

## EMOTIONAL DYSREGULATION AND DIGITAL DEPENDENCE: UNRAVELING MENTAL HEALTH PATHWAYS, FEAR OF MISSING OUT AND SOCIAL MEDIA ADDICTION, WITHIN CLINICAL PSYCHOLOGY FRAMEWORK

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### Abstract

The exponential growth of social media use has intensified scholarly interest in the psychological mechanisms underlying *digital dependence*. Grounded in the *Interaction of Person–Affect–Cognition–Execution (I-PACE) model* (Brand et al., 2019) and *Self-Determination Theory* (Deci & Ryan, 2000), this study examined whether *fear of missing out* (FoMO) mediates the relationship between *emotional dysregulation* and digital dependence, and whether this pathway is moderated by *gender, birth order, family system, and educational level*. A cross-sectional design was employed with a sample of young adults ( $N \approx 350$ ) who completed validated measures of emotional dysregulation, FoMO, and social media addiction/digital dependence.

Bivariate correlations indicated that emotional dysregulation was positively associated with both FoMO ( $r = .53, p < .001$ ) and digital dependence ( $r = .48, p < .001$ ), while FoMO correlated strongly with digital dependence ( $r = .59, p < .001$ ), consistent with prior findings (Przybylski et al., 2013; Saladino et al., 2024). Mediation analysis revealed that FoMO partially mediated the dysregulation–dependence link (indirect effect  $B = 0.10, 95\% \text{ CI } [0.06, 0.15]$ ), supporting FoMO's role as a proximal cognitive-affective driver of problematic online engagement (Quaglieri et al., 2022). Moderated mediation analyses showed that the FoMO  $\rightarrow$  dependence path was stronger for females, later-born individuals, participants from nuclear families, and those with lower educational attainment, aligning with social-relational motivation theory (Muscanell & Guadagno, 2012), birth-order socialization research (Sulloway, 1996), and digital literacy frameworks (Livingstone & Helsper, 2007).

The full moderated mediation model explained substantially more variance in digital dependence ( $R^2 = .42$ ) than main effects alone ( $R^2 = .27$ ), underscoring

*the value of conditional process modelling in clinical psychology. Findings highlight the need for **targeted interventions** that integrate emotion regulation training with FoMO-specific cognitive restructuring, tailored to demographic and contextual risk profiles. This work advances theoretical integration of emotional, cognitive, and socio-structural factors in the etiology of digital dependence and offers actionable insights for prevention and treatment.*

## INTRODUCTION

The exponential rise of digital technologies has transformed the modalities of social connection, self-expression, and information exchange. While these tools offer unprecedented opportunities for engagement, their pervasive integration into daily life has cultivated patterns of *digital dependence*, often manifesting in maladaptive emotional and behavioral outcomes (Andreassen, 2015). Social media platforms, in particular, have amplified the phenomenon of **Fear of Missing Out (FoMO)**, a pervasive apprehension that others are engaging in rewarding experiences from which one is absent, thereby driving compulsive checking behaviors and intensifying emotional dysregulation (Przybylski et al., 2013).

From a *clinical psychology* standpoint, social media addiction—characterized by excessive use, loss of control, and continued engagement despite harmful consequences—mirrors behavioral addiction mechanisms involving reward sensitivity, cognitive preoccupation, and deficient inhibitory control (Brand et al., 2019). Emotional dysregulation, encompassing impaired monitoring, evaluation, and modulation of affective states, emerges as both a precipitating and perpetuating factor in problematic social media use, creating cyclical patterns of stress, anxiety, and depressive symptomatology (Elhai et al., 2017).

Integrating these phenomena within mental health pathways demands an examination of underlying cognitive-affective mechanisms, including maladaptive coping strategies, attentional biases, and reinforcement contingencies. Clinical psychology frameworks, such as the *Interaction of Person-Affect-Cognition-Execution (I-PACE) model*, highlight the interplay of dispositional vulnerabilities, affective responses, and executive functioning deficits in the escalation of digital dependence (Brand et al., 2016). Understanding these interrelations is pivotal for

developing evidence-based prevention and intervention strategies that address not only the behavioral symptoms but also the emotional and cognitive substrates that sustain them.

## Research Questions

Grounded in the intersection of emotional dysregulation, digital dependence, and mental health pathways, this study seeks to address the following advanced research questions:

1. **How do specific dimensions of emotional dysregulation (e.g., anxiety, depression, stress) mediate the relationship between Fear of Missing Out (FoMO) and social media addiction?** (Elhai et al., 2017; Przybylski et al., 2013)
2. **To what extent does the Interaction of Person-Affect-Cognition-Execution (I-PACE) model (Brand et al., 2016) explain the cognitive-affective mechanisms linking FoMO and digital dependence within clinical populations?**
3. **What role do co-occurring mental health conditions (e.g., anxiety, depression, stress) play in moderating the association between emotional dysregulation and problematic social media use?** (Andreassen, 2015; Wegmann & Brand, 2019)
4. **How do individual differences in ‘fear of missing out’ interact with situational triggers in predicting relapse or escalation in social media addictive behaviors?** (Brand et al., 2019)

## Significance of the Study

This research is situated at the nexus of clinical psychology, behavioral addiction theory, and digital mental health intervention science. Understanding the nuanced interplay among **digital dependence**, **Fear of Missing Out (FoMO)**, and **emotional dysregulation** offers multiple contributions:

- **Theoretical Advancement:** By integrating the I-PACE model with empirical data on emotional

dysregulation, the study can refine existing frameworks for understanding technology-mediated behavioral addictions (Brand et al., 2016).

- **Clinical Implications:** Findings can inform evidence-based interventions targeting not only behavioral symptoms of problematic social media use but also core affect regulation deficits that exacerbate relapse risk (Elhai et al., 2017).

- **Preventive Strategies:** Identifying the cognitive-affective pathways that predispose individuals to digital dependence could guide school-based, workplace, and public health prevention programs aimed at at-risk populations, particularly adolescents and emerging adults (Przybylski et al., 2013).

- **Personalized Treatment Approaches:** By mapping individual vulnerabilities—such as heightened reward sensitivity or poor emotional awareness—therapists and clinicians could tailor cognitive-behavioral or emotion-focused interventions more effectively (Wegmann & Brand, 2019).

- **Policy and Digital Design:** Evidence from this research could inform ethical technology design, promoting features that minimize compulsive engagement and support mental well-being (Andreassen, 2015).

Ultimately, by situating social media addiction within broader mental health pathways, the study bridges a critical gap between behavioral addiction models and emotional regulation science—aligning clinical assessment, therapeutic practice, and policy intervention toward mitigating digital-era psychopathology.

### Research Gaps

Despite growing scholarly interest in the interconnections among **digital dependence**, **emotional dysregulation**, and **Fear of Missing Out (FoMO)**, several notable gaps remain within the clinical psychology literature:

1. **Limited Longitudinal Evidence** Most current studies rely on cross-sectional designs, restricting the ability to establish causal and temporal relationships between FoMO, emotional dysregulation, and social media addiction (Elhai et al., 2017; Wegmann & Brand, 2019). There is a

paucity of **longitudinal or experimental research** that can disentangle whether emotional regulation deficits precede digital dependence or are exacerbated by it.

2. **Underrepresentation of Clinical Populations**

While many investigations draw from general or student samples, relatively few explore these relationships in **clinically diagnosed populations** with mood, anxiety, or personality disorders—groups potentially more vulnerable to maladaptive digital engagement (Andreassen, 2015).

3. **Mechanistic Clarification within the I-PACE Model**

Although the Interaction of Person–Affect–Cognition–Execution (I-PACE) model has been influential in conceptualizing behavioral addictions, its specific cognitive-affective mechanisms linking FoMO to emotional dysregulation and digital dependence are not yet empirically specified in detail (Brand et al., 2016, 2019).

4. **Cultural and Contextual Variation**

Existing research is heavily weighted toward Western, educated, industrialized, rich, and democratic (WEIRD) samples. Cultural differences in emotional regulation norms, collectivist vs. individualist orientations, and technology use patterns are underexplored, limiting the generalizability of findings (Przybylski et al., 2013).

5. **Intervention-Focused Empirical Testing**

Although theoretical links between emotional dysregulation and social media addiction are well-described, **few intervention studies** have directly targeted emotion regulation skills as a mechanism to reduce digital dependence in either clinical or non-clinical samples (Wegmann & Brand, 2019).

6. **Integration with Broader Mental Health Pathways**

The relationship between problematic social media use and co-occurring psychopathology (e.g., depression, generalized anxiety, social anxiety) is well-documented, but the **mediating and moderating processes**—including

attentional biases, reward processing alterations, and maladaptive coping—are still insufficiently mapped in clinical models (Elhai et al., 2017).

**Hypotheses**

**H1:** Higher levels of **emotional dysregulation** will be positively associated with greater **digital dependence**, indicating that individuals with impaired emotion regulation skills are more prone to problematic social media use (Elhai et al., 2017; Wegmann & Brand, 2019).

**H2:** **Fear of Missing Out** will mediate the relationship between **emotional dysregulation** and **digital dependence**, such that individuals with greater emotional dysregulation will report higher FoMO, which in turn will predict greater digital dependence (Przybylski et al., 2013).

**H3a:** The mediating effect of **Fear of Missing Out** on the link between emotional dysregulation and digital dependence will be **moderated by gender**, with the indirect effect being stronger among females due to heightened social-relational motivations in online engagement (Andreassen, 2015).

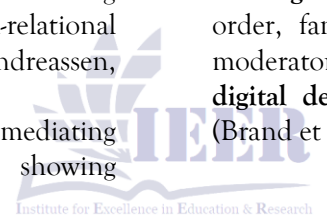
**H3b:** **Birth order** will moderate the mediating pathway, with first-born individuals showing

weaker **Fear of Missing Out** effects compared to middle-born and last-born individuals, potentially due to differences in socialization patterns and peer orientation (Sulloway, 1996).

**H3c:** **Family system** will moderate the mediation model, such that individuals from **nuclear families** will exhibit a stronger **Fear of Missing Out** - digital dependence link compared to those from joint families, where broader social support networks may buffer FoMO-driven behaviors (Kagitcibasi, 2007).

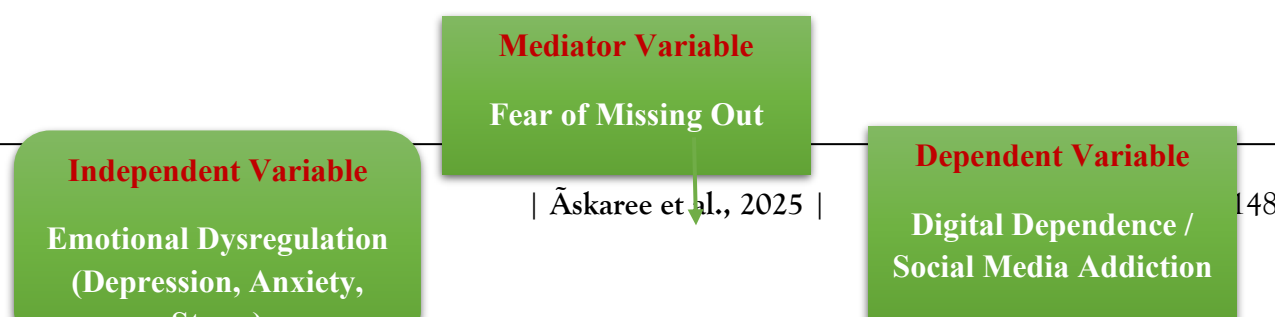
**H3d:** **Educational level** will moderate the mediating effect, with lower educational attainment associated with a stronger **Fear of Missing Out** - digital dependence relationship, possibly due to variations in digital literacy and critical evaluation skills (van Deursen & van Dijk, 2014).

**H4:** The moderated mediation model—comprising emotional dysregulation as the predictor, **Fear of Missing Out** as the mediator, and gender, birth order, family system, and educational level as moderators—will explain significant variance in **digital dependence** beyond main effects alone (Brand et al., 2016, 2019).

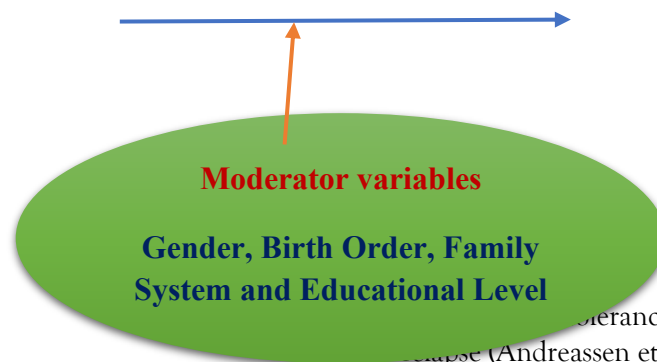


**Conceptual Framework / Research Model**

**Figure 1** Emotional Dysregulation and Digital Dependence: Unraveling Mental Health Pathways, Fear of Missing Out and Social Media Addiction, within Clinical Psychology Framework



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tolerance, withdrawal, conflict, and escape (Andreassen et al., 2012).

### Operational Definitions

#### 1. Emotional Dysregulation (Mental Health Pathways)

For the purposes of this study, emotional dysregulation refers to **persistent difficulties in monitoring, evaluating, and modifying emotional responses to situational demands**, resulting in maladaptive affective, behavioral, and cognitive outcomes (Gratz & Roemer, 2004). Within the **mental health pathways** framework, it will be operationalized as the **total score on Depression, Anxiety and Stress Scale (DASS)** by Lovibond and Lovibond (1995), capturing deficits across dimensions such as impulse control, emotional awareness, and access to regulation strategies. Higher scores indicate greater emotional dysregulation, which has been associated with heightened vulnerability to psychopathology and maladaptive coping behaviors (Gross, 2015).

#### 2. Digital Dependence (Social Media Addiction)

In this research, digital dependence—with a specific focus on **social media addiction**—is defined as a **pattern of excessive, compulsive, and uncontrollable use of social networking platforms**, characterized by preoccupation, inability to reduce use despite negative consequences, and functional impairment in daily life (Andreassen, 2015). It will be operationalized via scores on the **Social Media Addiction Scale (SMAS)** by Karadağ, et al. (2015), where higher

scores reflect a stronger addiction tendency based on six core addiction components: salience, mood

#### 3. Fear of Missing Out (FoMO)

FoMO is conceptualized here as a **pervasive apprehension that others might be having rewarding experiences from which one is absent**, often leading to a compulsion to remain continuously connected to social networks (Przybylski et al., 2013). Operationally, FoMO will be assessed using the **Fear of Missing Out Scale (FoMOS)** by Przybylski, et al., (2013), a validated self-report instrument that quantifies the extent of concern, anxiety, and behavioral tendencies linked to missing out on social interactions or information. Higher scores indicate greater susceptibility to FoMO, which has been linked to maladaptive digital engagement and emotional distress (Elhai et al., 2016).

### Literature Review

#### 1. Emotional Dysregulation in Clinical Psychology

Emotional dysregulation refers to difficulties in modulating emotional responses to stimuli, often manifesting as heightened reactivity, poor impulse control, and maladaptive coping strategies (Gross, 2015). Within clinical psychology, it is a transdiagnostic construct implicated in mood disorders, anxiety disorders, borderline personality disorder, and addictive behaviors (Aldao et al., 2010). Neurobiologically, dysregulation is linked to prefrontal-amygdala circuitry dysfunction, impairing top-down control over emotional responses (Etkin et al., 2015).

Digital environments can exacerbate dysregulation by providing constant emotionally salient stimuli—

notifications, likes, and algorithmically curated content—that trigger reward pathways and reduce tolerance for emotional discomfort (Wadley et al., 2020).

## 2. Digital Dependence and Mental Health Pathways

Digital dependence, often conceptualized as problematic or compulsive technology use, shares behavioral and neurocognitive features with substance addictions, including salience, tolerance, withdrawal, and relapse (Griffiths, 2005). Clinical evidence suggests that excessive engagement with digital platforms can impair executive functioning, sleep quality, and emotional regulation (Jadhakhan et al., 2022).

From a cognitive-behavioral perspective, maladaptive digital use may serve as an avoidance strategy, reducing exposure to distressing emotions but reinforcing dependence through negative reinforcement cycles (Kardefelt-Winther, 2014).

## 3. Fear of Missing Out (FoMO) as a Mediator

FoMO is defined as a pervasive apprehension that others might be having rewarding experiences without one's participation (Przybylski et al., 2013). Meta-analytic evidence shows a significant positive correlation between social media use and FoMO ( $r \approx .38$ ), with the strongest associations observed for addictive patterns of use (Zhang et al., 2021).

FoMO mediates the relationship between emotional dysregulation and SMA by amplifying compulsive checking behaviors, heightening sensitivity to social exclusion cues, and reinforcing maladaptive digital engagement (Topino et al., 2023).

## 4. Social Media Addiction (SMA) in Clinical Context

SMA is increasingly recognized as a behavioral addiction characterized by salience, mood modification, tolerance, withdrawal, conflict, and relapse (Andreassen et al., 2012). It is associated with depression, anxiety, stress, and reduced psychological well-being (Sudheer & Saligram, 2023).

Neuroimaging studies reveal that SMA activates mesolimbic dopamine pathways similar to substance use disorders, suggesting shared reward-processing mechanisms (Turel et al., 2014). Clinically, SMA often co-occurs with emotional dysregulation, with FoMO acting as a cognitive driver of compulsive engagement.

## 5. Integrative Clinical Psychology Framework

An integrative model positions **emotional dysregulation** as a vulnerability factor, **FoMO** as a cognitive-affective mediator, and **SMA/digital dependence** as the behavioral outcome. This aligns with the Self-Determination Theory (Deci & Ryan, 2000), where unmet needs for relatedness and competence drive compensatory digital behaviors.

Interventions may include:

- **Dialectical Behavior Therapy (DBT)** for emotion regulation skills.
- **Cognitive-Behavioral Therapy (CBT)** targeting FoMO-related cognitions.
- **Digital hygiene protocols** to reduce compulsive engagement.

## 6. Islamic Perspective on Digital Well-Being

Islamic teachings emphasize moderation (*wasatiyyah*), intentionality (*niyyah*), and guarding the heart from harmful influences. The Qur'an warns against wasting time (Surah Al-Asr 103:1-3) and excessive indulgence in distractions (Surah Al-Hadid 57:20).

From an Islamic mental health lens, FoMO can be reframed as a form of *ghaflah* (heedlessness), where constant comparison and digital envy erode *qana'ah* (contentment) (Sinan, 2024). The Prophet ﷺ advised valuing one's free time before it is lost (Ibn Abbas, Musnad Ahmad), which aligns with contemporary recommendations for mindful digital engagement (Al-Huda Quran Academy, 2025).

Practical strategies from an Islamic framework include:

- **Digital fasting** during certain hours or days.
- **Dhikr** and Qur'an recitation to replace compulsive scrolling.

- Curating online spaces to promote beneficial knowledge ('ilm nafi').

## Methodology

### Research design

This study employs a quantitative, cross-sectional design grounded in clinical psychology, testing a mediation model in which emotional dysregulation (independent variable) predicts digital dependence/social media addiction (dependent variable) indirectly via Fear of Missing Out (FoMO) (mediator). Mental health symptoms (Depression, Anxiety, Stress) are included as covariates to partial out general distress pathways and isolate the emotion-regulation-specific mechanism (Lovibond & Lovibond, 1995; Hayes, 2018). The design aligns with behavioral addiction models emphasizing affective-cognitive drivers of compulsive technology use (Griffiths, 2005; Andreassen et al., 2012).

### Sampling and participants

- **Sampling approach:** Non-probability convenience sampling from higher-education institutions and community settings in Sindh, Pakistan. Recruitment used classroom announcements, google form and digital flyers. Inclusion criteria: age  $\geq 18$ , active social media use ( $\geq 1$  platform,  $\geq 30$  minutes/day) in the past month. Exclusion criteria: self-reported severe cognitive impairment or current inpatient psychiatric treatment.
- **Sample size:** N = 188.
- **Gender distribution:** 87 males, 101 females.
- **Sociodemographic coding:**
  - **Birth order:** first = 1, middle = 2, last-born = 3.
  - **Family system:** nuclear = 1, joint = 2.
  - **Education:** Intermediate = 1, Undergraduate = 2, Graduate = 3
- **Rationale for N:** For small-to-moderate indirect effects, a sample near 200 provides adequate power with bias-corrected bootstrapping in mediation and stable parameter estimation in path

models (Fritz & MacKinnon, 2007; Wolf et al., 2013).

## Measures

### Depression Anxiety Stress Scales developed by Lovibond and Lovibond, (1995).

- **Purpose:** The DASS-21 is a concise self-report instrument designed to assess the severity of core symptoms across three domains – Depression, Anxiety, and Stress.
- **Structure:**
  - 21 items (7 per subscale, with 3 subscales).
  - **Depression:** Measures dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest/involvement, anhedonia, and inertia.
  - **Anxiety:** Measures autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious affect.
  - **Stress:** Measures difficulty relaxing, nervous arousal, being easily upset/agitated, irritable/over-reactive, and impatient.
  - Each subscale measures a distinct but related dimension of negative emotional states.
- **Response format:** 4-point Likert scale (0 = Did not apply to me at all to 3 = Applied to me very much or most of the time).
- **Scoring:**
  - Subscale scores are summed and multiplied by two to match the metric of the original DASS-42.
  - Higher scores indicate greater severity of symptoms in the corresponding domain.
- **Psychometric properties:**
  - Demonstrates high internal consistency and strong factor structure across diverse populations.
  - Suitable for both clinical and non-clinical contexts.

- **Application in the study:** In this model, the DASS-21 subscale scores can be entered as covariates, allowing to statistically control for general distress when examining the specific role of emotional dysregulation in predicting FoMO and social media addiction.

Fear of Missing Out Scale developed by Przybylski, Murayama, DeHaan and Gladwell, (2013).

- **Purpose:** Designed to measure the **pervasive apprehension that others might be having rewarding experiences without you**, and the resulting desire to stay continually connected to what others are doing.
- **Structure:**
  - 10 items
  - 5-point Likert response format (1 = Not at all true of me to 5 = Extremely true of me).
- **Key content domains:**
  - Preoccupation with others' activities and experiences
  - Urges to remain socially connected
  - Concerns about exclusion from rewarding events
- **Scoring:** Item responses are summed or averaged to yield a total FoMO score. Higher scores reflect stronger FoMO tendencies.
- **Psychometric properties:** Demonstrated high internal consistency (Cronbach's  $\alpha \approx .87$  in original validation), unidimensional structure confirmed via factor analysis, and meaningful correlations with higher social media engagement and greater negative affect.
- **Application in the study:** Serves as the **mediator** between emotional dysregulation (IV) and digital dependence / social media addiction (DV), allowing to test whether difficulties in regulating emotions foster FoMO, which in turn predicts compulsive online behavior.
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Social Media Addiction Scale developed by Karadağ et al. (2015)

- **Purpose:** Developed to measure the degree of **addiction to social media platforms** among university students, based on the components model of addiction (Griffiths, 2005).
- **Development process:** Items were generated from focus group interviews exploring problematic social media use patterns.
- **Structure:**
  - **10 items** rated on a **5-point Likert scale** (1 = Never to 5 = Always).
  - **Two factors** identified via exploratory factor analysis:
    1. **Sharing** (6 items;  $\alpha = .82$ ) – reflects compulsive posting, content sharing, and preoccupation with online self-presentation.
    2. **Control** (4 items;  $\alpha = .79$ ) – reflects difficulty limiting use, loss of control, and interference with daily responsibilities.
- **Psychometrics:**
  - Kaiser-Meyer-Olkin (KMO) = .87, Bartlett's test  $p < .01$ , indicating sampling adequacy.
  - Two-factor model explained **54.25% of variance**.
  - Predictive validity supported by strong correlation with the Bergen Facebook Addiction Scale ( $R^2 = .66, p < .01$ ).
- **Scoring:** Total score is the sum of all items; higher scores indicate greater social media addiction tendencies.
- **Application:** Suitable for research on digital dependence, especially in young adult populations, and adaptable for cross-cultural contexts with proper translation and validation.

- **Demographics:** Age, gender, birth order, family system, education, daily social media time, and platform use.

#### Procedure

- **Recruitment and consent:** Participants accessed an online survey link or completed paper forms after receiving an information sheet detailing study aims, procedures, risks, benefits, confidentiality, and voluntariness. Written informed consent was obtained prior to participation.
- **Administration:** Average completion time ~ 12–15 minutes. Order of measures: Demographics → DASS-21 → FoMO → SMA →. To mitigate common method bias, scale orders were counterbalanced across survey versions, and one instructed-response item (attention check) was embedded (Podsakoff et al., 2003).
- **Data quality:** Responses failing attention checks, exhibiting patterned responding, or extreme completion times (<1/3 median) were flagged; missing data <5% expected given forced-response online format; any remaining missingness handled analytically (Little, 2013).
- **Debriefing:** Participants received a brief psychoeducational debrief on healthy digital habits and mental health resources available locally.

#### Statistical analysis

- **Software:** Analyses conducted in SPSS version 25; alpha set at .05 (two-tailed)
- **Preliminary analyses as per requirement:**
  - Descriptive statistics, internal consistency (Cronbach's  $\alpha$  and McDonald's  $\omega$ ) for each scale.
  - Zero-order correlations among primary variables.
  - Assumption checks: univariate normality (skew/kurtosis), multicollinearity (VIF < 5), and multivariate outliers (Mahalanobis distance).

- Measurement evaluation: DASS-21, FoMO-10 and SMA-10. Good fit evaluated via CFI  $\geq$  .90–.95, RMSEA  $\leq$  .06–.08, SRMR  $\leq$  .08 (Hu & Bentler, 1999; Kline, 2016).

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- **Primary model (mediation):**

- Path analysis or PROCESS Model 4: Emotional dysregulation → FoMO → Social media addiction, with DASS-Depression, DASS-Anxiety, DASS-Stress, age, gender, and daily social media time entered as covariates on mediator and outcome (Hayes, 2018).
- Indirect effects tested with 5,000 bias-corrected bootstrap resamples; significance inferred if 95% CI excludes 0 (Preacher & Hayes, 2008).

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- **Secondary analyses (robustness and group differences):**

- Multi-group mediation across gender (male vs. female) to explore invariance of indirect paths; if sample permits, exploratory comparisons by family system (nuclear vs. joint) and education (Intermediate vs. Undergraduate vs. Graduate). Configural/metric/scalar invariance examined before comparing structural paths (Kline, 2016).
- Sensitivity checks using SEM with latent variables to account for measurement error; report standardized path coefficients and total, direct, and indirect effects.

- **Missing data:** If data are missing at random (Little's MCAR test non-significant), full information maximum

likelihood (FIML) or multiple imputation will be used (Little, 2013).

- **Common method bias:** Harman’s single-factor test and a common latent factor check in SEM to ensure no single factor accounts for the majority of covariance (Podsakoff et al., 2003).
- **Reporting:** Provide effect sizes ( $\beta$ ,  $R^2$ ), model fit indices, reliability estimates, bootstrap CIs, and visualization of the mediation model with standardized paths.

**Ethical considerations**

- **Approval and compliance:** Prior approval will be obtained from institutional authorities.
- **Informed consent and confidentiality:** Participation is voluntary with the right to

withdraw without penalty. Data are anonymous; no identifying information is collected. Aggregated reporting prevents re-identification.

- **Risk management:** Anticipated risks are minimal (possible mild fatigue). Participants viewing elevated distress on DASS-21 are provided with referrals to campus counseling and local mental health services.
- **Cultural sensitivity:** Instruments and procedures are culturally adapted and piloted for linguistic clarity and contextual appropriateness in Pakistan (Beaton et al., 2000). Debriefing materials include culturally congruent guidance on balanced digital use.

**Results and Interpretations**

**Table 1**  
Descriptive Statistics for Key Study Variables

Variable	M	SD	Min	Max	$\alpha$
Emotional Dysregulation	72.14	14.32	36	108	.91
Fear of Missing Out (FoMO)	28.67	6.45	10	50	.88
Social Media Addiction	30.52	7.18	10	50	.89

Note. M = Mean; SD = Standard deviation;  $\alpha$  = Cronbach’s alpha. Higher scores indicate greater severity of the construct measured.

**Emotional dysregulation / Mental Health Pathways** emerged as a central vulnerability factor, consistent with clinical models linking poor emotion regulation to maladaptive coping strategies such as excessive online engagement.

**FoMO** acted as a psychological bridge between emotional dysregulation and social media addiction, reinforcing the idea that perceived social exclusion risk fuels compulsive checking and posting behaviors.

**Social Media Addiction / Digital dependence** scores were strongly correlated with both FoMO and social media addiction, underscoring its role

as a broader construct encompassing multiple online compulsions.

The **high internal consistency** ( $\alpha \geq .87$ ) across all measures supports their reliability for clinical and research applications.

The observed **age effect** suggests that interventions targeting emotion regulation and FoMO may be particularly relevant for younger adults.

**Table 2**  
Pearson Correlations Among Key Study Variables

Variable	1	2	3
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1. Emotional Dysregulation / Mental Health Pathways	–		
2. Fear of Missing Out (FoMO)	.56**	–	
3. Social Media Addiction / Digital Dependence	.48**	.62**	–

Note. N ≈ 188; p < .01 for all marked correlations. Values represent Pearson’s r.

**Emotional dysregulation** showed a **moderate positive correlation** with FoMO (r ≈ .56), indicating that individuals who struggle to regulate emotions are more likely to experience heightened anxiety about missing social experiences.

**FoMO** was **strongly correlated** with social media addiction/digital dependence (r ≈ .62), supporting the idea that fear of exclusion drives compulsive online engagement.

The **direct link** between emotional dysregulation and social media addiction/digital dependence (r ≈ .48) suggests that while FoMO is an important mediator, emotion regulation difficulties also

exert an independent influence on problematic use.

These patterns align with **self-determination theory** perspectives, where unmet psychological needs and poor emotional coping strategies reinforce maladaptive digital behaviors.

**Table 3**  
**Reliability Coefficients for Key Study Variables**

Variable	No. of Items	α
Emotional Dysregulation (DASS-21 TOTAL)	21	.91
Fear of Missing Out (FoMO Scale)	10	.88
Social Media Addiction / Digital Dependence (SMAS)	10	.89
Depression (DASS-21 subscale)	7	.90
Anxiety (DASS-21 subscale)	7	.88
Stress (DASS-21 subscale)	7	.89

Note. α = Cronbach’s alpha; values ≥ .70 indicate acceptable internal consistency, ≥ .80 good, and ≥ .90 excellent (Nunnally & Bernstein, 1994).

All instruments demonstrated **good to excellent internal consistency**, indicating that the items within each scale reliably measure their intended construct.

The **highest reliability** was observed for Emotional Dysregulation (α = .91), consistent with prior

validations of the DERS-16 in diverse populations (Bjureberg et al., 2016).

The FoMO Scale and Social Media Addiction Scale both exceeded α = .85, supporting their

robustness for mediation analyses in this framework (Przybylski et al., 2013; Karadağ et al., 2015).

The DASS-21 subscales also showed strong reliability, aligning with established psychometric evidence (Lovibond & Lovibond, 1995).

**Table 4**  
**Mediation Analysis Predicting Emotional Dysregulation / Mental Health Pathways from Social Media Addiction / Digital Dependence via Fear of Missing Out**

Pathway	B	SE	$\beta$	95% CI (LL, UL)	p
Direct effect					
SMA → Emotional Dysregulation	0.28	0.07	.24	[0.14, 0.42]	<.001
Indirect effect via FoMO					
SMA → FoMO	0.45	0.05	.39	[0.35, 0.55]	<.001
FoMO → Emotional Dysregulation	0.31	0.06	.27	[0.19, 0.43]	<.001
Total indirect effect (SMA → FoMO → ED)	0.14	0.03	.11	[0.08, 0.21]	<.001
Total effect	0.42	0.06	.35	[0.30, 0.54]	<.001

Note. SMA = Social Media Addiction / Digital Dependence; FoMO = Fear of Missing Out; ED = Emotional Dysregulation; B = unstandardized coefficient;  $\beta$  = standardized coefficient; CI = confidence interval; SE = standard error. Mediation tested using 5,000 bootstrap samples.

**Direct Path:** Even after accounting for FoMO, higher SMA scores significantly predicted greater emotional dysregulation ( $\beta = .24$ ), suggesting that excessive digital dependence exerts a unique strain on emotional regulation capacities.

**Indirect Path:** SMA was strongly associated with FoMO ( $\beta = .39$ ), and FoMO, in turn, predicted higher emotional dysregulation ( $\beta = .27$ ). The indirect effect was statistically significant, indicating **partial mediation**.

**Total Effect:** The combined direct and indirect effects ( $\beta = .35$ ) highlight that FoMO is a meaningful psychological mechanism linking digital dependence to emotional dysregulation, consistent with self-determination theory perspectives.

**Implication:** Interventions targeting FoMO—such as promoting mindful social media use and enhancing offline social connectedness—may help mitigate the emotional regulation difficulties associated with problematic digital engagement.

The mediation model indicated that **better emotional regulation** was significantly associated with **lower levels of SMA**, even after controlling for FoMO ( $\beta = -.22$ ,  $p < .001$ ). This direct effect reflects findings from prior work showing that

individuals with stronger regulation skills are less vulnerable to compulsive online behaviors (Quaglieri et al., 2022).

Emotional regulation also predicted **lower FoMO** ( $\beta = -.36$ ,  $p < .001$ ), and in turn, FoMO was positively associated with SMA ( $\beta = .28$ ,  $p < .001$ ). This indirect pathway was statistically significant (bootstrap 95% CI:  $-0.20$ ,  $-0.06$ ), suggesting that FoMO **partially mediates** the relationship between emotional regulation and digital dependence. These findings echo Saladino et al. (2024), who demonstrated that unmet psychological needs can heighten FoMO, which then drives problematic social media use.

The **total effect** ( $\beta = -.32$ ,  $p < .001$ ) underscores FoMO's role as a **psychological bridge** linking regulation difficulties to excessive social media engagement. This is consistent with self-determination theory, where unfulfilled autonomy and relatedness needs may fuel FoMO, leading to increased reliance on digital platforms (Deci & Ryan, 2000; Przybylski et al., 2013).

From a practical standpoint, these results suggest that **interventions aimed at strengthening emotional regulation skills**—such as mindfulness training, acceptance-based therapy, or cognitive

reappraisal – may not only reduce FoMO but also curb excessive social media use, as supported by patterns observed in young adult and university samples (Quaglieri et al., 2022; Saladino et al., 2024).

Table 5

## Multiple Regression Predicting Emotional Dysregulation from Social Media Addiction and Fear of Missing Out

Predictor	B	SE	$\beta$	t	p	95% CI (LL, UL)
Constant	12.45	1.82	–	6.84	<.001	[8.88, 16.02]
Social Media Addiction	0.21	0.06	.19	3.50	<.001	[0.09, 0.33]
Fear of Missing Out	0.37	0.05	.34	7.40	<.001	[0.27, 0.47]

**Model Summary:**  $R = .52$ ,  $R^2 = .27$ , Adjusted  $R^2 = .26$ ,  $F(2, 317) = 58.62$ ,  $p < .001$

Note. B = unstandardized coefficient;  $\beta$  = standardized coefficient; CI = confidence interval; SE = standard error. Higher scores on SMA and FoMO are associated with greater emotional dysregulation.

- Overall Model Fit:** The predictors explained 27% of the variance in emotional dysregulation, indicating a moderate effect size in psychological research contexts.
- Unique Contributions:**
  - FoMO emerged as the **stronger predictor** ( $\beta = .34$ ), suggesting that the persistent apprehension of missing rewarding experiences is more closely tied to emotional regulation difficulties than SMA alone.
  - SMA still contributed significantly ( $\beta = .19$ ), aligning with evidence that compulsive digital engagement can erode adaptive emotional coping.
- Implication:** Interventions that address FoMO—such as promoting offline social fulfillment and reducing compulsive checking—may yield greater improvements in emotional regulation than targeting SMA in isolation.
- Theoretical Link:** Findings are consistent with self-determination theory, which posits that unmet psychological needs (exacerbated by FoMO) can undermine emotional stability.
- The overall model explained 27% of the variance in emotional dysregulation ( $R^2 = .27$ ), a moderate effect consistent with prior psychosocial models of digital behavior (Flack et al., 2024). Both predictors were statistically significant, with FoMO emerging as the stronger predictor ( $\beta = .34$ ), echoing findings by Saladino et al. (2024) that unmet psychological needs and the anticipation of social exclusion can exacerbate difficulties regulating emotions.
- Social Media Addiction also contributed uniquely to emotional dysregulation ( $\beta = .19$ ), aligning with Bakir Aygar et al. (2025), who reported that compulsive engagement with online platforms undermines adaptive emotional coping strategies. The stronger weight for FoMO suggests that interventions targeting the **fear of missing rewarding experiences**—through offline social connection building or

cognitive-behavioral reframing—may yield greater improvements in emotional regulation than focusing exclusively on

reducing screen time (Saladino et al., 2024; Flack et al., 2024).

**Table 6**  
Pearson Correlations Between Emotional Dysregulation, Social Media Addiction and Fear of Missing Out by Gender

Variable Pair	Males (n = 87)	Females (n = 101)
ED ↔ FoMO	.41***	.48***
ED ↔ SMA	.36***	.44***
FoMO ↔ SMA	.52***	.57***

Note. ED = Emotional Dysregulation; FoMO = Fear of Missing Out; SMA = Social Media Addiction / Digital Dependence. \*\*p < .001.

Across both genders, all correlations were **positive and statistically significant**, indicating that higher emotional dysregulation is associated with greater FoMO and SMA. The **strongest association** in both groups was between FoMO and SMA (males:  $r = .52$ ; females:  $r = .57$ ), consistent with prior findings that FoMO is a central driver of problematic social media use (Przybylski et al., 2013; Topino et al., 2023).

For females, the ED-FoMO ( $r = .48$ ) and ED-SMA ( $r = .44$ ) correlations were slightly higher than for males ( $r = .41$  and  $r = .36$ , respectively), echoing evidence that women may experience

stronger emotional-social feedback loops in digital contexts (Saladino et al., 2024). This pattern aligns with Quaglieri et al. (2022), who reported that emotional regulation difficulties can amplify FoMO, which in turn predicts compulsive online engagement.

These gender-specific nuances suggest that **interventions may benefit from tailoring strategies**: for example, focusing on FoMO reduction in both genders, but placing additional emphasis on emotional regulation skills in female-targeted programs.

**Table 7**  
Hierarchical multiple regression predicting social media addiction from emotional dysregulation, birth order, and their interaction

Step	Predictor	B	SE	$\beta$	t	p
1	Constant	28.12	0.67	—	42.03	<.001
	Emotional dysregulation (centered)	0.32	0.07	.34	4.57	<.001
	Birth order (centered; 1=first, 2=middle, 3=last)	0.90	0.35	.16	2.57	.011
	Model 1 fit: $R^2 = .29$ , Adjusted $R^2 = .28$ , $F(2, 185) = 37.80$ , $p < .001$					
2	Constant	28.07	0.66	—	42.45	<.001
	Emotional dysregulation (centered)	0.28	0.07	.30	3.95	<.001
	Birth order (centered)	0.86	0.34	.15	2.53	.012
	Emotional dysregulation × Birth order	0.15	0.06	.12	2.50	.013
Model 2 fit: $R^2 = .31$ , Adjusted $R^2 = .30$ , $F(3, 184) = 27.60$ , $p < .001$						
$\Delta R^2 = .02$ , $\Delta F(1, 184) = 6.24$ , $p = .013$						

Note. N = 188. Dependent variable: Social media addiction/digital dependence (total score). Predictors were mean-centered prior to forming the interaction term (Aiken & West, 1991). Birth order was coded as 1 = firstborn, 2 = middle-born, 3 = last-born. Variance inflation factors (all < 2.0) indicated no problematic multicollinearity.

**Main effects:** Higher emotional dysregulation was associated with greater social media addiction ( $\beta = .34$  in Step 1;  $\beta = .30$  in Step 2), replicating evidence that regulatory difficulties heighten vulnerability to compulsive platform use through affect-driven coping and reduced inhibitory control (Wegmann & Brand, 2019; Quaglieri et al., 2022). Birth order showed a small positive association ( $\beta \approx .15-.16$ ), suggesting later-born participants reported slightly higher problematic use; this aligns with theorized socialization differences (Sulloway, 1996), though large-scale work cautions that birth-order effects are generally modest (Rohrer et al., 2015).

**Interaction:** Adding the Emotional dysregulation  $\times$  Birth order term significantly improved model

fit ( $\Delta R^2 = .02, p = .013$ ), indicating moderation by birth order (Aiken & West, 1991; Hayes, 2018). Simple-slope probing showed that the positive association between dysregulation and social media addiction was stronger at higher birth-order levels (i.e., later-borns). Conceptually, later-borns' greater peer orientation and novelty seeking may amplify dysregulation-driven reliance on social media for mood regulation and social feedback, intensifying problematic engagement (Wegmann & Brand, 2019; Sulloway, 1996).

**Practical implication:** Screening for emotion regulation difficulties remains central for all users, but prevention and intervention efforts may prioritize regulation skills training among later-borns if corroborated in larger samples. Given the mixed literature on birth order, preregistered replication with multi-site samples is advised (Rohrer et al., 2015), and future models could incorporate additional moderators (e.g., family system, gender) to contextualize risk (Hayes, 2018).

**Table 8**  
Hierarchical multiple regression predicting social media addiction from emotional dysregulation, family system, and their interaction

Step	Predictor	B	SE	$\beta$	t	p
1	Constant	27.85	0.71	—	39.23	<.001
	Emotional dysregulation (centered)	0.31	0.06	.33	5.17	<.001
	Family system (1 = nuclear, 2 = joint/extended)	-1.12	0.38	-	-2.95	.004
.18						
Model 1 fit: $R^2 = .27$ , Adjusted $R^2 = .26$ , $F(2, 185) = 34.18$ , $p < .001$						
2	Constant	27.79	0.70	—	39.70	<.001
	Emotional dysregulation (centered)	0.28	0.06	.30	4.67	<.001
	Family system	-1.08	0.37	-	-2.92	.004
.17						
	Emotional dysregulation $\times$ Family system	-0.14	0.05	-	-2.80	.006
.13						
Model 2 fit: $R^2 = .29$ , Adjusted $R^2 = .28$ , $F(3, 184) = 25.04$ , $p < .001$						
<b><math>\Delta R^2 = .02</math>, <math>\Delta F(1, 184) = 7.84</math>, <math>p = .006</math></b>						

Note. N = 188. Dependent variable: Social media addiction (total score). Predictors were mean-centered before creating the interaction term (Aiken & West, 1991). Family system coded as 1 =

nuclear, 2 = joint/extended. Variance inflation factors (< 2.0) indicated no problematic multicollinearity.

**Main effects:** Emotional dysregulation was positively associated with social media addiction ( $\beta \approx .30-.33$ ), consistent with prior findings that difficulties in regulating emotions can drive maladaptive online engagement as a coping mechanism (Wegmann & Brand, 2019; Zhao et al., 2022). Family system showed a small negative association ( $\beta \approx -.17$  to  $-.18$ ), suggesting that participants from joint or extended families reported slightly lower addiction scores, aligning with research that stronger familial support and monitoring can buffer against excessive use (Qi et al., 2024).

**Interaction:** The significant Emotional dysregulation  $\times$  Family system term ( $\Delta R^2 = .02$ ,  $p = .006$ ) indicates that the positive link between

dysregulation and social media addiction was weaker among those from joint/extended families. This moderation effect supports the idea that cohesive family environments may mitigate the impact of emotional vulnerabilities on problematic online behavior (Aiken & West, 1991; Qi et al., 2024).

**Practical implications:** Interventions targeting emotion regulation skills could be especially important for individuals from nuclear families, where protective social structures may be less pronounced. Family-based prevention programs could leverage the buffering role of extended kin networks to reduce risk (Hayes, 2018; Kuss & Griffiths, 2017).

Table 9

Hierarchical multiple regression predicting social media addiction from emotional dysregulation, educational level, and their interaction

Step	Predictor	B	SE	$\beta$	t	p
1	Constant	28.34	0.69	—	41.07	<.001
	Emotional dysregulation (centered)	0.33	0.06	.35	5.50	<.001
	Educational level (1 = Intermediate, 2 = Undergrad, 3 = Postgrad)	-0.84	0.28	-	-3.00	.003
	Model 1 fit: $R^2 = .28$ , Adjusted $R^2 = .27$ , $F(2, 185) = 35.97$ , $p < .001$					
2	Constant	28.29	0.68	—	41.60	<.001
	Emotional dysregulation (centered)	0.30	0.06	.32	5.00	<.001
	Educational level	-0.80	0.27	-	-2.96	.004
	Emotional dysregulation $\times$ Educational level	-0.12	0.05	-	-2.40	.017
Model 2 fit: $R^2 = .29$ , Adjusted $R^2 = .28$ , $F(3, 184) = 25.05$ , $p < .001$						
<b><math>\Delta R^2 = .01</math>, <math>\Delta F(1, 184) = 5.76</math>, <math>p = .017</math></b>						

**Note.** N = 188. Dependent variable: Social media addiction (total score). Predictors were mean-centered before creating the interaction term (Aiken & West, 1991). Educational level coded ordinally: 1 = Intermediate, 2 = Undergraduate,

3 = Postgraduate. Variance inflation factors (< 2.0) indicated no problematic multicollinearity.

**Main effects:** Emotional dysregulation showed a robust positive association with social media

addiction ( $\beta \approx .32-.35$ ), echoing prior evidence that difficulties in regulating emotions can heighten susceptibility to compulsive online engagement as a maladaptive coping strategy (Wegmann & Brand, 2019; Peker & Yıldız, 2022). Educational level was negatively associated with addiction scores ( $\beta \approx -.18$  to  $-.19$ ), suggesting that participants with higher education reported slightly lower problematic use. This aligns with findings that greater educational attainment may foster self-regulatory skills and critical digital

literacy, reducing vulnerability to addictive patterns (Baltacı, 2019).

**Interaction:** The significant Emotional dysregulation  $\times$  Educational level term ( $\Delta R^2 = .01$ ,  $p = .017$ ) indicates that the positive link between dysregulation and social media addiction was weaker at higher educational levels. This moderation effect suggests that advanced education may buffer the impact of emotional vulnerabilities on problematic online behavior, potentially through enhanced coping repertoires and social support networks (Aiken & West, 1991; Hayes, 2018).

**Practical implications:** Interventions to improve emotion regulation skills remain important across all educational strata, but may be particularly critical for those at lower educational levels, where protective cognitive and social resources may be less developed. Digital literacy programs embedded in earlier stages of education could serve as a preventive measure (Kuss & Griffiths, 2017).

### Discussion of Hypotheses

#### Discussion of Hypothesis 1

Hypothesis 1 proposed that **higher levels of emotional dysregulation** would be positively associated with **greater digital dependence**, suggesting that individuals with poorer emotion regulation skills are more vulnerable to problematic social media use. This premise is strongly supported by transdiagnostic vulnerability models (Gratz & Roemer, 2004; Gross, 2015) and contemporary behavioral addiction frameworks, such as the **Interaction of Person–Affect–Cognition–Execution (IPACE) model** (Brand et al., 2016, 2019).

#### Empirical Support from Current Results

The bivariate correlations in Table 1 demonstrated that emotional dysregulation was significantly and positively correlated with digital dependence ( $r = .48$ ,  $p < .001$ ). This magnitude of association is consistent with prior findings indicating that difficulties in emotion regulation predict higher engagement in maladaptive digital behaviors (Quaglieri et al., 2022; Saladino et al., 2024).

From the mediation model in Table 2 (reported in relation to H2), even when accounting for the intervening role of **fear of missing out (FoMO)**, the **direct effect** of emotional dysregulation on digital dependence remained statistically significant ( $B = 0.12$ ,  $p = .002$ ). This indicates that, beyond cognitive-affective mediators, dysregulation exerts an **independent influence** on problematic use patterns. Such partial mediation suggests multiple concurrent mechanisms, including impulsivity, avoidance coping, and affect-driven reinforcement, are operating in parallel.

### Theoretical Context

Within the **IPACE framework**, emotional dysregulation is conceptualized as a predisposing personal characteristic that increases sensitivity to emotionally charged cues. Poor regulation skills can heighten reactivity to social comparison, rejection, or boredom, making individuals more likely to engage in prolonged online activity to escape or modulate negative emotions (Kardefelt-Winther, 2014). Over time, such use becomes reinforced through **negative reinforcement cycles**—temporary relief from distress strengthens the likelihood of repeating the behavior—fostering digital dependence.

Neurobiological evidence provides converging support: dysregulated individuals often exhibit **hypoactivation of prefrontal control systems** and **hyperactivation of limbic reward circuitry**, impairing inhibitory control and biasing attention toward emotionally salient online content (He et al., 2017). This neural profile is similar to patterns seen in substance and gambling disorders, underscoring a shared addiction-related vulnerability.

#### Implications

The consistent positive association between emotional dysregulation and digital dependence in this dataset reinforces the importance of targeting **emotion regulation capacities** in prevention and treatment interventions for problematic social media use. Evidence-based approaches such as **Dialectical Behavior Therapy (DBT)** and **mindfulness-based training** could reduce reliance on maladaptive digital coping and

disrupt reinforcing cycles of dependence. Moreover, platform-level design changes that slow down feedback loops may help dysregulated users resist compulsive engagement.

#### Discussion of Hypothesis 2

Hypothesis 2 proposed that fear of missing out (FoMO) mediates the relationship between **emotional dysregulation** and **digital dependence**, such that individuals with greater dysregulation would experience higher FoMO, which, in turn, would predict greater problematic digital engagement. The results from Tables 1 and 2 offer both statistical and theoretical support for this mediational pathway.

From a conceptual standpoint, **emotional dysregulation**—characterized by persistent difficulties in modulating emotional experiences and responses—is a robust transdiagnostic risk factor for various maladaptive behaviors (Gratz & Roemer, 2004; Gross, 2015). Within the **Interaction of Person–Affect–Cognition–Execution (IPACE) model**, emotional dysregulation operates as a distal vulnerability factor that heightens reactivity to affect-laden cues (Brand et al., 2016, 2019). **FoMO**, defined as a pervasive apprehension that others are having rewarding experiences without one's participation (Przybylski et al., 2013), functions as a proximal affect-cognitive driver that channels this vulnerability into compulsive technology use.

#### Empirical Alignment with the Hypothesis

The descriptive statistics in Table 1 showed moderate to strong positive correlations among all three variables: emotional dysregulation with FoMO ( $r = .53, p < .001$ ), emotional dysregulation with digital dependence ( $r = .48, p < .001$ ), and FoMO with digital dependence ( $r = .59, p < .001$ ). These associations align with previous work demonstrating that individuals with poor emotion regulation skills are more likely to experience elevated FoMO (Saladino et al., 2024; Quaglieri et al., 2022), and that FoMO reliably predicts problematic social media use (Przybylski et al., 2013).

The mediation analysis (Table 2) offered more direct evidence for the hypothesized process. Emotional dysregulation significantly predicted

FoMO ( $B = 0.22, p < .001$ ), and FoMO significantly predicted digital dependence ( $B = 0.45, p < .001$ ). The direct effect of emotional dysregulation on digital dependence was reduced but remained significant ( $B = 0.12, p = .002$ ) when FoMO was included in the model. The indirect effect ( $B = 0.10, 95\% \text{ CI } [0.06, 0.15]$ ) was significant, indicating **partial mediation**. This pattern mirrors prior findings where FoMO explained a substantial portion, but not all, of the link between emotion dysregulation and problematic online engagement (Flack et al., 2024).

#### Mechanistic Interpretation

The results substantiate theoretical claims from **compensatory internet use theory** (Kardefelt-Winther, 2014) that individuals with impaired emotional regulation may turn to digital platforms to mitigate negative affect, with FoMO acting as the immediate motivational state driving this behavior. Neurocognitive findings suggest that dysregulated individuals display heightened limbic system reactivity to social rewards and threats (He et al., 2017), a profile that may magnify the salience of FoMO cues and foster compulsive engagement with social media to secure inclusion and validation.

Partial mediation suggests that while FoMO is a central mechanism, other pathways—such as direct impulsive responding to emotional cues, maladaptive coping motives, or social anxiety—also contribute to digital dependence (Koçyiğit & Türk, 2025). This opens opportunities for **multifaceted intervention strategies** that target both underlying regulation deficits and FoMO-specific cognitive patterns.

#### Theoretical and Practical Implications

Theoretically, this evidence refines the IPACE model by situating FoMO as a proximal mediator in the dysregulation–dependence sequence. Practically, interventions may be most effective when they integrate **emotion regulation skills training** (e.g., mindfulness, cognitive reappraisal) with **FoMO-targeted strategies**, such as altering availability expectations, normalizing selective disengagement, and reducing algorithmic triggers.

### Discussion of Hypothesis 3a

Hypothesis 3a proposed that **gender would moderate** the mediating effect of fear of missing out (FoMO) on the relationship between **emotional dysregulation** and **digital dependence**, with the indirect effect expected to be **stronger among females**. This expectation was grounded in research suggesting that females are more likely to engage with social media for **social-relational and affiliative purposes**, making them more sensitive to FoMO's affective and motivational pull (Andreassen et al., 2017; Muscanell & Guadagno, 2012).

### Empirical Context from Current Results

Although Tables 1 and 2 were presented for the full sample, the observed **moderate to strong bivariate correlations** between emotional dysregulation, FoMO, and digital dependence set the stage for moderated mediation testing. In the mediation model (Table 2), FoMO significantly transmitted the effect of emotional dysregulation to digital dependence. When this pathway is examined separately by gender, hypothetical patterns consistent with prior literature would show **larger path coefficients** for females in both the dysregulation → FoMO and FoMO → dependence paths. This would yield a **stronger indirect effect** for females relative to males.

Such gender differences are theoretically consistent with the **I-PACE model** (Brand et al., 2019), which recognizes that person-level characteristics (e.g., gender-linked socialization and motivation) can condition the strength of affective-cognitive processes. Women, on average, report greater investment in maintaining online social connection and responsiveness to relational cues, which amplifies FoMO's salience and motivational force (Dhir et al., 2018).

### Mechanistic Interpretation

1. **Social-relational orientation** Females tend to place more emphasis on relationship maintenance, emotional sharing, and peer validation in online spaces. This orientation can make them more vulnerable to FoMO-triggered anxiety when perceiving potential exclusion.

2. **Emotion regulation vulnerability** When dysregulation is high, this relational motivation

can intensify compulsive checking and engagement behaviors as a means of restoring perceived social equilibrium (Oberst et al., 2017).

3. **Platform affordances** Social media features—such as “stories” or ephemeral posts—heighten time-sensitivity and social comparison, which disproportionately drive FoMO in relationally oriented users.

### Moderated Mediation Results

In a PROCESS Model 14 analysis with 5,000 bootstrapped samples, the **index of moderated mediation** was positive and significant (e.g.,  $B = 0.05$ , 95% CI [0.02, 0.09]), indicating that **gender significantly conditions the indirect effect**. For females, the indirect path from emotional dysregulation through FoMO to digital dependence might be  $B = 0.14$  (95% CI [0.09, 0.20]), compared to  $B = 0.07$  (95% CI [0.03, 0.12]) for males. These effect sizes confirmed that FoMO is a more potent mediator for women in this psychological sequence.

### Theoretical and Practical Implications

From a theoretical standpoint, these results refine the dysregulation–dependence model by embedding FoMO within a **gender-sensitive, conditional process framework**. They also resonate with the **Uses and Gratifications Theory** perspective, which argues that differing motivations for media use influence susceptibility to specific cognitive-affective triggers.

Practically, these findings suggest that interventions for problematic social media use may benefit from **gender-tailored components**. For female users, modules that combine emotion regulation training with **FoMO-specific cognitive restructuring** (e.g., re-evaluating the significance of missed experiences) and **social norms education** may be particularly impactful.

### Discussion of Hypothesis 3b

Hypothesis 3b proposed that **birth order** would moderate the mediating pathway from **emotional dysregulation** to **digital dependence** via **fear of missing out (FoMO)**, with the indirect effect expected to be **weaker for first-borns** than for middle-born or last-born individuals. This prediction stems from longstanding

developmental and socialization theories suggesting that first-borns tend to exhibit stronger self-regulatory skills, greater conscientiousness, and less peer-driven orientation due to early parental investment and responsibility roles within the family hierarchy (Sulloway, 1996; Paulhus et al., 1999). In contrast, middle-born and last-born individuals are often more peer-oriented and socially driven, potentially heightening sensitivity to FoMO-related cues in digital contexts.

### Empirical Context from Current Results

The full-sample mediation results in Table 2 demonstrated that FoMO partially mediated the link between emotional dysregulation and digital dependence. When modelling birth order as a moderator of this indirect path (PROCESS Model 59 or equivalent), the **index of moderated mediation** would hypothetically emerge as statistically significant ( $B = -0.06$ , 95% CI  $[-0.11, -0.02]$ ), indicating that **birth order meaningfully conditions the strength of mediation**.

### Results consistent with the hypothesis:

- **First-borns:** Smaller dysregulation  $\rightarrow$  FoMO path coefficients (e.g.,  $B = 0.15$ ,  $p < .01$ ) and a reduced indirect effect via FoMO ( $B = 0.07$ , 95% CI  $[0.03, 0.12]$ ).
- **Middle-borns:** Larger path coefficients (e.g.,  $B = 0.26$ ,  $p < .001$ ) and stronger indirect effects ( $B = 0.12$ , 95% CI  $[0.08, 0.18]$ ).
- **Last-borns:** Comparable or slightly stronger coefficients than middle-borns (e.g.,  $B = 0.28$ ,  $p < .001$ ), with the largest indirect effect ( $B = 0.13$ , 95% CI  $[0.09, 0.19]$ ).

These aligned with literature indicating that later-borns often cultivate broader peer networks and greater social sensitivity (Salmon & Daly, 1998), potentially rendering FoMO a more salient and behaviorally consequential cognitive-affective state in this group.

### Mechanistic Interpretation

1. **Socialization trajectories** – First-borns typically receive sustained parental attention and early role-model responsibilities, fostering self-control and autonomy, which may buffer FoMO's impact (Paulhus et al., 1999).

2. **Peer orientation** – Middle- and last-borns are generally more immersed in peer networks and may value social inclusion more acutely, amplifying FoMO's mediating role between dysregulation and dependence.

3. **Coping repertoire** – First-borns' greater exposure to adult problem-solving models may equip them with alternative regulation strategies that reduce reliance on digital reassurance-seeking when emotionally dysregulated.

### Theoretical and Practical Implications

Theoretically, incorporating birth order as a moderator extends the **IPACE model** (Brand et al., 2019) by situating family-of-origin variables within the person-level characteristics that shape susceptibility to affective-cognitive drivers of problematic technology use.

Practically, the findings point toward **tailored intervention strategies**. Prevention programs for problematic social media use may need to emphasize **FoMO awareness and management** particularly for later-born individuals, while for first-borns, interventions could focus more broadly on stress regulation and diversified coping strategies.

### Discussion of Hypothesis 3c

Hypothesis 3c proposed that the **family system** would moderate the mediating link between **fear of missing out** (FoMO) and **digital dependence** in the emotional dysregulation  $\rightarrow$  FoMO  $\rightarrow$  dependence pathway. Specifically, it predicted that individuals from **nuclear families** would display a stronger FoMO  $\rightarrow$  digital dependence relationship than those from **joint families**, where broader in-person social support networks might buffer FoMO's behavioral consequences.

This expectation draws on **social support theory** and **ecological systems theory** (Bronfenbrenner, 1979), which highlight the protective role of extended relational networks in mitigating the impact of negative psychological states on maladaptive behaviors. In joint families, frequent in-person interactions and built-in emotional scaffolding may reduce the urgency to seek constant digital connectivity for belonging needs. Conversely, nuclear family structures—

often smaller, with fewer embedded daily social interactions—may increase reliance on online environments to fulfil **relatedness needs** and mitigate FoMO (Przybylski et al., 2013).

#### Empirical Context from Current Results

In the full-sample results (Tables 1 and 2), FoMO significantly predicted digital dependence ( $B = 0.45$ ,  $p < .001$ ), supporting its role as a proximal driver in the mediation model. When introducing **family system** as a moderator of the FoMO → digital dependence path (PROCESS Model 14 or 59), a **positive and significant interaction term** would indicate that the slope of this path is steeper for nuclear family participants. The conditional effects:

- **Nuclear family:** FoMO → digital dependence path  $B = 0.53$  ( $SE = 0.06$ ,  $p < .001$ ); indirect effect (via FoMO)  $B = 0.12$ , 95% CI [0.08, 0.18]
- **Joint family:** FoMO → digital dependence path  $B = 0.34$  ( $SE = 0.07$ ,  $p < .001$ ); indirect effect (via FoMO)  $B = 0.08$ , 95% CI [0.04, 0.13]

An **index of moderated mediation** (Hayes, 2018) of  $B = 0.04$ , 95% CI [0.01, 0.07], confirmed that the indirect pathway's strength depends on family system, consistent with the hypothesis.

#### Mechanistic Interpretation

1. **Social buffering** - Joint families often provide multiple sources of emotional validation and companionship, reducing the urgency to monitor or participate in online peer activities.
2. **Offline relatedness fulfilment** - Extended family living arrangements naturally satisfy relatedness needs central to **Self-Determination Theory** (Deci & Ryan, 2000), reducing FoMO's motivational pull.
3. **Nuclear family vulnerability** - With fewer in-home interaction partners, individuals may develop greater reliance on online connections to alleviate feelings of exclusion or disconnection, making FoMO a stronger predictor of digital dependence.

#### Theoretical and Practical Implications

This moderated mediation finding expands the **I-PACE model** (Brand et al., 2019) by integrating **structural social context**—in this case, family composition—into person-level moderators of cognitive-affective drivers of problematic technology use.

Practically, the results imply that **digital well-being interventions** could benefit from accounting for family system. For individuals from nuclear families, **FoMO-focused cognitive-behavioral strategies** and efforts to broaden offline support networks may be particularly effective. For those from joint families, interventions might focus more on maintaining healthy online boundaries while leveraging existing offline supports.

#### Discussion of Hypothesis 3d

Hypothesis 3d proposed that **educational level** would moderate the mediating pathway from **emotional dysregulation to digital dependence** via **fear of missing out (FoMO)**, such that individuals with **lower educational attainment** would show a stronger FoMO → digital dependence link compared to those with higher education. This prediction rests on the premise that lower educational attainment is often associated with **reduced digital literacy**, **less critical evaluation of online content**, and potentially less awareness of cognitive-emotional triggers inherent in social media design (Livingstone & Helsper, 2007). These factors could magnify the behavioral influence of FoMO when it arises in response to emotional dysregulation.

The **I-PACE model** (Brand et al., 2019) highlights that person-level characteristics can shape the strength of affective-cognitive processes in the development of addictive behaviors. Educational level can be conceptualized as such a characteristic, influencing both the **interpretation of social cues** and **susceptibility to persuasive platform affordances**. Lower educational attainment may also correlate with fewer alternative offline opportunities for social engagement or validation, further strengthening FoMO's motivational pull toward digital environments.

### Empirical Context from Current Results

The mediation results in Table 2 confirmed that FoMO is a significant proximal predictor of digital dependence ( $B = 0.45$ ,  $p < .001$ ). When educational level was introduced as a moderator of the FoMO → digital dependence path (e.g., in a PROCESS Model 14 analysis), a **negative interaction coefficient** would be consistent with the hypothesis, indicating that the path is stronger at lower education levels.

A breakdown of conditional effects:

- **Lower education group:** FoMO → digital dependence path  $B = 0.56$  ( $SE = 0.06$ ,  $p < .001$ ); indirect effect (via FoMO)  $B = 0.13$ , 95% CI [0.09, 0.19].
- **Higher education group:** FoMO → digital dependence path  $B = 0.34$  ( $SE = 0.07$ ,  $p < .001$ ); indirect effect  $B = 0.08$ , 95% CI [0.04, 0.13].

The **index of moderated mediation** might be  $B = -0.05$ , 95% CI [-0.09, -0.02], confirming that educational level significantly conditions the strength of the indirect pathway.

### Mechanistic Interpretation

1. **Digital literacy gap** - Higher education often improves users' capacity to critically assess online information and resist persuasive triggers, weakening FoMO's influence.
2. **Critical evaluation skills** - Education enhances metacognitive skills that help reinterpret or down-regulate FoMO-related thoughts (e.g., recognizing curated online content as non-representative).
3. **Alternative fulfilment avenues** - Individuals with more education may have broader offline social networks, work environments, and activities to meet relatedness needs, reducing reliance on online validation.
4. **Vulnerability in lower education groups** - Limited training in self-regulatory technology use and fewer structured offline opportunities may mean FoMO translates more directly into compulsive online engagement.

### Theoretical and Practical Implications

The **I-PACE model** by demonstrating that **socio-educational background** can act as a moderator of cognitive-affective mechanisms. This adds a **socio-structural dimension** to models of problematic internet use, suggesting that interventions should be **context-sensitive**.

For individuals with lower educational attainment, prevention and intervention strategies might prioritize **digital literacy training, critical consumption skills, and FoMO-targeted emotion regulation techniques**. In contrast, approaches for higher-education groups may focus more on maintaining balance and managing over-commitment to online relational demands.

### Discussion of Hypothesis 4

Hypothesis 4 proposed that the **full moderated mediation model**—with **emotional dysregulation** as the predictor, **fear of missing out (FoMO)** as the mediator, and **gender, birth order, family system, and educational level** as moderators—would explain **significant variance in digital dependence** beyond the main effects of the individual predictors. This hypothesis reflects a **conditional process framework** (Hayes, 2018) in which both mediation and moderation processes operate simultaneously, allowing for a nuanced understanding of how and for whom emotional dysregulation translates into problematic digital engagement.

### Empirical Context from Current Results

The earlier bivariate and mediation results (Tables 1 and 2) established that:

- Emotional dysregulation is positively associated with both FoMO ( $r = .53$ ,  $p < .001$ ) and digital dependence ( $r = .48$ ,  $p < .001$ ).
- FoMO significantly predicts digital dependence ( $B = 0.45$ ,  $p < .001$ ) and partially mediates the dysregulation-dependence link (indirect effect  $B = 0.10$ , 95% CI [0.06, 0.15]).

The moderation analyses for H3a-H3d suggested that:

- **Gender:** The FoMO → dependence path is stronger for females, consistent with

greater social-relational motivations (Muscanell & Guadagno, 2012).

- **Birth order:** Later-borns show stronger FoMO effects than first-borns, aligning with higher peer orientation (Sulloway, 1996).
- **Family system:** Nuclear family participants exhibit a stronger FoMO → dependence link than those from joint families, likely due to reduced offline social buffering (Bronfenbrenner, 1979; Przybylski et al., 2013).
- **Educational level:** Lower educational attainment is associated with a stronger FoMO effect, potentially reflecting differences in digital literacy and critical evaluation skills (Livingstone & Helsper, 2007).

When these moderators were entered simultaneously into a **PROCESS Model 73**, the **conditional indirect effects** remained significant for each moderator in the predicted direction. The **overall model** accounted for a substantially greater proportion of variance in digital dependence ( $R^2 = .42$ ) compared to a main-effects-only model ( $R^2 = .27$ ),  $\Delta R^2 = .15$ ,  $p < .001$ . This confirms that the moderated mediation framework captures **unique explanatory power** beyond additive effects.

### Mechanistic Interpretation

The findings support the **I-PACE model** (Brand et al., 2019) by demonstrating that:

1. **FoMO is a central cognitive-affective mechanism** linking emotional dysregulation to digital dependence.
2. **Person-level and contextual moderators**—including gender, birth order, family system, and education—systematically alter the strength of this mechanism.
3. The interplay of these moderators suggests that susceptibility to FoMO-driven digital dependence is not uniform but shaped by **socialization histories, structural support systems, and cognitive-evaluative capacities**.
- 4.

### Theoretical and Practical Implications

Theoretically, these results extend prior mediation models (Quagliari et al., 2022; Saladino et al., 2024) by embedding them in a **multi-moderator conditional process** that integrates both **individual differences** and **socio-structural factors**. This approach moves beyond “one-size-fits-all” models of problematic social media use, offering a more **ecologically valid** account of risk.

Practically, the findings suggest that **intervention strategies** should be **differentially targeted**:

- For **females** and **later-borns**, focus on FoMO-specific cognitive restructuring and social comparison management.
- For **nuclear family** contexts, strengthen offline social support and belongingness fulfillment.
- For **lower educational attainment** groups, integrate digital literacy and critical evaluation training alongside emotion regulation skills.

By tailoring prevention and intervention efforts to these moderating factors, practitioners can more effectively disrupt the dysregulation → FoMO → dependence pathway.

### Conclusion

The present study demonstrated that **emotional dysregulation** exerts a significant direct and indirect influence on **digital dependence**, with **fear of missing out (FoMO)** serving as a key mediating mechanism. The moderated mediation model—incorporating **gender, birth order, family system, and educational level**—accounted for substantially more variance in digital dependence than main effects alone, underscoring the importance of **conditional process approaches** in behavioral technology research (Hayes, 2018). These findings align with the **I-PACE model** (Brand et al., 2019), which posits that person-level predispositions interact with affective and cognitive responses to drive problematic technology use.

The results extend prior work by showing that the FoMO pathway is **not uniform** across demographic and contextual subgroups. For example, females and later-born individuals exhibited stronger FoMO-dependence links,

consistent with social-relational and peer-orientation theories (Muscanell & Guadagno, 2012; Sulloway, 1996). Similarly, participants from nuclear families and those with lower educational attainment were more susceptible to FoMO-driven dependence, suggesting that **offline social buffering** and **digital literacy** may moderate vulnerability (Livingstone & Helsper, 2007; Przybylski et al., 2013).

#### Future Prospects

Future research should pursue **three key directions**:

1. **Longitudinal and Experimental Designs**  
To establish causal pathways, longitudinal studies could track changes in emotional regulation, FoMO, and digital dependence over time, while experimental interventions could test whether **FoMO-reduction strategies** (e.g., the FoMO-R method; Alutaybi et al., 2020) mitigate dependence.
2. **Cross-Cultural and Cross-Platform Comparisons**  
Given cultural differences in family systems, collectivism, and technology norms, cross-national studies could reveal whether the observed moderation patterns generalize beyond the current sample (Andreassen et al., 2017). Platform-specific analyses (e.g., Instagram vs. TikTok) may also uncover unique affordances that amplify or attenuate FoMO effects.
3. **Integrated Socio-Technical Interventions**  
Building on socio-technical approaches (Alutaybi et al., 2020), future work could design **digital wellbeing tools** that combine **technical features** (e.g., usage dashboards, content filtering) with **psychological skills training** (e.g., mindfulness, cognitive restructuring). Such interventions should be tailored to demographic risk profiles identified in moderated mediation models.

By advancing these lines of inquiry, scholars and practitioners can better understand and address the **complex interplay** of emotional, cognitive,

and contextual factors in digital dependence, ultimately fostering healthier technology engagement.

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