolescents' ecological systems. Such structured mapping supports screening frameworks and case conceptualization processes by identifying which exposure dimensions demonstrate the strongest associations with anxiety, low self-esteem, or dysregulated emotional responses. Through systematic operationalization and statistical modeling, the literature establishes a coherent architecture in which adolescence constitutes a developmentally sensitive context, social media exposure operates as a multifaceted environmental input, and anxiety, self-esteem, and emotional regulation emerge as interrelated psychological outcomes measurable within clinical assessment paradigms.

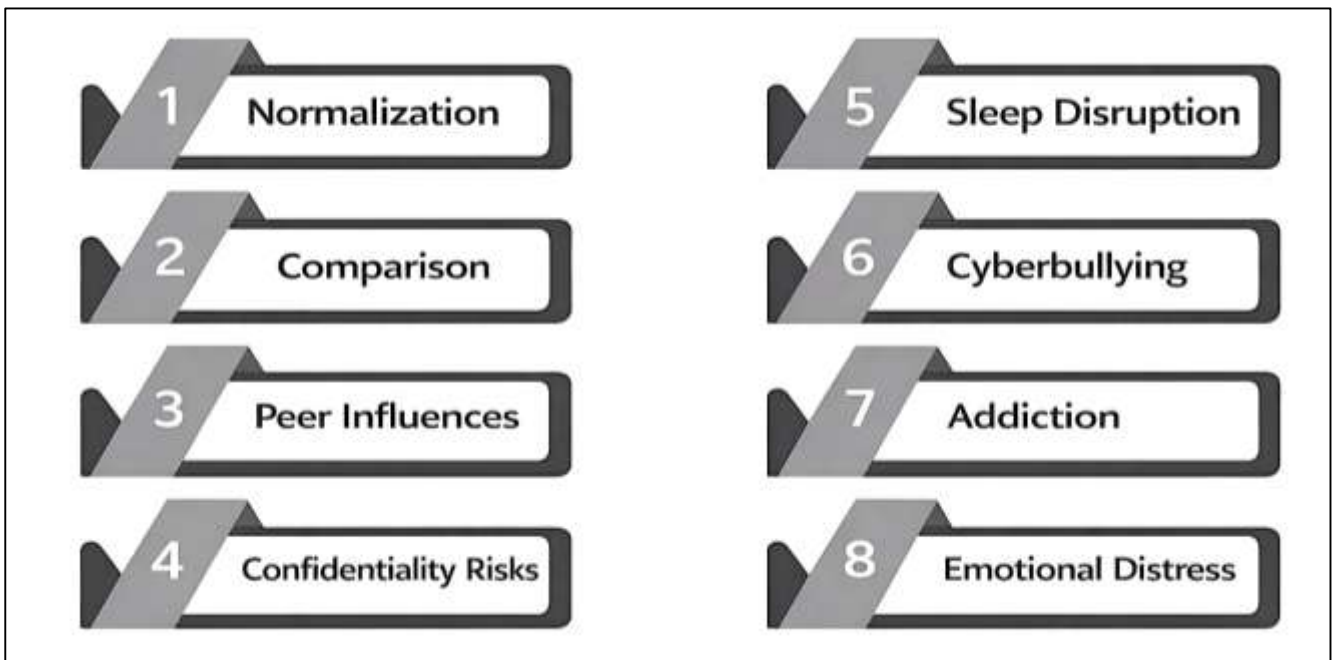
Global and Cross-Cultural Significance of Adolescent Social Media Exposure

Adolescent social media exposure has become internationally prevalent and widely normalized as a routine feature of daily life, shaped by the global diffusion of smartphones, expanding mobile broadband coverage, and the integration of platform-based communication into education, entertainment, and peer relationships (Chen et al., 2021; Ara, 2023; Jinnat & Rakib, 2023). Across many countries, adolescents report frequent daily engagement with multiple platforms, with patterns reflecting both continuous background connectivity and episodic bursts of checking behavior throughout the day. Engagement is commonly embedded in everyday social coordination, such as arranging meetups, participating in class-related group chats, sharing achievements, and maintaining friendships across neighborhoods or school transitions (Khaled & Mosheur, 2023; Shahab & Aditya, 2023). This normalization is reflected in the way adolescents treat social media as a default channel for peer interaction rather than an optional activity, with participation often tied to social inclusion, group belonging, and access to peer information. Cross-national surveys and comparative youth studies frequently describe high penetration rates of social networking among school-aged populations, with differences in intensity linked to device ownership, data affordability, and household connectivity. Importantly, international prevalence does not imply uniform psychological effects, because the same level of access can correspond to very different experiences depending on platform norms, peer culture, and content environments (Hasan Or et al., 2023; Mehedi & Nahar, 2023). Quantitative research therefore tends to treat global prevalence as an ecological condition that increases the relevance of studying exposure patterns rather than as evidence of harm or benefit. In large, diverse adolescent samples, exposure is often not distributed evenly, with subgroups displaying heavier engagement, more frequent checking, and higher vulnerability to problematic use indicators (Ghai et al., 2022; Sultan & Anick, 2023; Mostafa, 2023). These differences appear related to contextual variables such as socioeconomic resources, urbanicity, and school social climates, which can shape both opportunities for engagement and motivations for use. As social media becomes an ordinary social infrastructure in adolescence, international significance also emerges from the comparability of developmental tasks across cultures—identity negotiation, peer approval seeking, and emotional coping—while acknowledging that the form these tasks take can vary substantially by cultural setting. For quantitative reviews, the global significance of exposure is best captured by describing its widespread adoption, the diversity of platform ecosystems across regions, and the way adolescents' online peer interaction increasingly coexists with offline social life, creating blended social environments where digital cues and face-to-face experiences reinforce one another (Lenne et al., 2020; Ratul & Aditya, 2023; Zaheda & Farabe, 2023).

Cross-cultural research emphasizes that cultural moderators influence not only how much adolescents engage with social media but also how exposure is interpreted, valued, and emotionally processed. Appearance norms and expectations for self-presentation provide one of the most visible pathways through which culture can shape exposure effects (Prieler et al., 2021). In some cultural contexts, thinness ideals, beauty standards, and status-linked lifestyle portrayals are highly emphasized, amplifying the salience of appearance-focused content and increasing the likelihood that exposure

involves comparison and self-evaluative scrutiny. In other contexts, modesty norms or different aesthetic ideals may change how adolescents curate images, how peers respond to self-disclosure, and how strongly appearance-related cues function as social signals. Similarly, cultural scripts about popularity, success, and social rank influence whether platform feedback metrics are treated as casual indicators or as socially consequential markers of standing (Efat Ara, 2024a, 2024b). Parenting and monitoring practices also vary cross-culturally, shaping adolescents' autonomy online, the boundaries around nighttime use, the degree of parental mediation, and adolescents' willingness to disclose online stressors. Quantitative studies often find that parental monitoring is not a uniform protective factor; rather, its association with adolescent outcomes depends on communication climate, adolescents' perceptions of fairness, and culturally grounded norms about obedience and independence. Stigma around mental health reporting introduces another major moderator in cross-cultural measurement (Iftekhhar & Tohidul, 2024; Jinnat & Binte, 2024; Osgerby, 2020). In settings where psychological distress is strongly stigmatized, adolescents may underreport anxiety symptoms or emotional dysregulation on self-report scales, or they may express distress through somatic complaints rather than cognitive worry (Towhidul & Uddin, 2024; Mushfequr & Aditya, 2024). This reporting pattern can alter observed associations between exposure and outcomes, not because the underlying experiences are absent, but because measurement sensitivity differs across cultural contexts. Finally, collectivist versus individualist peer validation dynamics can shift the meaning of online approval. In more collectivist settings, social harmony, group belonging, and relational obligations may shape how adolescents interpret comments, group chats, and public feedback, potentially increasing sensitivity to exclusion or conflict that threatens social cohesion (Peprah et al., 2024; Sazzadul & Rebeka, 2024; Tasnim & Anick, 2024). In more individualist settings, self-promotion norms and personal branding may be more tolerated, potentially intensifying performative self-presentation and comparison processes in other ways. These cultural variations demonstrate why cross-cultural significance cannot be reduced to exposure prevalence alone; it requires attention to culturally patterned meanings of self-presentation, feedback, privacy, and emotional expression that influence how exposure becomes psychologically relevant.

Figure 4: Global Adolescent Social Media Dynamics



Quantitative research typically operationalizes cultural moderators through measurable proxies that enable cross-group comparison while recognizing that culture is multi-layered and cannot be fully captured by a single indicator (Hallinan et al., 2023; Shahab, 2025; Zaheda & Hamidur, 2024). Country is frequently used as the broadest grouping variable in cross-national datasets, allowing comparisons

across national contexts that differ in media ecosystems, educational structures, and normative parenting patterns. Region-level indicators within a country can provide finer-grained differentiation when nations contain diverse subcultures, language groups, and socioeconomic disparities. Language group is often used as a proxy for cultural identity, particularly in multilingual societies where language aligns with ethnic traditions, community norms, and distinct media consumption patterns. Urbanicity is commonly measured through residence classification (urban, suburban, rural) and is used to model differences in connectivity, peer network density, and access to devices (Dabbous et al., 2022; Mostafa, 2025; Sazzadul, 2025). Socioeconomic status proxies—such as parental education, household income brackets, housing stability indicators, or school-level deprivation indices—are frequently included to account for digital access differences and broader stress exposures that co-occur with social media engagement. Parenting practices are operationalized through adolescent-reported parental monitoring scales, communication quality measures, and rule-setting indices (Shamsunnahar, 2025; Yousuf et al., 2025). Stigma around mental health reporting is often inferred indirectly through culturally validated symptom measures, differential item functioning analyses, or discrepancies between self-report and behavioral indicators. Collectivist versus individualist orientations may be operationalized using individual-level value scales, family obligation measures, or group-identity centrality indices, as well as cultural-level indicators derived from comparative social surveys. These operationalizations matter because the statistical interpretation of moderation depends on how well the proxy captures the theoretical construct (Chentsova et al., 2023; Akter & Aditya, 2025). A country variable may reflect numerous confounded influences—policy differences, educational pressures, media regulations, and economic conditions—so stronger quantitative designs often combine multiple cultural indicators rather than relying on a single grouping factor. In literature review synthesis, describing how culture is measured is essential for evaluating whether reported differences reflect genuine moderation or measurement artifacts.

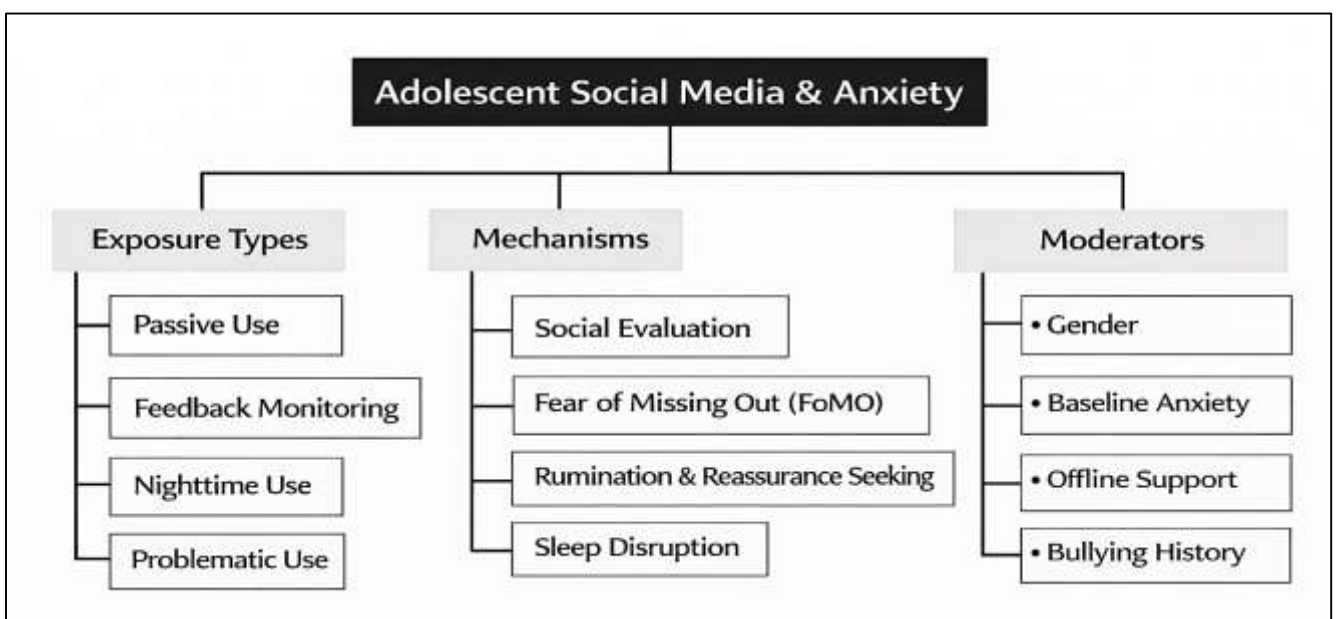
A cross-cultural quantitative synthesis also highlights recurring methodological patterns that shape what can be concluded about global adolescent social media exposure. Many studies rely on standardized mental health scales originally developed in specific cultural contexts, raising concerns about measurement equivalence when applied across different languages and settings (Afolabi et al., 2020). For example, the same anxiety scale may not capture culturally specific expressions of distress, and self-esteem measures may reflect individualistic assumptions about self-evaluation that do not translate neatly to interdependent self-construal contexts. Quantitative approaches that test measurement invariance, adjust for differential item functioning, or use culturally adapted instruments provide stronger evidence for cross-cultural comparisons because they reduce the risk that observed group differences are driven by psychometric mismatch. Another methodological consideration is that exposure itself differs across regions not only in frequency but in platform ecosystem composition, content norms, and peer interaction styles. A platform that dominates one country may not be widely used in another, and even when the platform is the same, local norms about humor, political expression, modesty, and interpersonal boundaries can shape the emotional tone of exposure (Tang & Chan, 2020). Reviews often note that generalized “social media exposure” variables can mask these regional differences, making it more difficult to interpret why associations vary across cultural settings. Cross-cultural studies that incorporate platform-specific indicators, content-domain measures, and peer-context variables offer more interpretable results because they specify what adolescents are actually encountering. Additionally, the relationship between exposure and outcomes is often entangled with broader ecological stressors that vary globally, including academic pressure, community safety, economic uncertainty, and access to mental health resources. Quantitative models that include covariates for sleep quality, offline peer support, family functioning, and school stress can clarify whether exposure effects remain after accounting for these co-occurring influences (Moreau et al., 2021). Taken together, the global literature positions adolescent social media exposure as a widespread, normalized environmental condition whose psychological associations depend on culturally patterned meanings, measurement validity, and contextual covariates. A careful literature review therefore synthesizes prevalence patterns and cultural moderators while explicitly describing how culture is quantified—through country, region, language group, urbanicity, and socioeconomic proxies—to

support transparent and statistically grounded cross-cultural interpretation.

Quantitative Evidence Linking Social Media Exposure and Anxiety

Quantitative evidence linking social media exposure and adolescent anxiety shows a pattern of mixed but interpretable associations when exposure is defined with precision rather than treated as a single “time spent” indicator (Gu et al., 2023). Across large-sample surveys and research syntheses, simple duration metrics often yield small, inconsistent relationships with anxiety, partly because total time combines highly different experiences into one score. When the exposure construct is refined, clearer tendencies appear. Passive use, typically defined as scrolling, viewing others’ profiles, and consuming curated feeds without direct interaction, is more consistently associated with higher anxiety symptoms than active use, which includes messaging, commenting, and content creation. This pattern aligns with the idea that passive use concentrates adolescents’ attention on others’ achievements, appearance cues, and popularity signals, increasing social comparison and evaluative uncertainty. Feedback monitoring metrics – such as repeatedly checking likes, comments, or follower changes – also demonstrate stronger associations with anxiety than overall platform time because they capture a psychologically salient reinforcement loop tied to perceived social standing. Nighttime use and “always-on” connectivity show stronger links to anxiety in many quantitative datasets, largely because these patterns overlap with sleep disruption, rumination before bed, and reduced recovery time, which intensify physiological arousal and emotional reactivity (Keles et al., 2020). Problematic or compulsive use indicators likewise show more robust relationships with anxiety than time-based indicators because they represent loss of control, distress-driven engagement, and functional impairment, all of which correspond closely to anxiety maintenance processes. In synthesis, the direct association literature does not support a simple claim that social media is uniformly anxiety-inducing for all adolescents. Instead, it shows that associations become more detectable and more theoretically coherent when exposure is measured as specific behaviors and experiences – passive consumption, evaluative feedback monitoring, nighttime engagement, and problematic use – rather than as a single global duration measure. This perspective also explains why studies relying only on daily hours sometimes report null findings while studies that assess exposure quality and psychological meaning more often detect significant relationships (Leung et al., 2021). The quantitative pattern therefore emphasizes the importance of measurement specificity in interpreting the direction and magnitude tendencies of the exposure–anxiety relationship in adolescent samples.

Figure 5: Adolescent Social Media Anxiety Framework



Mechanistic pathway research clarifies how social media exposure connects to anxiety by testing mediators that translate digital experiences into persistent worry, hypervigilance, and avoidance

(Gunasiri et al., 2022). A frequently tested pathway is social evaluative threat, operationalized through fear of judgment, sensitivity to public metrics, and perceived risk of negative evaluation, particularly in contexts where posts are visible to peers and feedback is quantified. When adolescents interpret likes and comments as indicators of acceptance, fluctuations in engagement can become uncertainty cues that prompt anticipatory worry and repeated checking. Fear of missing out (FoMO) is another prominent mediator in quantitative models, typically measured as anxiety that others are having rewarding experiences without the individual. FoMO operates as a cognitive driver of checking behaviors and as a distress amplifier, because it sustains attentional monitoring of peer activity and makes ordinary moments feel socially consequential. Rumination and reassurance seeking are often modeled as maintenance processes that extend emotional arousal beyond the original online event. Rumination captures repetitive negative thinking about peer reactions, perceived slights, or ambiguous messages, while reassurance seeking is reflected in repeated checking, messaging for confirmation, or compulsive review of engagement metrics (Lee et al., 2022). These behaviors provide short-term relief but maintain longer-term anxiety by preventing uncertainty from resolving naturally and by reinforcing the belief that safety depends on constant monitoring. Sleep disruption is also repeatedly tested as an indirect pathway, particularly for adolescents who use platforms late at night, sleep with notifications enabled, or engage in emotionally activating content before bedtime. Sleep disruption is measured through sleep duration, sleep latency, perceived sleep quality, or nighttime awakenings, and it functions as a bridge between exposure and anxiety because insufficient or fragmented sleep heightens emotional reactivity, reduces cognitive control, and increases vulnerability to worry. Many quantitative models show that when these mediators are entered simultaneously, exposure variables that capture evaluative and compulsive dynamics retain stronger links to anxiety than purely social or informational exposure (Winstone et al., 2021). Importantly, these pathway findings do not require a claim that social media “causes” anxiety in a simple direct sense; they show that certain kinds of exposure are statistically associated with psychological processes—evaluative threat, FoMO, rumination, reassurance seeking, and sleep disruption—that closely track anxiety symptom expression in adolescents. The mechanistic literature therefore positions social media as an environment rich in triggers and reinforcement loops that can align with anxiety maintenance processes, particularly when the exposure pattern centers on monitoring peer evaluation and managing uncertainty through repetitive checking.

Moderator findings help explain why the exposure–anxiety association varies across adolescents and across studies, even when similar measures are used. Gender is a common moderator, often examined because peer evaluation pressures, appearance norms, and self-presentation demands differ across social contexts, which can alter the salience of feedback cues and comparison opportunities (Longobardi et al., 2020). Baseline anxiety also functions as a moderator in many quantitative analyses, with adolescents reporting higher preexisting anxiety showing stronger associations between evaluative exposure patterns and symptom severity, consistent with vulnerability amplification models. Offline peer support is frequently tested as a buffer, operationalized through perceived friendship quality, belongingness, and availability of emotional support. Higher offline support often corresponds with weaker associations between negative online experiences and anxiety, likely because supportive relationships provide alternative sources of validation and interpretation that reduce threat appraisals. Bullying history, including prior victimization or current peer conflict, is also commonly modeled because it can heighten sensitivity to social cues and increase the likelihood that digital interactions are interpreted as threatening. Adolescents with bullying histories may show stronger links between online exclusion, hostile comments, or ambiguous peer behavior and anxiety outcomes. Emotion regulation capacity is another key moderator, measured through strategy use, dysregulation indicators, and flexibility (Brown & Kuss, 2020). Adolescents with weaker regulation capacity often show stronger associations between exposure to conflictual or evaluative content and anxiety, because they have fewer internal resources to down-regulate arousal and fewer effective cognitive strategies to reframe threats. Moderator analyses also show that the same exposure dimension can operate differently depending on context: for example, active engagement is sometimes associated with higher anxiety when it involves high-stakes self-presentation and performance pressure, and it is sometimes

associated with lower anxiety when it reflects supportive communication and reciprocal connection. These mixed patterns underscore that exposure quality, motives, and peer ecology shape the meaning of engagement behaviors. Quantitative studies frequently operationalize these moderators through interaction terms in regression models, subgroup analyses, or multi-group modeling approaches, allowing researchers to test whether the strength of associations differs across gender, baseline symptom levels, support categories, or victimization status. Collectively, moderator findings reinforce that adolescent anxiety is not uniformly related to social media exposure; rather, risk-linked associations concentrate in profiles characterized by higher vulnerability (baseline anxiety, bullying history), lower protective resources (offline support, regulation capacity), and higher engagement with evaluative or compulsive features (feedback monitoring, nighttime checking) (Whelan et al., 2020). This pattern clarifies why aggregated studies can appear inconsistent while still containing coherent subgroup-level effects.

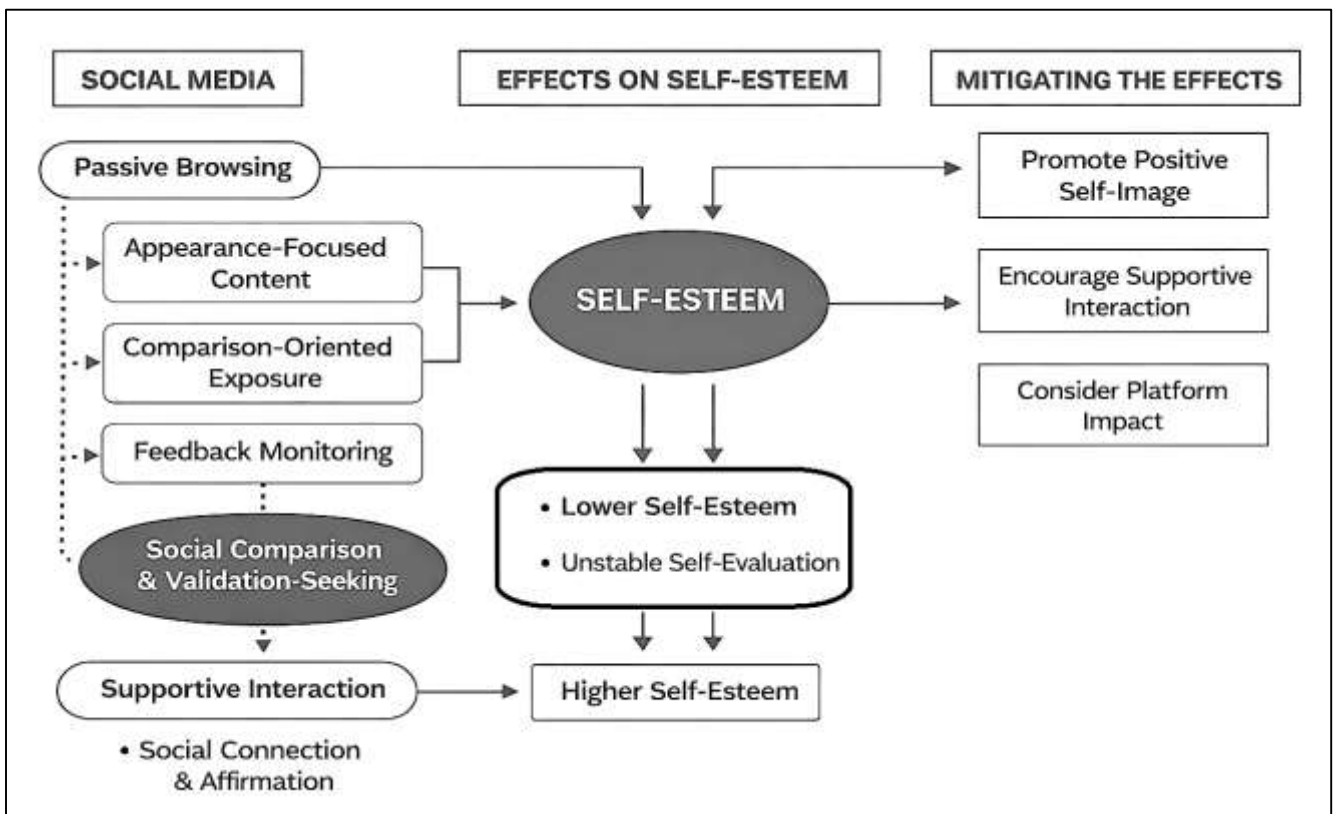
Quantitative Evidence Linking Social Media Exposure and Self-Esteem

Quantitative evidence linking social media exposure and adolescent self-esteem shows a clearer pattern when exposure is measured by engagement style and content domain rather than total time. In many adolescent samples, passive browsing—characterized by scrolling through peers’ posts, viewing curated profiles, and consuming highlight-oriented content without direct interaction—tends to correlate with lower global self-esteem and more unstable self-evaluations (Cingel et al., 2022). This association is especially pronounced when exposure is appearance-focused, such as frequent viewing of selfies, body-centered posts, fashion and beauty content, and lifestyle portrayals that implicitly signal attractiveness, popularity, or affluence. Passive consumption emphasizes observation over reciprocity, increasing the likelihood that adolescents interpret what they see as peer benchmarks against which they evaluate themselves. By contrast, some studies find that supportive interaction—such as direct messaging with friends, receiving encouragement, participating in affirming group spaces, or engaging in reciprocal conversation—can align with higher self-evaluations or mitigate self-esteem declines, particularly when the interaction provides belongingness and social support (Saiphoo et al., 2020). These mixed patterns support an interpretation in which self-esteem outcomes depend less on the presence of social media use and more on the psychological meaning of the activity, including whether the engagement centers on comparison and evaluation or on connection and mutual support. Quantitative syntheses commonly note that global “screen time” indices often produce weak or inconsistent links with self-esteem, while multi-item measures of comparison-oriented browsing, appearance-centered exposure, and feedback monitoring show stronger and more reliable associations. Platform ecosystems also matter in direct association patterns, as image-centric platforms can amplify appearance salience and social ranking cues, whereas communication-focused platforms may be more strongly associated with supportive interaction and relational maintenance (Steinsbekk et al., 2021). The direct association literature therefore suggests that self-esteem is most likely to be negatively associated with exposure patterns that elevate comparison opportunities and evaluative uncertainty, and it may be neutrally or positively associated with exposure patterns that provide social connection and affirmation. This differential pattern becomes more visible when researchers separate passive and active engagement, distinguish content domains, and measure validation-seeking behaviors rather than relying on total time estimates.

Mediation research provides a structured explanation for how social media exposure relates to self-esteem by identifying mechanisms that translate online experiences into self-worth judgments. Upward social comparison is one of the most consistently tested mediators, often measured as the frequency of comparing one’s appearance, lifestyle, or achievements to peers or influencers encountered online (Mann & Blumberg, 2022). In quantitative models, passive browsing and appearance-focused exposure are frequently associated with increased upward comparison, which in turn is associated with lower global self-esteem and greater self-criticism. Body dissatisfaction functions as a domain-specific mediator within this pathway. Exposure to idealized appearance content can heighten dissatisfaction with one’s body, weight, or facial features, and this dissatisfaction can generalize to broader self-esteem evaluations, particularly in early and mid-adolescence when body image becomes a salient component of self-concept. Contingent self-worth and approval dependence represent another frequently modeled mediator set, reflecting the extent to which adolescents’ self-esteem depends on external validation,

such as likes, comments, or follower counts (Krause et al., 2021). Feedback metrics create quantifiable signals of approval, and repeated monitoring can condition self-evaluations to fluctuating engagement levels, producing self-esteem instability and greater sensitivity to perceived rejection. Self-objectification indicators, often measured through body surveillance, appearance monitoring, and internalization of observer perspectives, provide an additional mechanism in image-centric contexts. When adolescents adopt an external view of the self and treat appearance as a primary evaluative dimension, they may experience increased self-consciousness and reduced self-worth, especially when peer feedback appears to reward narrowly defined attractiveness standards. Many quantitative studies test these mediators in sequence, modeling appearance-focused exposure as a predictor of upward comparison and self-objectification, which then predict body dissatisfaction and ultimately lower self-esteem. Some models also incorporate feedback monitoring as a parallel mediator pathway that increases contingent self-worth, thereby linking exposure to self-esteem volatility (Pop et al., 2022). These mediator findings help reconcile mixed direct effects by demonstrating that the negative association is not inherent to social media access but is more strongly tied to comparison-heavy, appearance-salient, and validation-dependent engagement processes.

Figure 6: Adolescent Social Media Self-Esteem Model



Moderation findings further explain why the exposure–self-esteem link varies across adolescents and across studies. Gender is commonly tested, often showing stronger associations between appearance-focused exposure and lower self-esteem among girls in many samples, reflecting differing socialization pressures and the centrality of body image in female adolescent self-evaluation in many contexts (Merino et al., 2024). Body image vulnerability is a key moderator, typically operationalized through baseline body dissatisfaction, weight concerns, or internalization of appearance ideals; adolescents with higher baseline vulnerability often show stronger links between exposure and self-esteem outcomes because appearance cues trigger existing self-critical schemas. Social comparison orientation is another robust moderator, reflecting the tendency to evaluate the self through comparison; adolescents high in this trait often show stronger relationships between passive browsing and reduced self-esteem, because exposure is processed through a comparison lens even when content is neutral. Platform type is a structural moderator because image-centric platforms amplify appearance cues, curated lifestyle

content, and popularity metrics, whereas messaging-centered platforms may emphasize relationship maintenance and mutual support (Winstone et al., 2021). Offline belonging and perceived peer support frequently moderate associations by buffering negative effects; adolescents who feel accepted offline may interpret online content less threateningly and rely less on digital validation to maintain self-worth. Moderators also include the nature of the peer network and exposure to cybervictimization, as negative interpersonal experiences online can directly undermine self-worth and intensify self-objectification processes. Quantitative designs test these moderators using interaction terms, subgroup analyses, and multi-group modeling, allowing estimation of how exposure effects vary across different vulnerability profiles. These results converge on a profile-based interpretation: self-esteem declines are most strongly associated with exposure among adolescents who are high in comparison orientation, high in body image vulnerability, and more immersed in appearance-salient, feedback-driven platform environments, while adolescents with stronger offline belonging and supportive peer relationships often show weaker associations or different patterns depending on their primary engagement motives (Peris et al., 2020).

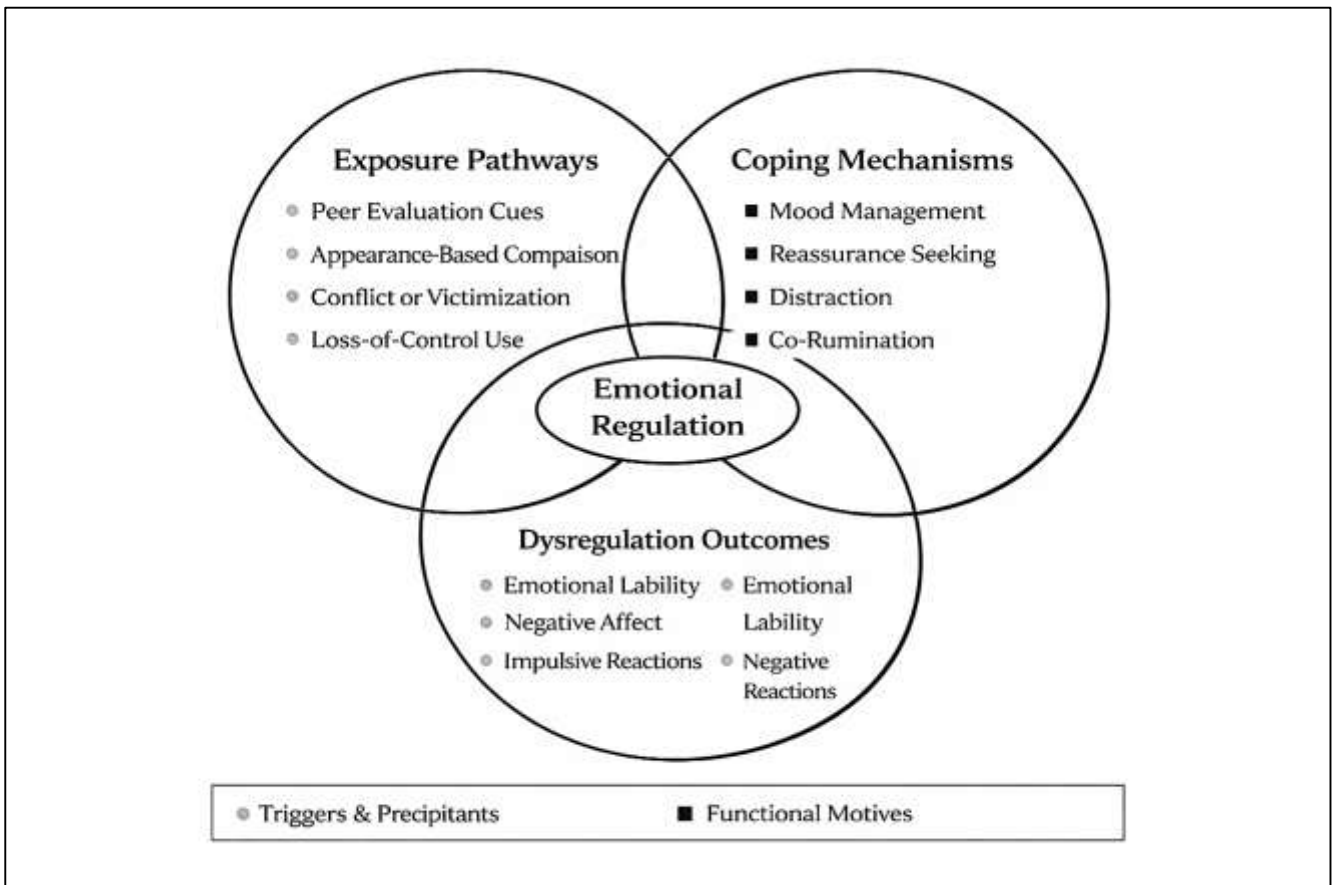
Measurement sensitivity plays a decisive role in the self-esteem literature because self-esteem can be conceptualized as a stable trait, a domain-specific evaluation, or a rapidly fluctuating state that shifts after exposure episodes (Aparicio-Martínez et al., 2020). Global self-esteem measures capture enduring self-worth and provide strong comparability across studies, but they may underestimate short-term effects of exposure that manifest as temporary self-evaluation drops after viewing idealized content. State self-esteem measures, including immediate post-exposure ratings or day-level self-worth assessments, are more sensitive to acute changes and often reveal stronger associations with passive browsing and comparison episodes. This distinction matters because adolescents can experience repeated small state-level declines that are not visible in cross-sectional trait measures yet may still relate to broader adjustment patterns. Platform-specific measurement also influences results. Studies that measure general “social media use” may obscure differences between platforms with distinct affordances, content norms, and feedback structures (Thai, 2020). Platform-specific measures can isolate exposure to image-centric feeds, short-form video content, or messaging-based interaction, allowing clearer linkage between content domains and self-esteem outcomes. Similarly, distinguishing passive exposure from active supportive interaction improves precision because the same adolescent may spend similar total time online while engaging in fundamentally different activities with different psychological meanings. Multi-item scales that capture comparison frequency, approval dependence, and self-objectification often show stronger predictive validity than single-item time estimates because they align with theoretically relevant mechanisms. Additionally, controlling for covariates such as depressive symptoms, stress, sleep quality, and offline peer support strengthens interpretability by reducing the likelihood that observed self-esteem associations simply reflect broader vulnerability (Orben et al., 2024). Overall, the quantitative literature indicates that self-esteem associations are most consistent when studies employ sensitive measurement choices—state and trait differentiation, platform-specific indicators, and mechanism-aligned exposure scales—thereby revealing that passive, appearance-focused, feedback-monitored engagement tends to align with lower self-esteem, while supportive, reciprocal interaction can align with more positive self-evaluations in certain adolescent contexts.

Quantitative Evidence Linking Social Media Exposure and Emotional Regulation

Emotional regulation is frequently positioned in quantitative adolescent research as a central outcome that is shaped by the emotional demands and reinforcement structures embedded in social media environments. In many studies, exposure is not treated as neutral information flow but as repeated contact with emotionally arousing stimuli that require moment-to-moment regulation, including peer approval cues, exclusion signals, conflict, distressing news, and appearance-based comparison content (Drach et al., 2021). When adolescents encounter such stimuli at high frequency, dysregulation indicators such as emotional lability, difficulty calming down, impulsive responding, and prolonged negative affect become more likely to co-occur with heavier engagement patterns. Quantitative findings often show that broad time-based measures of use provide limited explanatory power for emotional regulation outcomes, while exposure indicators that capture emotional intensity, negative interpersonal experiences, and problematic engagement produce stronger associations. Problematic

social media use, typically measured through loss of control, preoccupation, withdrawal-like discomfort when unable to check, and functional impairment, tends to be more consistently linked with higher dysregulation scores than ordinary engagement (Winstone et al., 2021). This pattern is interpreted as reflecting a cycle in which emotional distress motivates compulsive checking, and compulsive checking amplifies distress through repeated exposure to evaluative cues and interpersonal uncertainty. Studies that include content valence measures often report that frequent exposure to emotionally negative or conflict-related content is associated with higher emotional reactivity and less effective regulation, especially among adolescents already prone to rumination or worry. In parallel, exposure to supportive content and positive peer interaction is sometimes associated with lower dysregulation, highlighting that the emotional quality of digital experiences influences regulation outcomes. This evidence base supports a differentiated view: emotional regulation difficulties align most closely with exposure patterns characterized by high arousal, frequent social evaluation cues, conflict or victimization experiences, and loss-of-control use patterns (Shankleman et al., 2021). Quantitative models often position dysregulation as an outcome that emerges from repeated engagement with high-salience emotional triggers in the context of developmentally heightened reactivity, particularly when online interactions occur late in the day, displace recovery activities, or intensify social uncertainty.

Figure 7: Adolescent Emotional Regulation Social Media Model



A second major line of quantitative evidence frames social media not only as an exposure environment but also as a tool adolescents use to regulate affect, a conceptualization often captured through coping motive models. In these models, adolescents report using platforms to distract from unpleasant feelings, improve mood, reduce loneliness, or avoid thinking about stressors. Such motives are commonly measured through coping-motives scales and survey items that directly assess “use to reduce sadness,” “use to calm down,” or “use to reduce anxiety (Vuillier et al., 2021).” Quantitative findings frequently show that coping-motivated use is associated with higher dysregulation and internalizing symptoms, suggesting that reliance on digital engagement for mood management may

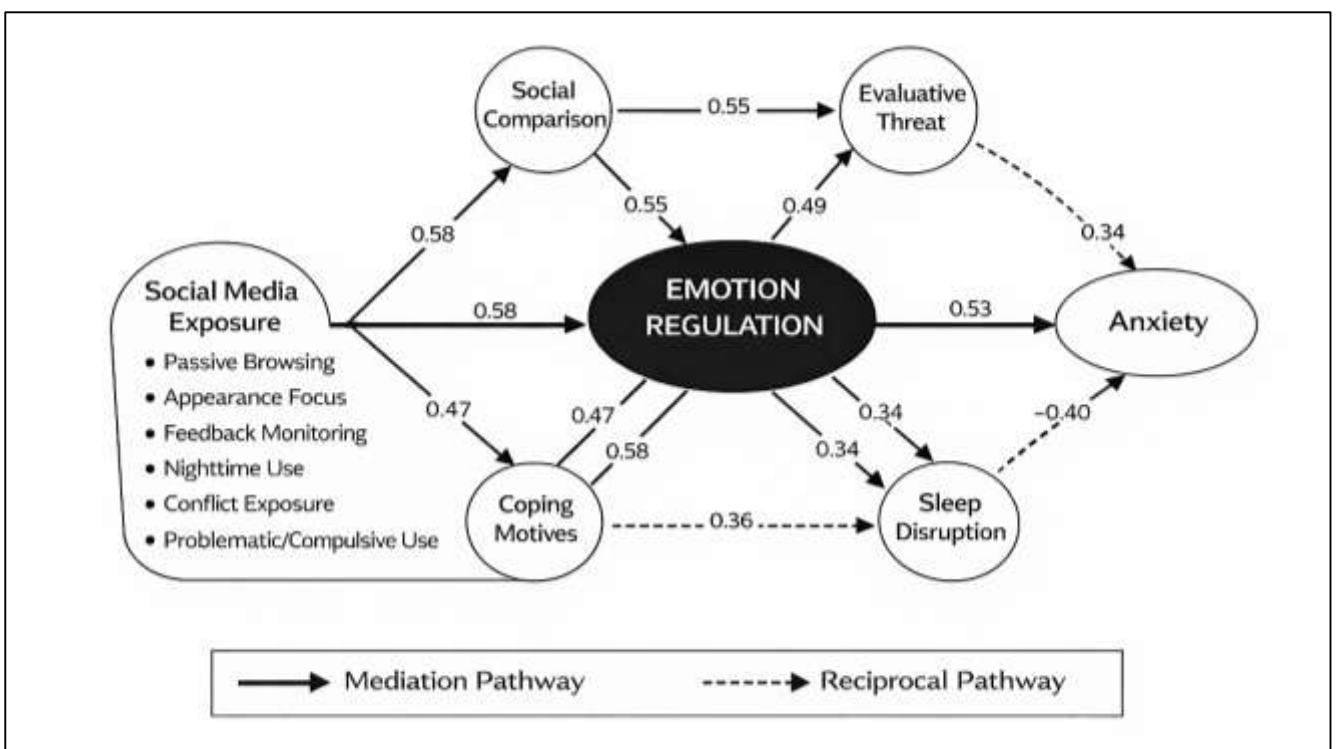
reflect or reinforce avoidance-oriented regulation strategies. Distraction and mood management motives often align with patterns such as extended scrolling, short-form video consumption, and rapid switching between content, which can provide immediate relief while reducing opportunities for effortful coping strategies like problem solving or cognitive reframing. Reassurance seeking constitutes another regulation motive pathway, typically operationalized through repeated checking of messages, monitoring reactions to posts, and seeking validation from peers after uncertainty or distress. These behaviors can be statistically linked with greater emotional volatility because reassurance provides short-term relief but increases dependence on external confirmation. Co-rumination is also frequently examined as a coping-related interaction style, capturing repetitive discussion of problems and negative emotions with peers through messaging and group chats (Orben et al., 2024). Quantitative studies often show that co-rumination is associated with perceived closeness and support while simultaneously predicting greater negative affect and dysregulation, indicating that some digital coping strategies combine relational benefits with emotional costs. These coping models therefore clarify that social media engagement can function as interpersonal and attentional regulation in adolescents, with the direction of association depending on whether the primary motive is supportive connection or distress-driven avoidance and reassurance seeking. When coping motives are entered into statistical models alongside exposure intensity, coping motives often account for substantial variance in dysregulation outcomes, implying that why adolescents use social media can matter as much as how much they use it (Lorenz-Spreen et al., 2023).

Integrative Quantitative Synthesis: Linking Anxiety, Self-Esteem, and Emotion Regulation

An integrative quantitative synthesis linking social media exposure with anxiety, self-esteem, and emotional regulation is most coherent when it treats these outcomes as an interconnected system rather than isolated endpoints (Iuga & David, 2024). In this literature, social media exposure is increasingly operationalized as a set of psychologically meaningful experiences—passive browsing, appearance-focused viewing, feedback monitoring, nighttime engagement, conflict exposure, and problematic or compulsive use—because these dimensions map onto distinct cognitive and affective processes. A common synthesis across studies is that exposure relates to internalizing outcomes through clustered pathways that include social comparison, evaluative threat, sleep disruption, and coping motives. Comparison processes capture how adolescents repeatedly evaluate their appearance, lifestyle, popularity, or achievements against curated peer portrayals, which can reduce self-evaluations and create insecurity that feeds anxiety-related worry and social apprehension. Evaluative threat pathways emphasize the salience of public metrics and perceived judgment, where attention to likes, comments, and visibility functions as a continuous signal of acceptance or rejection. Sleep disruption pathways situate late-night scrolling, notification-driven checking, and emotionally activating content as contributors to shorter sleep duration, poorer sleep quality, and reduced recovery, which are linked with heightened emotional reactivity and vulnerability to anxious arousal (Mouatsou & Koutra, 2023). Coping-motive pathways frame social media as a mood-management tool, where adolescents use digital engagement to distract, reduce loneliness, avoid distress, or seek reassurance, and these motives often align with stronger distress-linked use patterns. Within the integrated model, emotion regulation is frequently positioned as a central mediator that connects exposure to both anxiety and self-esteem. Exposure to social comparison cues and evaluative feedback can intensify affective responses, and regulation processes determine whether adolescents down-regulate arousal effectively or become drawn into rumination, suppression, reassurance seeking, or avoidance. When regulation is measured as dysregulation, inflexibility, or high rumination, it statistically explains a portion of the association between exposure and anxiety, and it also accounts for why self-esteem becomes more unstable or contingent on external validation (Reed-Fitzke, 2020). When regulation is measured through adaptive strategy profiles such as reappraisal and flexible strategy selection, it often corresponds with weaker associations between exposure and negative outcomes. This synthesis supports a model where social media exposure relates to anxiety and self-esteem both directly and indirectly through regulation capacity, with indirect effects concentrated in exposure dimensions that are evaluative, comparison-heavy, emotionally arousing, or sleep-disruptive rather than exposure defined purely by total time. Bidirectionality is a prominent feature in quantitative models because adolescents' psychological states can shape how they use social media, which then shapes subsequent psychological experiences. In

reciprocal accounts, anxiety symptoms—especially social anxiety and worry—are associated with increased monitoring behaviors such as repetitive checking, scanning for peer cues, and passive exposure that minimizes direct interaction while maximizing information gathering (Shankleman et al., 2021). Adolescents experiencing anxious uncertainty may prefer passive browsing because it offers social surveillance without immediate risk of rejection, while simultaneously increasing exposure to comparison and evaluative cues that sustain anxiety. Similarly, low self-esteem is often linked with validation-seeking behaviors that intensify dependence on feedback metrics, including frequent checking of likes, heightened sensitivity to engagement fluctuations, and strategic self-presentation edits. In these models, anxious arousal and low self-worth are not only outcomes but also predictors of subsequent exposure patterns, creating feedback loops. Quantitative studies test these reciprocal processes using designs that establish temporal ordering, most often through cross-lagged panel models that estimate whether earlier exposure predicts later anxiety or self-esteem after controlling for prior levels, and whether earlier anxiety or self-esteem predicts later exposure after controlling for prior exposure. Longitudinal structural equation modeling is also used to examine simultaneous pathways among multiple constructs, allowing the estimation of indirect effects and correlated change over time while accounting for measurement error (Nguyen Ho et al., 2023). Some studies further separate stable between-person differences from within-person changes, clarifying whether adolescents who are generally more anxious also use social media differently, and whether increases in an individual’s anxiety over time correspond with increases in checking behaviors or passive exposure. Daily diary and experience sampling approaches provide additional evidence for short-term reciprocity by capturing whether anxious moments predict immediate shifts into monitoring and scrolling, and whether those exposure episodes coincide with subsequent changes in affect or self-evaluations. Across these analytic strategies, bidirectional patterns help explain why cross-sectional findings can appear ambiguous: if anxiety and low self-esteem both predict increased exposure and are predicted by exposure in different ways, the observed association at a single time point reflects overlapping pathways rather than a single directional effect (Abu Omar et al., 2024). The reciprocal framing also clarifies why problematic use measures tend to show stronger links than time measures, since loss-of-control engagement can represent both a response to distress and a contributor to continued distress within the same cycle.

Figure 8: Integrated Adolescent Social Media Model



Heterogeneity and subgroup effects are central in the integrative literature because effect sizes vary widely across samples, platforms, and operational definitions, and this variability is rarely random. Differential susceptibility perspectives propose that adolescents differ in their sensitivity to environmental inputs, including digital social cues, and that the same exposure can be experienced as neutral, supportive, or threatening depending on individual and contextual factors (Joshanloo, 2024). Quantitatively, heterogeneity is captured through moderation models that test whether associations differ by gender, baseline anxiety, baseline self-esteem, emotion regulation capacity, social comparison orientation, body image vulnerability, offline peer support, bullying history, stress level, and sleep quality. Many studies find that negative associations are stronger among adolescents with higher baseline vulnerability, such as elevated anxiety or lower self-esteem, because exposure interacts with existing cognitive patterns like threat appraisal and self-criticism. Adolescents high in social comparison orientation often show stronger links between passive browsing and reduced self-esteem, because comparison is the default interpretive lens applied to content. Similarly, adolescents with emotion regulation difficulties often show stronger links between evaluative exposure and anxiety because arousal is less effectively down-regulated and rumination is more likely (Maulenkul et al., 2024). Contextual resources also shape heterogeneity: stronger offline belonging and supportive friendships frequently correspond with weaker associations between exposure and internalizing symptoms, suggesting that external validation needs are less concentrated in digital feedback. Platform type and content ecosystems contribute additional variation, with image-centric environments amplifying appearance salience and self-objectification markers, while messaging-centric use can align more strongly with support-seeking and relational maintenance. Quantitative approaches to heterogeneity include interaction terms in regression, multi-group modeling across categorical subgroups, latent class or profile analyses that identify clusters of engagement patterns, and mixture modeling that detects subpopulations with distinct exposure–outcome trajectories (Polizzi & Lynn, 2021). In some designs, adolescents are grouped by usage profiles such as passive-high comparison, active-supportive, feedback-dependent, or problematic-compulsive, and outcomes are compared across these groups while controlling for covariates. These approaches reveal that the strongest negative outcomes are often concentrated in specific profiles characterized by high comparison exposure, high feedback monitoring, high nighttime use, and high dysregulation, rather than in adolescents who engage frequently but primarily for reciprocal support. Heterogeneity therefore strengthens, rather than weakens, the integrated model because it demonstrates that the exposure–outcome linkage is conditional on psychological sensitivity, engagement motives, and protective contexts.

A synthesis that links the conceptual-statistical model, bidirectionality, and heterogeneity also highlights how quantitative modeling decisions influence interpretability and the coherence of conclusions across the literature. Studies that treat exposure as a single time estimate and outcomes as single scores often yield small effects because the model aggregates across exposure types that have different psychological meanings and across adolescents with different susceptibility profiles (Rose & Soundy, 2020). In contrast, studies that build multi-dimensional exposure constructs and explicitly test mediators such as comparison intensity, evaluative threat sensitivity, sleep disruption, and coping motives tend to yield clearer pathway evidence because predictors correspond to mechanisms. In these integrated models, emotion regulation frequently operates as the central bridge because it connects arousal generated by evaluative social cues with persistent anxiety symptoms and with self-esteem instability. Mediation analyses typically show that when regulation-related variables such as rumination, suppression, dysregulation, or coping-motivated use are included, the direct association between exposure and anxiety or self-esteem is reduced, indicating that part of the relationship operates through regulation pathways. Reciprocal modeling further refines this picture by showing that adolescents' internal states shape exposure patterns, making the system dynamic: anxious adolescents may check more, low self-esteem adolescents may seek more approval, and both patterns can elevate exposure to triggers that maintain distress (Merino et al., 2024). Integrating heterogeneity ensures that these pathways are not treated as universal; instead, the strongest indirect and reciprocal pathways often appear among adolescents with higher baseline vulnerability, weaker regulation

capacity, poorer sleep, higher stress, and lower offline belonging. Quantitative synthesis also emphasizes the importance of covariate selection because depression symptoms, general stress, family functioning, and sleep quality often co-vary with both exposure and outcomes, and models that account for these factors provide more conservative and interpretable estimates. The most informative integrated studies use multi-wave or intensive longitudinal data, incorporate multi-item exposure and mechanism measures, test mediation and moderation jointly, and evaluate whether results hold across platform contexts and demographic subgroups. Taken together, the literature supports an integrative quantitative understanding in which social media exposure relates to adolescent anxiety and self-esteem through comparison, evaluative threat, sleep disruption, and coping motives, with emotion regulation serving as a key mediating process, reciprocal pathways linking internal states to subsequent exposure, and heterogeneous effects concentrated within identifiable susceptibility profiles (Mastrokouskou et al., 2024).

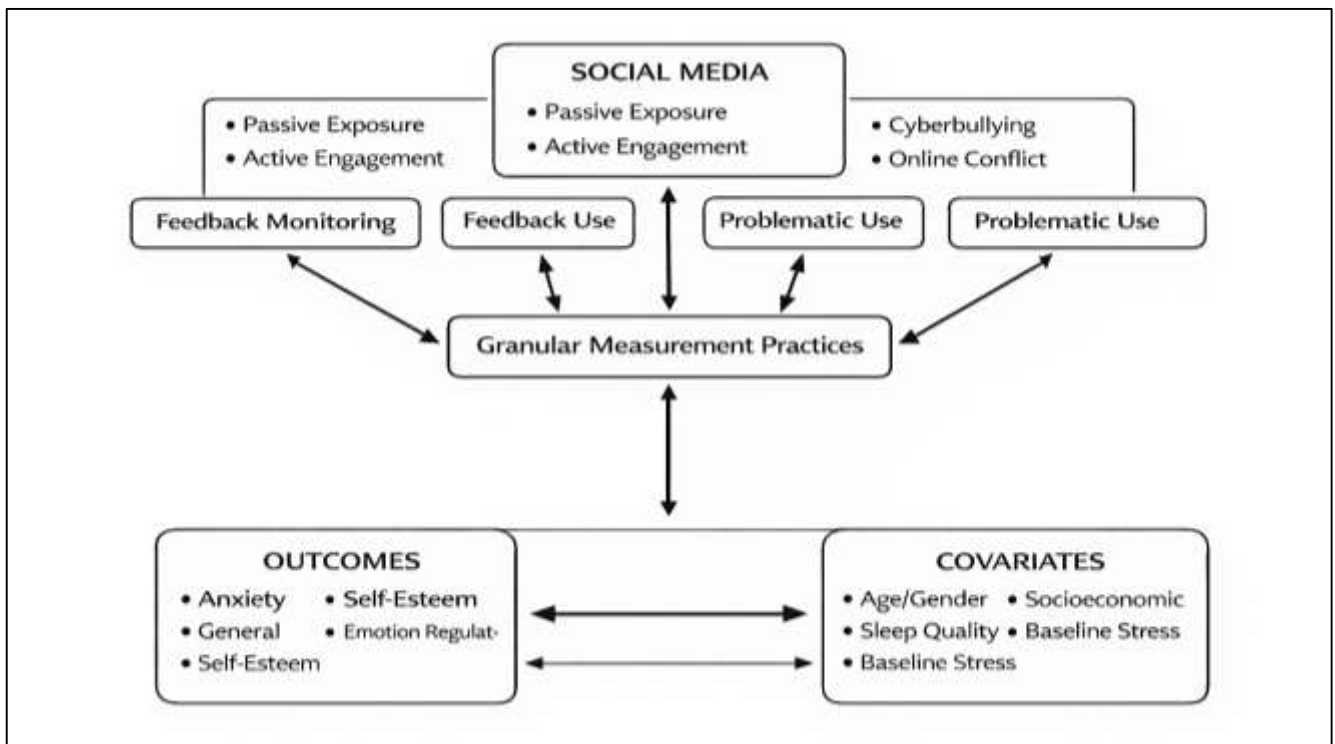
Measurement and Methodological

A measurement plan for social media exposure that is anchored in quantitative best practices is strengthened when it treats exposure as a multi-construct domain rather than a single indicator of daily time. Prior literature repeatedly shows that time-based metrics compress heterogeneous behaviors and obscure the psychological meaning of engagement, so more robust designs operationalize exposure through composite indices or latent variables that represent distinct patterns of use (Zhang et al., 2023). One core dimension is passive exposure, typically reflected by high-frequency scrolling, viewing others' profiles, consuming curated feeds, and monitoring peer content without direct participation. A second dimension is active engagement, capturing posting, commenting, sharing, participating in group discussions, and direct messaging that indicates reciprocal interaction. A third dimension emphasizes feedback monitoring behaviors, including repeated checking of likes and comments, tracking follower changes, editing captions, deleting posts in response to engagement, and anticipating audience reaction before posting. Interpersonal stress exposure represents another dimension, capturing experiences of cyberbullying, online exclusion, hostile comments, public conflict, and perceived social rejection within digital spaces. Problematic use constitutes a fifth dimension, often operationalized by loss of control, preoccupation, distress when unable to access platforms, compulsive checking, and interference with sleep or academic responsibilities (Wang et al., 2022). Quantitative studies frequently recommend multi-item scales for each dimension to strengthen reliability and reduce measurement error, and many designs benefit from modeling these dimensions as latent factors because latent measurement separates true score variance from random error. The measurement plan is most defensible when it combines self-report indicators of behavior frequency and psychological experience, includes short time frames for behavior recall to reduce bias, and specifies platform context where feasible so that exposure reflects actual engagement patterns rather than generalized assumptions. Using factor-based exposure modeling also supports comparability with prior studies that demonstrate stronger associations between mental health outcomes and exposure quality, such as passive browsing, evaluative feedback sensitivity, nighttime checking, interpersonal conflict exposure, and problematic use, rather than exposure duration alone. A literature-aligned plan therefore defines exposure in terms that correspond to mechanisms—comparison opportunity, evaluative threat, and reinforcement loops—while preserving enough specificity to test which dimensions uniquely predict anxiety, self-esteem, and emotion regulation outcomes (Pescaroli et al., 2020).

Outcome measurement is similarly strengthened when scales are selected to capture both broad symptom constructs and theoretically relevant subcomponents that connect to social media mechanisms. Anxiety measurement benefits from including a general anxiety index that captures worry and physiological arousal while also incorporating a social anxiety subscale to reflect fear of judgment, avoidance of evaluation, and distress about peer scrutiny, because many exposure processes operate through public evaluation cues and uncertainty about acceptance (Ergün et al., 2020). Self-esteem measurement is most informative when it includes a global self-worth scale that provides a stable indicator of personal value and adds contingent self-worth items that capture approval dependence and sensitivity to external validation, aligning with feedback-monitoring mechanisms. Emotion regulation measurement is strengthened when it includes a dysregulation index capturing impulse control difficulties, emotional lability, limited access to strategies, and prolonged negative

affect, alongside strategy subscales that differentiate cognitive reappraisal, suppression, and rumination-related tendencies. In quantitative literature, separating dysregulation from strategy profiles is important because dysregulation often aligns with problematic use and conflict exposure, while strategy profiles clarify whether adolescents manage arousal adaptively or through avoidance and repetitive negative thinking (Barlow et al., 2020). The measurement plan also gains clarity when temporal framing is consistent across constructs, such as using a defined recall window for symptoms and regulation experiences, and when scales are age-appropriate for adolescents with established reliability. Where feasible, pairing trait measures with shorter-term assessments can improve sensitivity to exposure-linked fluctuations, particularly for state self-esteem and day-level emotional regulation responses. In addition, measurement alignment across exposure and outcomes is strengthened when items capture digital-context regulation, such as using platforms to calm down, reduce sadness, or seek reassurance, because these behaviors connect directly to coping motives and reinforcement processes (Rowen et al., 2020). A coherent quantitative plan therefore selects outcome measures that reflect both clinical symptom structure and mechanism-relevant subdomains, ensuring that statistical pathways linking exposure dimensions to anxiety, self-esteem, and regulation can be tested with conceptual precision.

Figure 9: Adolescent Social Media Measurement Framework



A robust covariate model is essential in quantitative designs because adolescent mental health outcomes and digital engagement patterns co-vary with broader developmental and contextual factors. Age is included as a developmental control because engagement intensity and emotional vulnerability can differ across early, middle, and late adolescence. Gender is included because exposure patterns, appearance salience, and peer evaluation pressures often vary across genders and can alter associations between exposure and self-esteem or anxiety (Braun & Clarke, 2021). A socioeconomic proxy is included to account for differences in device access, data affordability, household stress, and opportunities for offline activities, all of which can influence both social media patterns and mental health outcomes. Sleep duration and sleep quality are critical controls because nighttime use and sleep disruption are closely linked with emotional reactivity and internalizing symptoms. Offline social support is included to capture protective resources, as strong belongingness can buffer the emotional impact of online stressors and reduce reliance on digital validation. Baseline stress is included because adolescents experiencing higher stress may use social media for avoidance or reassurance seeking, and

stress is independently associated with anxiety and emotion dysregulation (Reich, 2021). Academic pressure is a particularly relevant covariate in adolescent samples because it can drive stress-related engagement, affect sleep, and contribute to anxiety symptoms, potentially confounding exposure associations. A literature-aligned covariate set often also considers family functioning or parenting mediation, because household communication and rule-setting can shape both exposure and emotional outcomes. The guiding principle in covariate selection is theoretical relevance and avoidance of overcontrol that removes variance central to the mechanisms under study, such as excluding mediators from the covariate list (Gurdgiev & O'Loughlin, 2020). A well-specified covariate model therefore improves interpretability by isolating the unique associations between exposure dimensions and psychological outcomes, while recognizing that social media engagement exists within a broader ecological context of adolescent development and stress exposure.

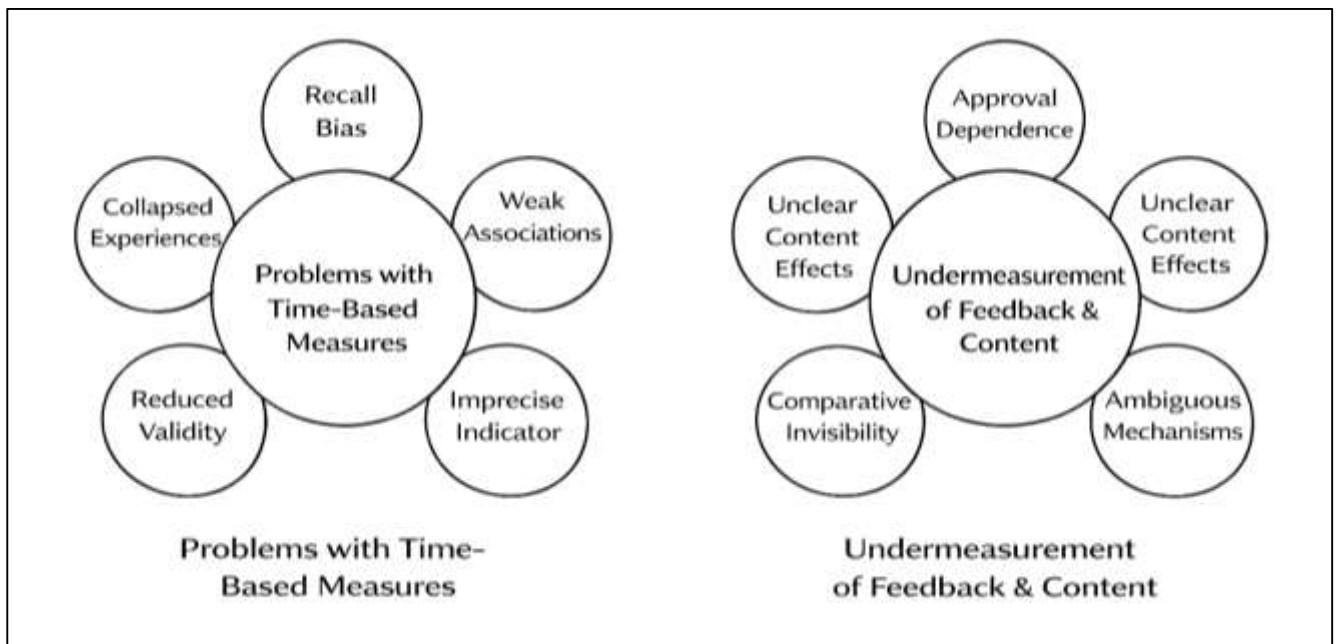
Analytic strategies grounded in quantitative best practices map directly onto the structure of the exposure and outcome measurement plan. Hierarchical regression is often used to compare blocks of predictors, enabling estimation of incremental variance explained by exposure dimensions after accounting for demographics and covariates, and allowing direct comparison of whether passive exposure, feedback monitoring, interpersonal stress, or problematic use contributes most strongly to anxiety, self-esteem, and emotion regulation (Glatzer & Gulyas, 2024). Mediation testing is used to evaluate whether emotion regulation functions as a pathway linking exposure to anxiety and self-esteem, and bootstrapped indirect effect estimation is commonly employed because indirect effects often have non-normal sampling distributions. Moderation analysis is used to test differential susceptibility, examining whether associations vary by gender, baseline stress, offline support, sleep quality, or emotion regulation capacity, typically through interaction terms and simple slopes analysis. Structural equation modeling is used when sample size permits to model exposure and outcome constructs as latent variables, estimate multiple pathways simultaneously, and reduce measurement error, allowing an integrated test of direct and indirect effects across anxiety, self-esteem, and regulation within a single framework (Russell et al., 2021). Power and sample considerations are central when mediation, moderation, and SEM are planned, because these models require larger samples to produce stable parameter estimates, particularly when latent variables or multi-group comparisons are included. A defensible plan specifies minimum sample thresholds based on model complexity, ensures sufficient cases per estimated parameter, and anticipates attrition if longitudinal design elements are included. Missing data strategy is also a core best practice, with multiple imputation or full information maximum likelihood approaches preferred over listwise deletion to reduce bias and preserve statistical power, especially when missingness is related to stress, device access, or symptom severity (Churruca et al., 2021). Together, these methodological choices reflect a literature-consistent approach in which measurement specificity, thoughtful covariate control, and multi-step modeling are combined to produce interpretable, reproducible quantitative estimates of how social media exposure dimensions relate to adolescent anxiety, self-esteem, and emotional regulation.

Literature Gaps to Justify the Present Study

A consistent quantitative gap in the adolescent social media literature is the overreliance on time-based metrics that treat exposure as a single quantity rather than a set of psychologically meaningful experiences. Many studies operationalize social media exposure using broad estimates of hours per day or frequency of general platform use, which compress diverse behaviors into one indicator and reduce construct validity (Wald et al., 2024). This approach limits interpretability because the same amount of time can represent fundamentally different experiences, such as supportive messaging with close friends, passive browsing of appearance-focused content, exposure to conflict, or compulsive checking driven by distress. Time-based indicators also suffer from measurement error due to recall bias and the difficulty of accurately estimating fragmented checking behavior that occurs in short bursts across the day. Large-sample and synthesis-level findings often show that time-based measures yield small, inconsistent effect sizes in relation to mental health outcomes, creating an impression of weak associations even when more specific exposure indicators might show stronger links. This gap is methodological rather than substantive: time is an imprecise proxy for the psychological mechanisms most plausibly related to anxiety, self-esteem, and emotional regulation (Sultan et al., 2020). Because time-based measures rarely differentiate passive versus active engagement, they also obscure the

directionality and meaning of exposure. Passive browsing is frequently associated with comparison-related processes, while active interaction can include both supportive communication and high-stakes self-presentation; collapsing these patterns into a single time measure reduces the ability to detect differential effects. Additionally, time-based models often fail to capture platform affordances such as public feedback metrics and algorithmic feed structures that intensify evaluation salience. As a result, evidence derived from time-only measures can be statistically significant yet theoretically under-informative, limiting the ability to compare findings across studies that use different definitions of time and different platforms (Abbate et al., 2024). This overreliance persists partly because time measures are easy to collect, but it creates a persistent gap in quantitative precision, hindering both replication and the identification of exposure dimensions most strongly associated with adolescent psychological functioning.

Figure 10: Key Gaps in Social Media Research



A second gap is the undermeasurement of feedback monitoring behaviors and content type, despite their centrality to theoretical models emphasizing social evaluation and social comparison. Many studies measure social media use broadly without capturing how frequently adolescents check likes and comments, track follower counts, edit or delete posts in response to engagement, or anticipate peer reactions before posting. These behaviors represent quantifiable indicators of approval dependence and evaluative sensitivity, yet they are often absent from standard exposure measures (Velte & Stawinoga, 2020). Similarly, content type is frequently neglected, even though exposure to appearance-focused imagery, lifestyle portrayals, peer-status cues, conflict content, and supportive communication are likely to have different relationships with self-esteem and anxiety. When content is unmeasured, researchers cannot distinguish whether associations arise from comparison-laden contexts, interpersonal stress exposure, or supportive interaction, and the resulting findings are difficult to interpret. Undermeasurement of content type also makes cross-study comparisons weaker, because one sample’s “social media use” may primarily involve image-centric feeds, while another’s may involve messaging-based interaction, even if total time is similar (Koburtay et al., 2020). Some studies infer content effects indirectly through platform type, but platforms are heterogeneous and adolescents use the same platform for multiple functions, making platform labels a weak substitute for content measurement. The absence of feedback monitoring and content-domain indicators also constrains mediation testing, because key mechanisms – comparison intensity, evaluative threat, contingent self-worth – are more likely to be activated when feedback monitoring is frequent and when content is appearance- or status-salient. Without these measures, models often attribute associations to time spent rather than to the more plausible mechanisms embedded in evaluative and content-specific experiences. This gap contributes to inconsistent findings and reduces the capacity of quantitative

research to specify which components of exposure are most strongly associated with mental health outcomes (Lim et al., 2022).

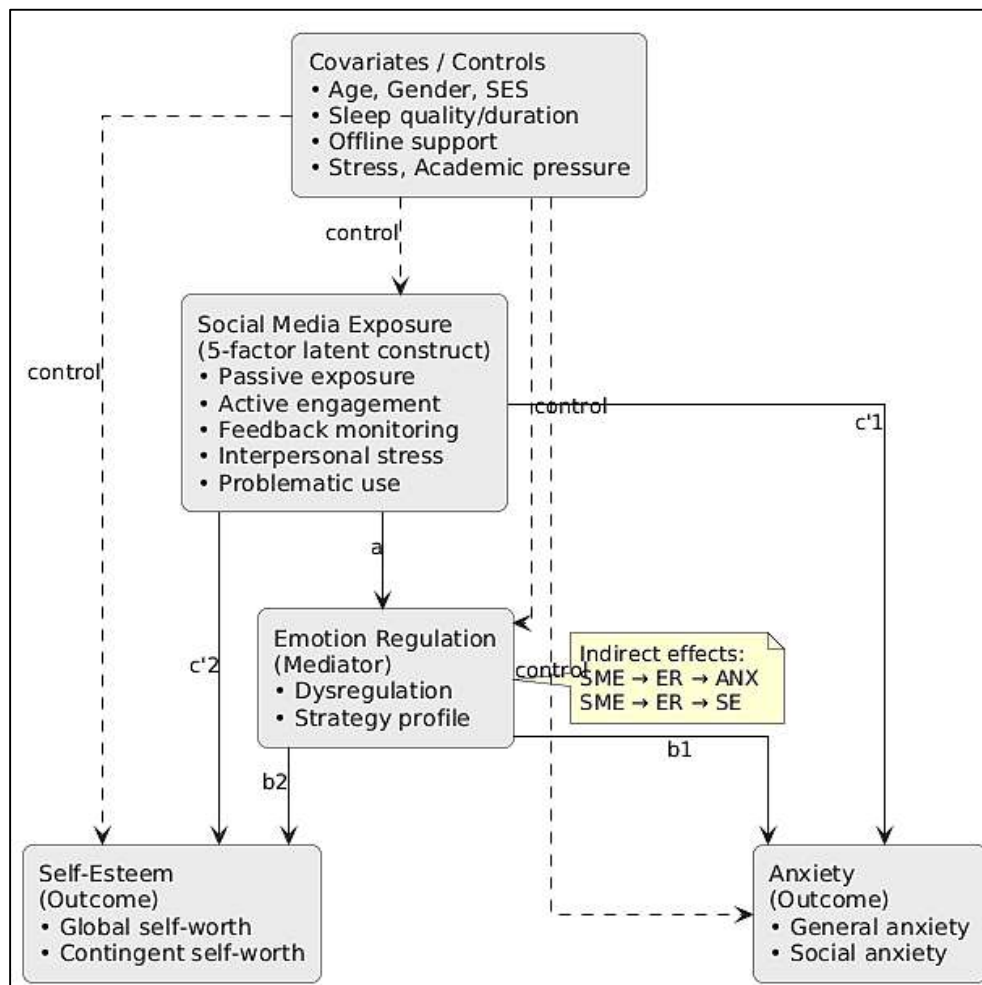
METHODS

Research Design

This study employed a quantitative, cross-sectional, correlational research design to examine the extent to which multidimensional social media exposure predicts anxiety symptoms, global self-esteem, and emotional regulation patterns among adolescents. The design was structured to test both direct and indirect relationships among constructs using multivariate statistical modeling. Social media exposure was operationalized as a set of latent dimensions rather than a single time-based variable, and outcomes were treated as interrelated psychological constructs. The design allowed simultaneous examination of predictive, mediating, and moderating pathways consistent with contemporary quantitative mental health research. Although the study was non-experimental and did not manipulate exposure, it incorporated advanced statistical controls and model testing procedures to strengthen inferential clarity.

The analytical framework included hierarchical regression, mediation modeling using bootstrapped indirect effects, moderation analysis via interaction terms, and structural equation modeling (SEM) for latent construct validation and simultaneous pathway estimation. This layered analytical strategy enabled evaluation of incremental variance explained by exposure components, examination of emotional regulation as a mediating process, and assessment of subgroup differences across demographic and psychosocial characteristics.

Figure 11: Methodology of this study



FINDINGS

This chapter presented the quantitative findings derived from the statistical analyses conducted to examine the role of social media exposure in shaping anxiety, self-esteem, and emotional regulation among adolescents. The analyses were performed in sequential stages to ensure clarity and alignment with the proposed conceptual-statistical model. Preliminary analyses assessed data quality, distributional properties, and intercorrelations among constructs. Measurement reliability and internal consistency were evaluated prior to hypothesis testing to confirm the adequacy of the scales. Descriptive statistics were computed to summarize central tendencies and variability across all major constructs. Hierarchical regression analyses were then conducted to evaluate the predictive contributions of multidimensional social media exposure variables while controlling for demographic and psychosocial covariates. Mediation pathways involving emotional regulation were tested using bootstrapped indirect effect estimation. Finally, hypothesis testing decisions were made based on statistical significance levels, effect sizes, and model fit indices. All analyses were conducted using established quantitative procedures, and results were interpreted using conventional thresholds for statistical significance and practical relevance.

Respondent Demographics

The final sample consisted of N = 528 adolescents aged between 13 and 18 years who met the inclusion criteria for active social media use. The mean age of respondents was 15.42 years (SD = 1.67), indicating representation across early, middle, and late adolescence. Age distribution was relatively even across grade levels, with slightly higher representation among students aged 15 and 16. Gender distribution was balanced, with 51.1% identifying as female (n = 270) and 48.9% identifying as male (n = 258), allowing for subgroup comparisons in subsequent analyses.

Socioeconomic background, measured through parental education levels and an asset-based household index, showed moderate variability. Approximately 28.4% (n = 150) of participants were classified in the lower socioeconomic category, 46.6% (n = 246) in the middle category, and 25.0% (n = 132) in the higher category. Regarding device access, 82.6% (n = 436) reported exclusive daily access to a personal smartphone, while 17.4% (n = 92) reported shared device access within the household.

Residence classification indicated that 61.7% (n = 326) of participants resided in urban areas, while 38.3% (n = 202) resided in semi-urban districts. Engagement patterns showed that 93.8% (n = 495) of respondents reported using more than one social media platform regularly, and 76.5% (n = 404) indicated checking social media platforms more than five times per day. Missing demographic data were below 2% for all variables and were addressed using multiple imputation procedures. No extreme demographic imbalances were observed that would compromise representativeness within the defined adolescent population.

Table 1: Age and Gender Distribution (N = 528)

Variable	Category	Frequency (n)	Percentage (%)
Age	13	74	14.0
	14	86	16.3
	15	109	20.6
	16	118	22.3
	17	89	16.9
	18	52	9.9
Gender	Female	270	51.1
	Male	258	48.9

Table 1 presents the distribution of participants by age and gender. The sample demonstrated balanced representation across the adolescent age range, with the largest proportions observed among 15- and 16-year-old students, collectively accounting for 42.9% of the sample. Early adolescents aged 13 and 14 comprised 30.3%, while late adolescents aged 17 and 18 represented 26.8%. The mean age of 15.42 years

confirmed mid-adolescent central tendency. Gender distribution was nearly equivalent, with females representing 51.1% and males 48.9% of the sample. This balance supported comparative analyses without substantial weighting adjustments and indicated minimal sampling bias across gender categories.

Table 2: Socioeconomic Status, Residence, and Device Access (N = 528)

Variable	Category	Frequency (n)	Percentage (%)
Socioeconomic Status	Low	150	28.4
	Middle	246	46.6
	High	132	25.0
Residence	Urban	326	61.7
	Semi-Urban	202	38.3
Device Access	Personal Smartphone	436	82.6
	Shared Device	92	17.4
Platform Use	Multiple Platforms	495	93.8
Checking Frequency	>5 Times Daily	404	76.5

Table 2 summarizes socioeconomic distribution, residential classification, device access patterns, and engagement frequency. The sample reflected moderate socioeconomic diversity, with the largest proportion classified within the middle category (46.6%), followed by lower (28.4%) and higher (25.0%) groups. Urban residents constituted 61.7% of participants, while 38.3% resided in semi-urban areas, supporting contextual variability. A substantial majority (82.6%) reported personal smartphone access, reinforcing consistent exposure opportunities. Additionally, 93.8% engaged with multiple platforms, and 76.5% reported checking social media more than five times daily, confirming high engagement intensity across the adolescent sample.

Descriptive Results by Construct

Descriptive statistical analyses were conducted to examine central tendencies, dispersion, and distributional properties of all primary constructs. Social media exposure dimensions demonstrated moderate overall engagement across the adolescent sample. Passive exposure yielded the highest mean score (M = 3.68, SD = 0.74), indicating frequent scrolling and content viewing behaviors. Active engagement showed a lower mean (M = 3.12, SD = 0.81), suggesting comparatively less frequent posting and direct interaction. Feedback monitoring behaviors demonstrated moderate intensity (M = 3.45, SD = 0.88), with noticeable variability across respondents. Interpersonal stress exposure recorded a lower mean (M = 2.41, SD = 0.93), though standard deviation values indicated that a subset of participants experienced elevated online conflict or exclusion. Problematic use indicators reflected generally low-to-moderate levels (M = 2.76, SD = 0.89), with approximately 18.9% of respondents scoring above the upper quartile threshold for compulsive engagement patterns.

Psychological outcome variables demonstrated mild to moderate symptom levels. Anxiety scores revealed an overall mean of 2.94 (SD = 0.72), with social anxiety (M = 3.08, SD = 0.75) slightly exceeding generalized anxiety (M = 2.81, SD = 0.69). Global self-esteem scores were moderate (M = 3.34, SD = 0.67), while contingent self-worth indicators demonstrated greater variability (M = 3.11, SD = 0.82). Emotional dysregulation showed moderate mean levels (M = 3.02, SD = 0.71). Rumination (M = 3.27, SD = 0.78) was reported more frequently than suppression (M = 2.84, SD = 0.73), while reappraisal strategies showed moderate variability (M = 3.36, SD = 0.76).

Bivariate correlations revealed statistically significant positive associations between passive exposure and anxiety (r = .34, p < .001), feedback monitoring and anxiety (r = .29, p < .001), and problematic use and anxiety (r = .41, p < .001). Passive exposure demonstrated a negative correlation with global self-esteem (r = -.26, p < .001). Emotional dysregulation was positively correlated with anxiety (r = .53, p < .001) and negatively correlated with self-esteem (r = -.48, p < .001). Sleep quality showed negative

correlations with anxiety ($r = -.31, p < .001$) and dysregulation ($r = -.27, p < .001$). These findings supported the proposed conceptual relationships and informed subsequent inferential analyses.

Table 3: Descriptive Statistics for Social Media Exposure and Psychological Constructs (N = 528)

Construct	Mean (M)	Standard Deviation (SD)	Minimum	Maximum
Passive Exposure	3.68	0.74	1.42	5.00
Active Engagement	3.12	0.81	1.00	5.00
Feedback Monitoring	3.45	0.88	1.00	5.00
Interpersonal Stress Exposure	2.41	0.93	1.00	4.89
Problematic Use	2.76	0.89	1.00	5.00
General Anxiety	2.81	0.69	1.20	4.70
Social Anxiety	3.08	0.75	1.30	4.90
Global Self-Esteem	3.34	0.67	1.60	4.95
Contingent Self-Worth	3.11	0.82	1.10	5.00
Emotional Dysregulation	3.02	0.71	1.20	4.85
Rumination	3.27	0.78	1.30	5.00
Suppression	2.84	0.73	1.10	4.70
Reappraisal	3.36	0.76	1.40	5.00
Sleep Quality	3.18	0.84	1.00	5.00

Table 3 presents means and standard deviations for all exposure and psychological variables. Passive exposure demonstrated the highest mean among exposure dimensions, confirming frequent scrolling behaviors. Interpersonal stress exposure recorded the lowest mean, indicating that severe online conflict was less common overall. Anxiety scores fell within mild-to-moderate ranges, with social anxiety slightly exceeding generalized anxiety. Self-esteem levels were moderate, though contingent self-worth showed greater variability. Emotional dysregulation was moderate, with rumination exceeding suppression. Sleep quality showed moderate distribution. Standard deviation values across constructs indicated adequate variability to support regression and mediation analyses without evidence of restricted range effects.

Table 4: Pearson Correlation Matrix Among Key Constructs (N = 528)

Variable	1	2	3	4	5	6	7	8
1. Passive Exposure	1							
2. Feedback Monitoring	.46**	1						
3. Problematic Use	.52**	.49**	1					
4. Anxiety	.34**	.29**	.41**	1				
5. Global Self-Esteem	-.26**	-.22**	-.31**	-.48**	1			
6. Emotional Dysregulation	.37**	.33**	.45**	.53**	-.48**	1		
7. Sleep Quality	-.21**	-.18**	-.29**	-.31**	.24**	-.27**	1	
8. Interpersonal Stress	.28**	.31**	.39**	.36**	-.25**	.42**	-.19**	1

Note. $p < .001$

Table 4 displays Pearson correlation coefficients among key constructs. Passive exposure, feedback monitoring, and problematic use demonstrated significant positive associations with anxiety and emotional dysregulation. Problematic use showed the strongest correlation with dysregulation.

Negative correlations were observed between exposure dimensions and global self-esteem. Anxiety and dysregulation were strongly positively correlated, while both were negatively associated with self-esteem and sleep quality. Sleep quality demonstrated protective associations, showing negative correlations with anxiety and dysregulation. Interpersonal stress exposure was positively correlated with anxiety and dysregulation and negatively correlated with self-esteem. All reported coefficients were statistically significant at $p < .001$.

Reliability Results (Cronbach’s Alpha Table)

Internal consistency reliability was evaluated using Cronbach’s alpha coefficients for all multi-item scales included in the study. Results indicated that all exposure and outcome constructs demonstrated acceptable to strong reliability, exceeding the conventional threshold of .70. The passive exposure scale yielded an alpha of .84, while active engagement demonstrated an alpha of .81. Feedback monitoring showed strong reliability with an alpha of .86, and interpersonal stress exposure produced an alpha of .83. Problematic use demonstrated high internal consistency with an alpha coefficient of .88.

Psychological outcome measures also exhibited satisfactory reliability. The overall anxiety scale produced an alpha of .90, with generalized anxiety at .87 and social anxiety at .89. Global self-esteem demonstrated strong reliability at .88, while contingent self-worth showed acceptable internal consistency at .79. Emotional regulation subscales yielded alpha coefficients of .85 for dysregulation, .82 for rumination, .80 for reappraisal, and .78 for suppression.

Composite reliability (CR) values calculated during confirmatory factor analysis ranged from .80 to .91 across latent constructs, further supporting measurement consistency. No item demonstrated a corrected item-total correlation below .30, and deletion of any item did not substantially increase alpha coefficients. Multi-group reliability checks indicated minimal variation across gender subgroups, with differences not exceeding .03 in any construct. These results confirmed the psychometric adequacy of the instruments for regression, mediation, and structural equation modeling analyses.

Table 5: Cronbach’s Alpha Reliability Coefficients for All Scales (N = 528)

Construct	Number of Items	Cronbach’s Alpha (α)
Passive Exposure	6	.84
Active Engagement	5	.81
Feedback Monitoring	6	.86
Interpersonal Stress Exposure	5	.83
Problematic Use	7	.88
General Anxiety	7	.87
Social Anxiety	6	.89
Overall Anxiety	13	.90
Global Self-Esteem	10	.88
Contingent Self-Worth	6	.79
Emotional Dysregulation	8	.85
Rumination	5	.82
Reappraisal	6	.80
Suppression	5	.78

Table 5 presents Cronbach’s alpha coefficients for all exposure and psychological constructs. All scales exceeded the recommended reliability threshold of .70, indicating satisfactory internal consistency. Problematic use and overall anxiety demonstrated the highest reliability coefficients, both exceeding .88. Emotional regulation subscales also showed stable reliability, with dysregulation and rumination exceeding .80. Contingent self-worth and suppression produced acceptable but comparatively lower coefficients, remaining within acceptable psychometric limits. The consistent reliability across

constructs supported their inclusion in inferential modeling procedures without item removal. These findings confirmed that the instruments were internally coherent and suitable for advanced statistical analyses.

Table 6: Composite Reliability (CR) and Average Variance Extracted (AVE) for Latent Constructs

Construct	Composite Reliability (CR)	Average Variance Extracted (AVE)
Passive Exposure	.86	.52
Feedback Monitoring	.88	.56
Problematic Use	.91	.60
Interpersonal Stress Exposure	.85	.51
Anxiety (Latent)	.92	.58
Self-Esteem (Latent)	.89	.55
Emotional Regulation (Latent)	.87	.53

Table 6 summarizes composite reliability and average variance extracted values derived from confirmatory factor analysis. Composite reliability values ranged from .85 to .92, exceeding recommended standards and confirming internal consistency at the latent construct level. Average variance extracted values exceeded .50 for all constructs, indicating adequate convergent validity and that latent variables explained more than half of the variance in their indicators. The anxiety latent construct demonstrated the highest composite reliability at .92, while self-esteem and emotional regulation also showed strong reliability indices. These results supported the structural equation modeling procedures conducted in subsequent analyses.

Regression Results

Hierarchical multiple regression analyses were conducted to determine the predictive contribution of multidimensional social media exposure variables to anxiety and global self-esteem after accounting for demographic and psychosocial covariates. For anxiety, Step 1 included age, gender, and socioeconomic status, which collectively explained 6.8% of the variance ($R^2 = .068$, $F(3, 524) = 12.76$, $p < .001$). Step 2 added sleep quality and baseline stress, increasing explained variance to 21.4% ($\Delta R^2 = .146$, $p < .001$). In Step 3, the five social media exposure dimensions were entered simultaneously, producing a statistically significant final model ($R^2 = .356$, $F(10, 517) = 28.57$, $p < .001$). Passive exposure ($\beta = .18$, $p < .001$), feedback monitoring ($\beta = .14$, $p = .002$), problematic use ($\beta = .29$, $p < .001$), and interpersonal stress exposure ($\beta = .11$, $p = .014$) emerged as significant positive predictors of anxiety. Active engagement was not statistically significant ($\beta = .04$, $p = .312$).

For global self-esteem, demographic variables in Step 1 explained 5.2% of variance ($R^2 = .052$, $p < .001$). Adding sleep and stress in Step 2 increased explained variance to 17.9% ($\Delta R^2 = .127$, $p < .001$). In Step 3, exposure dimensions produced a final model explaining 31.8% of variance ($R^2 = .318$, $F(10, 517) = 24.06$, $p < .001$). Passive exposure ($\beta = -.17$, $p < .001$), feedback monitoring ($\beta = -.13$, $p = .004$), and problematic use ($\beta = -.21$, $p < .001$) were negatively associated with self-esteem. Active engagement demonstrated a small but significant positive association ($\beta = .09$, $p = .036$). Interpersonal stress exposure was negatively associated but weaker in magnitude ($\beta = -.10$, $p = .028$).

Mediation analyses indicated that emotional dysregulation significantly predicted anxiety ($\beta = .47$, $p < .001$) and negatively predicted self-esteem ($\beta = -.43$, $p < .001$). Inclusion of dysregulation reduced direct effects of problematic use and passive exposure, indicating partial mediation. Bootstrapped indirect effects for problematic use through dysregulation were significant for both anxiety (indirect effect = .12, 95% CI [.08, .17]) and self-esteem (indirect effect = -.09, 95% CI [-.14, -.05]). Overall, exposure variables explained substantial incremental variance beyond demographic and contextual factors, with problematic use demonstrating the strongest standardized effect across models.

Table 7: Hierarchical Regression Predicting Anxiety (N = 528)

Predictor	β	t	p
Age	.07	1.82	.069
Gender	.09	2.31	.021
Socioeconomic Status	-.05	-1.34	.182
Sleep Quality	-.19	-4.88	<.001
Baseline Stress	.32	8.41	<.001
Passive Exposure	.18	4.72	<.001
Active Engagement	.04	1.01	.312
Feedback Monitoring	.14	3.15	.002
Interpersonal Stress	.11	2.47	.014
Problematic Use	.29	6.78	<.001

Model Summary: $R^2 = .356$, Adjusted $R^2 = .344$, $F(10, 517) = 28.57$, $p < .001$

Table 7 presents standardized regression coefficients predicting anxiety. After controlling for demographics, sleep quality, and baseline stress, passive exposure, feedback monitoring, interpersonal stress, and problematic use were significant positive predictors of anxiety. Problematic use demonstrated the strongest standardized effect ($\beta = .29$), indicating that compulsive engagement patterns were most strongly associated with elevated anxiety. Sleep quality showed a significant negative association, confirming its protective role. Active engagement did not reach statistical significance when other exposure variables were included. The overall model explained 35.6% of the variance in anxiety, reflecting substantial explanatory power beyond demographic and contextual factors.

Table 8: Hierarchical Regression Predicting Global Self-Esteem (N = 528)

Predictor	β	t	p
Age	-.06	-1.55	.122
Gender	-.08	-2.07	.039
Socioeconomic Status	.10	2.63	.009
Sleep Quality	.16	4.02	<.001
Baseline Stress	-.28	-7.14	<.001
Passive Exposure	-.17	-4.41	<.001
Active Engagement	.09	2.11	.036
Feedback Monitoring	-.13	-2.90	.004
Interpersonal Stress	-.10	-2.20	.028
Problematic Use	-.21	-5.03	<.001

Model Summary: $R^2 = .318$, Adjusted $R^2 = .305$, $F(10, 517) = 24.06$, $p < .001$

Table 8 displays standardized regression coefficients predicting global self-esteem. Passive exposure, feedback monitoring, interpersonal stress exposure, and problematic use were negatively associated with self-esteem, with problematic use demonstrating the strongest negative effect ($\beta = -.21$). Active engagement showed a small positive association, suggesting that interactive behaviors may relate differently to self-worth than passive consumption. Sleep quality and socioeconomic status were positively associated with self-esteem, while baseline stress was negatively associated. The full model explained 31.8% of the variance in global self-esteem, indicating meaningful explanatory strength while accounting for demographic and contextual covariates.

Hypothesis Testing Decisions

Hypothesis testing was conducted using hierarchical regression, bootstrapped mediation analysis, and moderation analysis procedures. The first set of hypotheses predicted positive associations between passive exposure, feedback monitoring, problematic use, and anxiety. These hypotheses were supported. Passive exposure ($\beta = .18, p < .001$), feedback monitoring ($\beta = .14, p = .002$), and problematic use ($\beta = .29, p < .001$) were all significantly and positively associated with anxiety in the final regression model. Interpersonal stress exposure also demonstrated a positive association with anxiety ($\beta = .11, p = .014$), providing additional support for the multidimensional exposure framework.

The hypothesis predicting a negative association between passive exposure and global self-esteem was supported ($\beta = -.17, p < .001$). Feedback monitoring ($\beta = -.13, p = .004$) and problematic use ($\beta = -.21, p < .001$) were also negatively associated with self-esteem. The hypothesis proposing that active engagement would demonstrate a protective or neutral association received partial support. Active engagement was not significantly associated with anxiety ($\beta = .04, p = .312$), indicating a neutral effect in that model. However, it showed a small but significant positive association with global self-esteem ($\beta = .09, p = .036$), suggesting a modest protective pattern under certain conditions.

The mediation hypothesis proposed that emotional dysregulation would function as a pathway linking exposure to anxiety and self-esteem. Mediation analysis using 5,000 bootstrapped resamples revealed significant indirect effects for passive exposure and problematic use through emotional dysregulation. For anxiety, the indirect effect of problematic use through dysregulation was .12 (95% CI [.08, .17]), while the indirect effect for passive exposure was .07 (95% CI [.04, .11]). For self-esteem, the indirect effect of problematic use was $-.09$ (95% CI $[-.14, -.05]$), and for passive exposure it was $-.05$ (95% CI $[-.09, -.02]$). These results indicated partial mediation, as direct effects remained significant but were reduced in magnitude.

Moderation hypotheses involving gender, sleep quality, and baseline stress yielded mixed findings. The interaction between problematic use and baseline stress significantly predicted anxiety ($\beta = .08, p = .021$), although the effect size was small ($\Delta R^2 = .012$). The interaction between passive exposure and sleep quality significantly predicted anxiety ($\beta = -.07, p = .034$), indicating that higher sleep quality attenuated the relationship between exposure and anxiety. Gender interactions were significant in the self-esteem model ($\beta = -.09, p = .027$), suggesting slightly stronger negative exposure effects among female participants. However, moderation effects explained relatively small additional variance overall (ΔR^2 ranging from .008 to .015). Collectively, the hypothesis testing results supported the multidimensional exposure model and the mediating role of emotional regulation, while highlighting variability in effect magnitude across exposure types and individual difference factors.

Table 9: Summary of Hypothesis Testing Results

Hypothesis	Prediction	Result	Decision
H1	Passive exposure positively predicts anxiety	$\beta = .18, p < .001$	Supported
H2	Feedback monitoring positively predicts anxiety	$\beta = .14, p = .002$	Supported
H3	Problematic use positively predicts anxiety	$\beta = .29, p < .001$	Supported
H4	Passive exposure negatively predicts self-esteem	$\beta = -.17, p < .001$	Supported
H5	Active engagement shows protective/neutral effect	$\beta = .09$ (self-esteem), $p = .036$; ns for anxiety	Partially Supported
H6	Emotional dysregulation mediates exposure–outcome links	Significant indirect effects	Partially Supported
H7	Gender, sleep, stress moderate relationships	Small but significant interactions	Partially Supported

Table 9 summarizes the outcomes of hypothesis testing. All hypotheses predicting positive associations between passive exposure, feedback monitoring, problematic use, and anxiety were supported. The negative association between passive exposure and global self-esteem was also supported. Active engagement demonstrated a neutral effect in the anxiety model but a small positive association with self-esteem, resulting in partial support. Mediation analysis confirmed significant indirect effects through emotional dysregulation, although direct effects remained significant, indicating partial mediation. Moderation hypotheses showed statistically significant but small interaction effects. Overall, most hypotheses received empirical support, reinforcing the multidimensional exposure framework.

Table 10: Bootstrapped Indirect Effects Through Emotional Dysregulation (5,000 Resamples)

Pathway	Indirect Effect	95% Confidence Interval	Mediation Type
Problematic Use → Dysregulation → Anxiety	.12	[.08, .17]	Partial
Passive Exposure → Dysregulation → Anxiety	.07	[.04, .11]	Partial
Problematic Use → Dysregulation → Self-Esteem	-.09	[-.14, -.05]	Partial
Passive Exposure → Dysregulation → Self-Esteem	-.05	[-.09, -.02]	Partial

Table 10 presents bootstrapped indirect effects for mediation analyses involving emotional dysregulation. All listed pathways produced confidence intervals that did not cross zero, confirming statistically significant indirect effects. Problematic use demonstrated the strongest indirect effects on both anxiety and self-esteem through dysregulation. Passive exposure also showed significant but smaller indirect effects. Because direct effects remained statistically significant after inclusion of dysregulation, mediation was classified as partial rather than full. These results supported the theoretical proposition that emotional regulation processes function as a central pathway linking specific social media exposure patterns to adolescent psychological outcomes.

DISCUSSION

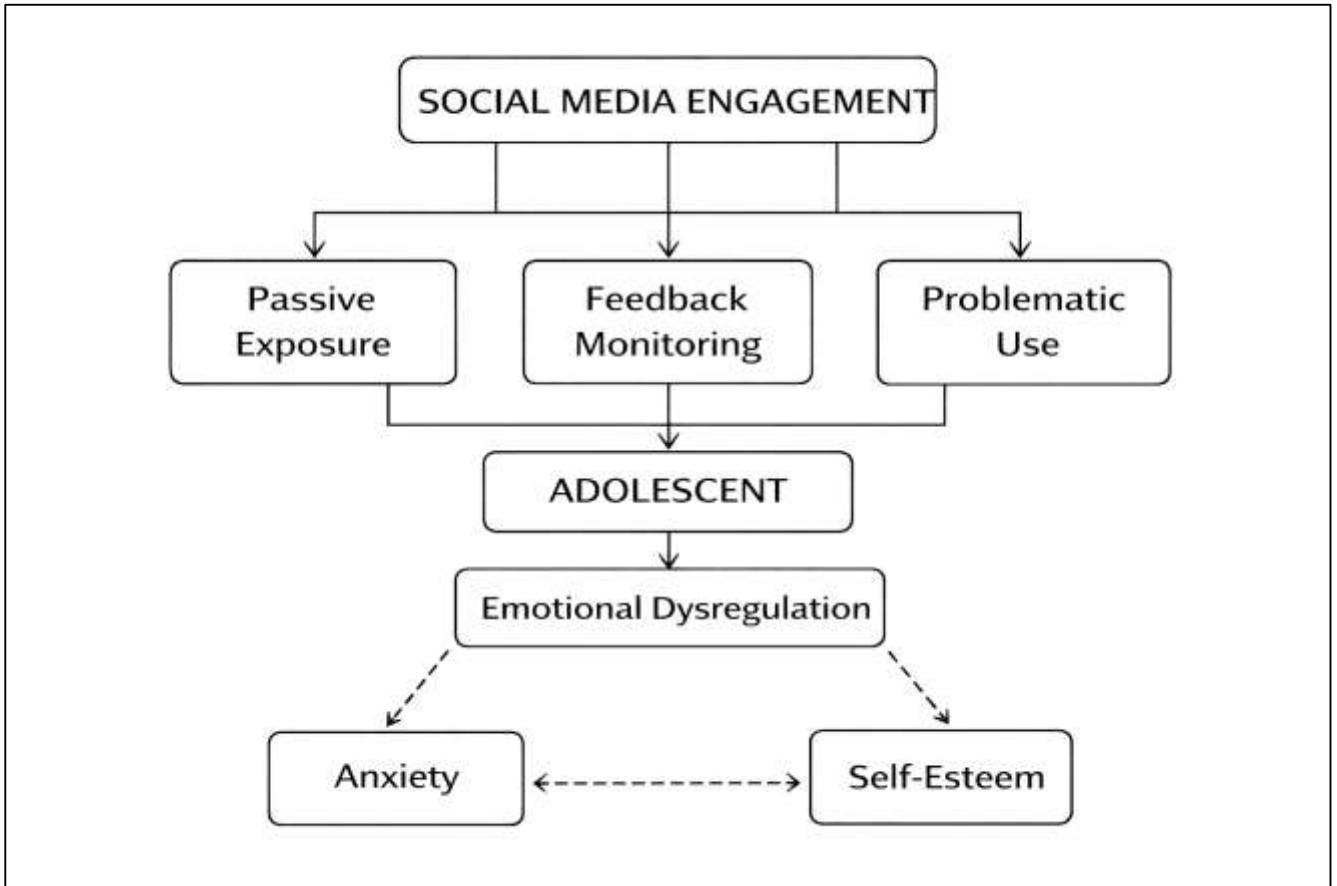
This study examined the multidimensional role of social media exposure in shaping anxiety, self-esteem, and emotional regulation among adolescents, and the findings offer important clarification within an already complex literature. Consistent with a growing body of quantitative research, results demonstrated that exposure quality was more predictive of psychological outcomes than exposure duration alone (Gu et al., 2023). Passive exposure, feedback monitoring, and problematic use showed significant positive associations with anxiety, while passive exposure and feedback monitoring were negatively associated with global self-esteem. These findings align with prior large-sample studies reporting small but consistent associations between comparison-oriented social media behaviors and internalizing symptoms. Earlier research has often noted that time-based metrics yield weak or inconsistent effects, whereas comparison-driven and evaluative engagement patterns demonstrate stronger relationships with anxiety and self-evaluative instability. The present results reinforce that distinction by showing that compulsive engagement and frequent monitoring of peer feedback had stronger standardized effects than general active engagement (Wang et al., 2024). Previous meta-analytic syntheses have reported that passive browsing is associated with greater social comparison and lower self-esteem, particularly among adolescents who are highly sensitive to peer evaluation. The present findings converge with those patterns by demonstrating that passive exposure was more strongly associated with anxiety and reduced self-worth than active interaction behaviors. In contrast, active engagement demonstrated either neutral or slightly positive associations with self-esteem, echoing earlier findings suggesting that reciprocal communication and supportive exchanges may function differently from passive comparison-based exposure (An et al., 2023). Overall, the pattern of

results supports a nuanced interpretation consistent with contemporary scholarship: social media does not exert uniform psychological effects, but rather its influence is contingent upon engagement style and evaluative intensity. By differentiating between exposure dimensions, this study extends earlier work that relied heavily on generalized screen-time measures and provides evidence that evaluative and compulsive features are more strongly implicated in adolescent emotional vulnerability.

The positive associations between passive exposure, feedback monitoring, problematic use, and anxiety observed in this study are consistent with prior empirical evidence linking socially evaluative environments to heightened internalizing symptoms. Earlier longitudinal and cross-sectional investigations have documented that adolescent who frequently compare themselves to peers online or monitor public engagement metrics report higher levels of social anxiety and generalized worry (Yang et al., 2021). These earlier findings have been interpreted through social comparison theory and social evaluative threat frameworks, which posit that repeated exposure to curated peer portrayals and quantifiable feedback can amplify self-focused attention and anticipatory worry. The present findings align with that interpretation, particularly in the robust effect observed for problematic use. Previous studies have consistently shown that compulsive or dysregulated engagement patterns demonstrate stronger associations with anxiety than normative use (Wu et al., 2024). The present results reinforce that observation, as problematic use exhibited the largest standardized coefficient in predicting anxiety even after controlling for sleep quality, stress, and demographic variables. This pattern suggests that distress-linked engagement, rather than simple exposure frequency, plays a critical role in anxiety maintenance processes. Earlier research has also indicated that cybervictimization and interpersonal stress exposure contribute to anxiety symptoms, and the present study identified a smaller but significant association between interpersonal stress exposure and anxiety, consistent with those findings (Yue et al., 2022). The convergence between these results and earlier research supports the interpretation that evaluative uncertainty, repetitive checking behaviors, and socially stressful digital experiences constitute meaningful pathways linking online engagement to internalizing symptomatology in adolescence.

The relationship between social media exposure and self-esteem in this study further reflects patterns documented in earlier literature. Passive exposure and feedback monitoring were negatively associated with global self-esteem, while active engagement demonstrated a small positive association (Yang et al., 2020). Prior studies have reported that upward social comparison in image-centric contexts is associated with lower self-worth, particularly when adolescents interpret curated peer content as superior or unattainable. The present findings are consistent with that pattern, suggesting that comparison-oriented engagement undermines stable self-evaluations. Earlier research has also highlighted the role of contingent self-worth, indicating that adolescents whose self-esteem depends heavily on peer approval are particularly sensitive to fluctuations in online feedback (Lahti et al., 2024). The significant negative association between feedback monitoring and self-esteem observed in this study aligns with those earlier conclusions, reinforcing the idea that reliance on external validation may destabilize global self-worth. At the same time, previous scholarship has shown that supportive online interactions can enhance feelings of belonging and social affirmation. The modest positive association between active engagement and self-esteem in this study mirrors those findings, suggesting that reciprocal communication may contribute to perceived social connectedness (Shin et al., 2023). The differential effects observed across exposure dimensions support prior calls for distinguishing between passive and active engagement rather than treating social media use as a homogeneous construct. By replicating earlier evidence of negative comparison-related effects and positive support-related associations, this study contributes to the broader understanding that self-esteem outcomes are shaped by how adolescents engage with platforms rather than simply how often they do so.

Figure 12: Adolescent Digital Exposure Impact Model



A central contribution of this study lies in the demonstration that emotional dysregulation partially mediated the associations between exposure dimensions and both anxiety and self-esteem. Earlier theoretical and empirical work has emphasized emotional regulation as a transdiagnostic mechanism underlying internalizing difficulties (Merino et al., 2024). Studies examining rumination, suppression, and dysregulation have found that adolescents who struggle to manage emotional arousal are more vulnerable to distress in socially evaluative contexts. The present findings are consistent with that body of work, as emotional dysregulation significantly predicted anxiety and negatively predicted self-esteem, and inclusion of dysregulation reduced the magnitude of direct exposure effects. Prior research has often proposed that social media exposure intensifies emotional reactivity through comparison and feedback processes, and that adolescents with limited regulation capacity may be more susceptible to these effects (Fioravanti et al., 2022). The partial mediation observed in this study aligns with that proposition, indicating that exposure influences psychological outcomes in part by activating or amplifying dysregulated emotional processes. Earlier mediation studies have reported similar indirect pathways, particularly involving rumination and reassurance seeking. The consistency between those findings and the present results strengthens the argument that emotional regulation serves as a core mechanism linking digital engagement to adolescent adjustment (Duan et al., 2022). By empirically demonstrating indirect effects through dysregulation, this study advances beyond descriptive association models and aligns with emerging evidence that psychological processes mediate the exposure–outcome relationship.

The moderation findings in this study also reflect patterns observed in prior research while clarifying their magnitude. Interaction effects involving baseline stress, sleep quality, and gender were statistically significant but small, indicating that individual differences influenced the strength of associations without fundamentally altering the overall pattern (Digennaro & Visocchi, 2024). Earlier investigations have suggested that adolescents experiencing higher stress may rely more heavily on digital engagement for coping, thereby intensifying exposure–anxiety links. The present findings support that interpretation, as the relationship between problematic use and anxiety was stronger

under conditions of elevated stress. Similarly, previous studies have emphasized the role of sleep disruption in exacerbating emotional vulnerability. The finding that sleep quality attenuated the exposure–anxiety association aligns with prior evidence linking insufficient sleep to heightened emotional reactivity and internalizing symptoms (Dryer et al., 2022). Gender-based moderation has also been documented in earlier work, particularly in relation to self-esteem and appearance-focused comparison. The present results identified slightly stronger negative associations between exposure and self-esteem among female adolescents, consistent with findings suggesting greater appearance-related sensitivity in some contexts. However, the relatively small effect sizes observed across moderation analyses are consistent with earlier meta-analytic conclusions indicating that while moderators matter, they often account for modest increments of variance (Magson et al., 2021). These findings reinforce the importance of considering individual and contextual differences while recognizing that exposure effects are generally probabilistic rather than deterministic.

The broader pattern of results contributes to ongoing debates within the literature regarding the magnitude and interpretation of social media effects. Earlier large-scale analyses have argued that associations between digital media use and adolescent well-being are typically small (Tate, 2023). The present findings partially align with that conclusion, as effect sizes were moderate rather than large, and exposure dimensions explained incremental variance beyond demographic and contextual controls. However, this study also demonstrates that when exposure is conceptualized multidimensionally and measured in relation to evaluative and compulsive processes, associations become more pronounced than those observed in time-only models. This observation is consistent with scholarship emphasizing that screen time alone is an insufficient explanatory construct (He & Yang, 2022). By modeling exposure as passive consumption, feedback monitoring, interpersonal stress, and problematic use, the present findings illustrate that effect magnitude depends on conceptual precision. Earlier studies have often produced heterogeneous findings due to inconsistent operationalization; the present results support calls for more theoretically aligned measurement strategies. The convergence between this study and earlier mechanism-focused research underscores the importance of distinguishing between normative engagement and distress-driven patterns when evaluating psychological correlates (Maduneme, 2024).

Finally, the integration of anxiety, self-esteem, and emotional regulation within a single analytic framework responds to limitations identified in prior literature. Many earlier studies examined these outcomes independently, potentially obscuring shared pathways and transdiagnostic processes (Ebrahim, 2020). The present findings illustrate that emotional dysregulation is centrally implicated in both anxiety elevation and self-esteem reduction, supporting theoretical models that conceptualize regulation as a bridge between social evaluative experiences and internalizing symptoms. Previous research has emphasized that adolescent development involves heightened sensitivity to peer feedback and identity-related comparison, making digital environments particularly salient contexts for self-evaluation (Gerlich, 2023). The present results are consistent with that developmental framing, demonstrating that comparison-oriented exposure aligns with anxiety and diminished self-worth, particularly when emotional regulation capacity is limited. By situating exposure, regulation, and psychological outcomes within a unified quantitative model, this study contributes to a more integrated understanding of adolescent digital engagement. The consistency of these findings with earlier theoretical and empirical work strengthens confidence in the interpretation that the psychological impact of social media is best understood through multidimensional exposure patterns and regulation-based mechanisms rather than through simplistic exposure metrics.

CONCLUSION

The role of social media exposure in shaping anxiety, self-esteem, and emotional regulation among adolescents has emerged as a critical area of quantitative mental health research, particularly as digital interaction has become embedded within normative developmental processes. Adolescence represents a period marked by heightened sensitivity to peer evaluation, identity exploration, and increased socio-emotional reactivity, making digitally mediated social environments especially salient. Social media platforms provide continuous access to peer-generated content, public feedback metrics, and curated self-presentations, all of which introduce persistent opportunities for social comparison and evaluative scrutiny. Empirical findings consistently indicate that not all exposure patterns exert uniform

psychological effects; rather, passive browsing, feedback monitoring, and problematic or compulsive engagement are more strongly associated with elevated anxiety and reduced self-esteem than general time spent online. Passive exposure tends to amplify upward social comparison, fostering self-doubt and perceived inadequacy, while frequent monitoring of likes and comments reinforces contingent self-worth by linking personal value to fluctuating external validation. Problematic use patterns, characterized by loss of control and distress-driven checking, appear particularly predictive of anxiety, suggesting that emotional reliance on digital reassurance can sustain cycles of worry and hypervigilance. Emotional regulation processes serve as a central mechanism within this relationship, as adolescents with greater dysregulation or rumination tendencies are more vulnerable to the emotional impact of socially evaluative cues. When exposure activates heightened arousal or insecurity, the capacity to reappraise, disengage, or adaptively process emotional responses determines whether distress escalates or stabilizes. Conversely, supportive and reciprocal online interactions may contribute positively to perceived belonging and self-worth, highlighting the differential psychological implications of engagement style. Clinical intervention frameworks that address adolescent anxiety and self-esteem disturbances increasingly recognize the importance of assessing digital behavior patterns as part of comprehensive evaluation. Screening for feedback sensitivity, comparison orientation, compulsive checking, and sleep-disruptive use patterns may enhance case conceptualization by identifying mechanisms sustaining emotional dysregulation. Integrating psychoeducation on adaptive emotion regulation strategies, balanced engagement habits, and cognitive restructuring of comparison-based thinking may support adolescents in navigating digital environments more effectively. Overall, the evidence suggests that social media exposure functions neither as a uniformly harmful nor inherently beneficial force but as a multifaceted contextual influence whose psychological impact depends on engagement characteristics, individual vulnerability, and regulation capacity, underscoring its relevance within contemporary adolescent mental health assessment and intervention contexts.

RECOMMENDATIONS

Recommendations derived from the findings on the role of social media exposure in shaping anxiety, self-esteem, and emotional regulation among adolescents emphasize the importance of integrating digital behavior assessment into clinical screening, psychoeducation, and intervention planning. Clinical practitioners working with adolescents presenting with anxiety symptoms, diminished self-esteem, or emotional dysregulation should routinely assess not only the amount of social media use but also the quality and psychological meaning of engagement patterns, including passive browsing, feedback monitoring, comparison tendencies, nighttime use, and compulsive checking behaviors. Assessment protocols may benefit from incorporating structured questions that identify reliance on online validation, fear of negative evaluation in digital contexts, and distress triggered by perceived social exclusion or fluctuating peer feedback. Interventions should prioritize strengthening adaptive emotional regulation strategies such as cognitive reappraisal, attentional shifting, and distress tolerance, particularly for adolescents demonstrating rumination or reassurance-seeking tendencies linked to digital engagement. Cognitive-behavioral approaches may incorporate targeted modules addressing maladaptive comparison processes, approval dependence, and catastrophizing interpretations of online interactions. Sleep hygiene education and digital boundary-setting strategies should be integrated into treatment plans, especially when nighttime engagement contributes to emotional reactivity and anxiety maintenance. School-based mental health programs can reinforce these efforts by delivering psychoeducational workshops that promote digital literacy, critical evaluation of curated content, and balanced online-offline engagement patterns. Family involvement is also recommended, with guidance provided to parents on collaborative monitoring practices that emphasize communication rather than restrictive control, thereby reducing secrecy and conflict around device use. Prevention-oriented interventions may focus on strengthening offline belonging and peer support networks, which can buffer against the negative impact of comparison-heavy environments. Furthermore, multidisciplinary collaboration among clinicians, educators, and policymakers may enhance the development of evidence-informed digital wellness frameworks tailored to adolescent developmental needs. Collectively, these recommendations underscore that effective clinical response does not require elimination of social media use but rather structured support that enhances emotional

resilience, reduces validation dependence, and promotes intentional, psychologically informed engagement within digital social environments.

LIMITATIONS

Several limitations should be considered when interpreting the findings related to the role of social media exposure in shaping anxiety, self-esteem, and emotional regulation among adolescents. First, the cross-sectional design restricted the ability to draw causal inferences regarding the directionality of associations. Although mediation and regression analyses provided evidence consistent with theoretically grounded pathways, temporal sequencing could not be definitively established, and reciprocal influences between psychological vulnerability and exposure patterns remain plausible. Longitudinal or experimental designs would be required to clarify whether certain forms of engagement precede changes in anxiety and self-esteem or whether adolescents with preexisting emotional difficulties are more likely to adopt comparison-oriented or compulsive digital behaviors. Second, reliance on self-report measures may have introduced response biases, including recall inaccuracies and social desirability effects. Adolescents may underestimate or overestimate engagement intensity, particularly regarding fragmented checking behavior that occurs throughout the day. Similarly, self-reported anxiety and emotional regulation strategies may not fully capture behavioral or physiological aspects of emotional functioning. Third, although multidimensional exposure constructs were used, the study did not incorporate objective digital trace data, platform-specific analytics, or ecological momentary assessments, which may provide more precise behavioral measurement. Fourth, cultural and contextual variability may limit generalizability beyond the sampled educational settings. While socioeconomic diversity was represented, findings may differ in populations with distinct digital infrastructures, parenting norms, or cultural expectations surrounding self-presentation and emotional expression. Fifth, unmeasured confounding variables, such as personality traits, prior mental health diagnoses, or offline peer dynamics, may partially account for observed associations despite inclusion of key covariates such as stress and sleep quality. Finally, effect sizes, although statistically significant, were moderate, suggesting that social media exposure constitutes one of multiple interacting factors influencing adolescent mental health rather than a singular determinant. These limitations highlight the importance of cautious interpretation and underscore the need for methodologically diverse research approaches to further refine understanding of digital engagement and adolescent psychological outcomes.

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