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Intolerance of Uncertainty and Emotion Dysregulation Mediate Relations Between Fear of Negative Evaluation and Problematic Social Media Use Severity

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Abstract

Problematic social media use (PSMU) has been associated with social anxiety symptoms, including fear of negative evaluation (FNE), across the literature. Less is known about constructs mediating relations between fear of negative evaluation and PSMU, such as emotion dysregulation and intolerance of uncertainty. Given the high prevalence of social media usage and social nature of these sites, and their high usage in emerging adults, we explored relationships between FNE and fear of positive evaluation (FPE) with PSMU severity, and whether intolerance of uncertainty and emotion dysregulation mediated these relationships. The sample of 372 undergraduate students aged 18–25 (M = 19.9, SD = 4.3) at a Midwestern U.S. University (65.6% or n = 244 female) completed a web survey to assess the relations between fears of evaluation, emotion dysregulation, intolerance of uncertainty, and PSMU severity in a cross-sectional design. Structural equation modeling results demonstrated significant direct pathways between intolerance of uncertainty and emotion dysregulation with FNE (β = .67; β = .59, respectively; ps < .01) and PSMU severity (β = .30, β = .29, respectively; ps < .01). Indirect effect testing indicated that intolerance of uncertainty (β = .21, p < .001) and emotion dysregulation (β = .17, p < .001) mediated relations between FNE (but not FPE) and PSMU severity. Results provide support for the mediating roles of intolerance of uncertainty and emotion dysregulation in the relationship between FNE and PSMU severity. Results are discussed in context of prior work on fear of evaluation, PSMU, and relevant transdiagnostic psychopathology processes.

Keywords: problematic social media use; fear of negative evaluation; intolerance of uncertainty; emotion regulation; social anxiety; social media; internet addiction; social networking

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Introduction

Widespread use of social media is a global phenomenon, with 5.07 billion unique social media users worldwide (Kemp, 2024). Additionally, approximately 83% of the American public uses at least one social media site, with the majority checking at least one social media platform daily (Gottfried, 2024). Emerging adulthood is a unique developmental period, with identity and role exploration of crucial importance, and social media provides opportunities to express one's identity (Arnett, 2000). Furthermore, 95% of American emerging adults aged 18–25 report use of at least one social media site, making the study of social media use in this age group particularly relevant (Auxier & Anderson, 2021).

While using social media can be beneficial for some users by providing increased socioemotional support or social capital (D. Liu et al., 2018; Williams, 2019), some individuals are at risk of developing adverse consequences from social media use, therefore causing it to become problematic (Hussain & Starcevic, 2020; Lee et al., 2017). Problematic social media use (PSMU) falls under the broader umbrella of problematic internet use (Fineberg et al., 2018) and is defined by prolonged and uncontrolled use of social media despite negative consequences, with significant distress and impairment (Fineberg et al., 2022). These symptoms are similar to substance and behavioral addictions, such as mood swings, cravings, unsuccessful attempts to control, withdrawal symptoms, impaired functioning, and significant distress (Koc & Gulyagci, 2013; Marino et al., 2018; Schou Andreassen & Pallesen, 2014). However, PSMU is a distinct construct from other problematic online behaviors (e.g., problematic online gaming, problematic online gambling; Baggio et al., 2024). PSMU has also been referred to as social media addiction (Lee et al., 2017), though we acknowledge that PSMU is not a diagnosis codified in DSM-5 or ICD-11.

After all, social media sites are designed to prolong time spent engaging with them (Montag et al., 2019; Schou Andreassen & Pallesen, 2014), particularly social media smartphone applications (Montag & Elhai, 2023). Many individuals access social media sites from their smartphones, causing some overlap with problematic online behaviors such as problematic smartphone use, particularly with messaging apps such as WhatsApp (Marino et al., 2021; Rozgonjuk, Sindermann, Elhai, Christensen & Montag, 2020). Furthermore, certain social media sites have been linked with PSMU more strongly than others, specifically Instagram, WhatsApp, and Facebook (Rozgonjuk et al., 2021; Rozgonjuk, Sindermann, Elhai & Montag, 2020).

PSMU severity has been linked generally to worse mental health and well-being (Fineberg et al., 2022; Twenge & Campbell, 2019; Wong et al., 2020) and specifically associated with anxiety and depression severity in emerging adults (Marino et al., 2018; Primack et al., 2017; Shannon et al., 2022). PSMU can also share some features with obsessive-compulsive disorder such as repeated checking, and social anxiety disorder by way of using social media to avoid face-to-face interaction (Fineberg et al., 2018). These sites all involve communication or evaluation of some type (e.g., evaluation of physical appearance, verbal expression, or communication skills).

Approximately one-third of emerging adults globally experience symptoms of social anxiety (Jefferies & Ungar, 2020), and social media use may function as a maladaptive coping mechanism for symptoms of social anxiety (Elhai et al., 2019; Longstreet et al., 2019), particularly for those who perceive they rely on social media for social support, tend toward upward social comparisons, and/or show difficulties with self-regulation (Burnell & Kuther, 2016; Z. Liu et al., 2020). Social anxiety disorder (SAD) is linked with PSMU severity in the extant literature (Casale et al., 2024; Casale & Fioravanti, 2015; Wu et al., 2024), and PSMU can become an avoidance strategy, maladaptive coping technique, or way to compensate for perceived social deficits in those with SAD (Casale et al., 2015; Dobrean & Pasarelu, 2016; Zsido et al., 2020).

The core construct contributing to SAD is fear of evaluation, particularly fear of negative evaluation (FNE) in social situations (American Psychiatric Association, 2013; Sigurvinsdottir et al., 2021). FNE is heightened in SAD compared to individuals with other or no anxiety disorders (Shihata et al., 2017; Stopa & Clark, 2000). Additionally, fear of positive evaluation (FPE) has also been conceptualized as a part of SAD (Weeks, Heimberg, Rodebaugh & Norton, 2008; Weeks et al., 2010). Both FNE and FPE are strongly correlated with SAD severity, and with each other, but are distinct constructs (Weeks, 2015; Weeks & Howell, 2012; Yap et al., 2016). FNE and/or FPE have been associated with problematic smartphone use and problematic internet use severity (Casale et al., 2014; Wolniewicz et al., 2018). And FNE has been associated with PSMU severity for either males only (Casale et al., 2018), or for both sexes (Ali et al., 2021; Naidu et al., 2023). Ultimately, further research is needed to clarify the relationship between PSMU and the core evaluation constructs underlying social anxiety.

There is evidence for certain transdiagnostic psychopathology mechanisms mediating the relationship between SAD severity and PSMU severity, such as fear of missing out (FoMO), rumination, and decreased mindfulness and self-regulation (Charoensukmongkol, 2016; Dempsey et al., 2019; Shaw et al., 2015). Specific transdiagnostic mechanisms less studied in the literature, and relevant to the present paper, are emotion dysregulation (ED) and intolerance of uncertainty (IU).

The emotion dysregulation (ED) process applies to many clinical presentations, including SAD. ED involves difficulties with understanding and accepting emotions or utilizing effective emotional coping skills during distress (Gratz & Roemer, 2004) and relates to struggles with impulse control and accessing adaptive coping mechanisms (Farmer & Kashdan, 2012; Helbig-Lang et al., 2015). ED is associated with greater SAD severity (Blalock et al., 2016; Rusch et al., 2012). Research on ED and PSMU also supports relations between ED and PSMU severity in adults and adolescents (Drach et al., 2021; Rasmussen et al., 2020; Wartberg et al., 2021), such that ED mediates the relationship between SAD severity and PSMU severity (Sertbaş et al., 2020; Zsido et al., 2021). Because SAD relates to both ED and PSMU, it is likely that some individuals with SAD may engage in excessive, habitual social media use to regulate emotions (Sloan et al., 2017; Zsido et al., 2020, 2021). The consequence is of such habitual use of social media can involve habit formation, dependency, and adverse consequences, and therefore PSMU (Burnell & Kuther, 2016; Z. Liu et al., 2020).

IU is defined as the inability to cope with aversive cognitions or emotions related to uncertainty (Carleton, 2016). IU is a transdiagnostic construct implicated in the development and maintenance of anxiety disorders (Boswell et al., 2013; Counsell et al., 2017; Mahoney & McEvoy, 2012a), and SAD specifically (Carleton et al., 2010; Li et al., 2020; Shihata et al., 2017). Individuals with SAD may have difficulty coping with uncertainly in social situations, are more likely to interpret ambiguous social cues as negative (Beard & Amir, 2009), and more likely to engage in smartphone use to reduce anxiety in social situations (Brown & Medcalf-Bell, 2022). IU is related to problematic smartphone use severity (Brown & Medcalf-Bell, 2022; C. Liu et al., 2022; Rozgonjuk et al., 2019) and addictive behaviors (Kraemer et al., 2015; Oglesby et al., 2015). For those with high FNE/FPE, greater IU could lead to distress in uncertain social situations, therefore driving PSMU as a maladaptive coping strategy. Additionally, IU is related to PSMU (Sun et al., 2022) and FoMO on social media (Alfasi, 2021). However, no studies have yet explored IU as a mediator between SAD (or psychopathology in general) and PSMU severity.

Theory

We conceptualize PSMU through the lens of the Interaction of Person-Affect-Cognition-Execution (I-PACE) theoretical model of specific internet use disorders (Brand et al., 2016, 2019), which is supported by a meta-analysis of 117 studies (Sánchez-Fernández & Borda-Mas, 2023). The I-PACE model (Brand et al., 2019) is a comprehensive model of risk factors that influence likelihood to engage in problematic internet use. The I-PACE model conceptualizes internet (over)use as a behavioral addiction, and is informed by a variety of behavioral theories of addiction (e.g., incentive sensitization and dual system approaches), and the Bergen Social Media Addiction Scale (BSMAS) used to assess PSMU in this study queries the six factors of Griffiths' "components model" of addiction applied to social media use (Everitt & Robbins, 2016; Griffiths, 2005; Robinson & Berridge, 2008). The model includes personal, predisposing factors such cognitions, personality factors, genetic influences, and psychopathology. In I-PACE, FNE and FPE would be examples of longstanding psychopathology or personal factors predisposing one's likelihood to develop PSMU (Brand et al., 2019).

I-PACE also includes an individual's response to predisposing factors through mediating mechanisms which serve as risk or protective factors for PSMU. Such responses/mechanisms include cognitive and affective processes, attentional biases, inhibitory control, coping styles, and craving for social media. These mechanisms may lead a person to decide to engage in social media use, which could lead to problematic usage (Brand et al., 2016, 2019). As cognitive and affective processes, ED and IU are examples of risk factors in promoting PSMU, and of importance to this study as potential mediators in the relationship between FNE/FPE and PSMU. It is possible that individual differences in ED and IU may lead to the development of psychopathology, rather than underlying psychopathology leading to greater IU or ED. However, emotion regulation strategies and responses to uncertainty are not static traits, as they are influenced by both individual and situation-level characteristics, and function as cognitive and affective responses to stimuli in a given situation. This conceptualization of IU and ED as mediating the relationship between psychopathology and PSMU fits with the I-PACE model of problematic internet use, which is of most relevance to conceptualizing research on PSMU.

An additional theory conceptualizing this relationship is Kardefelt-Winther's (2014) Compensatory Internet Use Theory (CIUT), which posits that individuals engage in technology overuse (such as PSMU) to alleviate negative emotions triggered by stressful life events (Kardefelt-Winther, 2014). CIUT highlights the causal link between negative life events and problematic internet use, with internet use functioning as compensatory behavior to regulate emotions like depression and anxiety. Several studies support CIUT's understanding of psychological distress or psychopathology as a driver of problematic internet use (Zhitomirsky-Geffet & Blau, 2016) and PSMU specifically (Wang et al., 2016), similar to the I-PACE model.

Aims

Because social anxiety is strongly related to both FNE and FPE (Weeks & Howell, 2012; Weeks et al., 2010), it is important to understand the potential roles of FNE and FPE in relation to PSMU severity, potential mediators of these relationships. Using I-PACE, we built a model of PSMU exploring core constructs of social anxiety—FNE and FPE—with special attention to IU and ED as cognitive and affective factors potentially influencing this relationship. Due to the high rates of social media use and PSMU among emerging adults, a sample aged 18-25 was chosen to study this model. Age and sex at birth were treated as covariates of PSMU, as both have been found related to PSMU (Hussain & Starcevic, 2020; Jeong et al., 2016; Kircaburun et al., 2020).

Hypotheses

Based on current theory and the literature presented, we posed the following hypotheses.

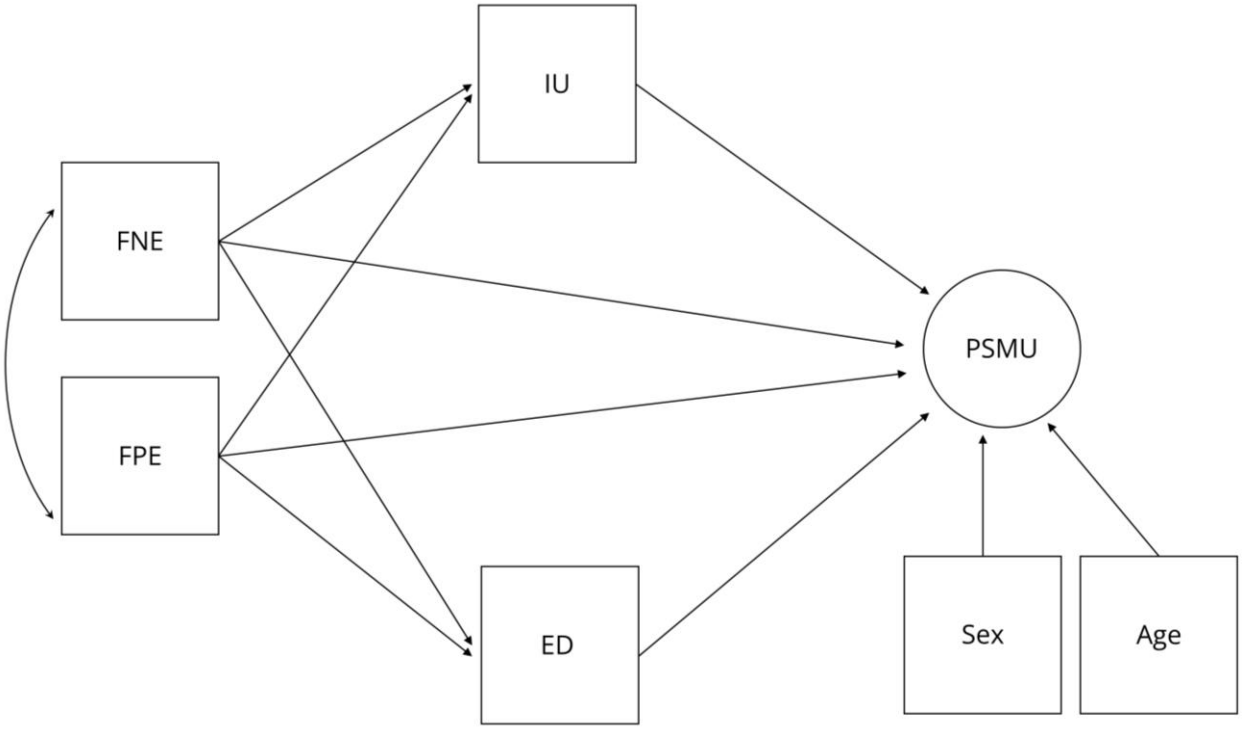
H1: IU will be positively related to PSMU severity.

H2: ED will be positively related to PSMU severity.

H3: IU will mediate the relationships between FNE (H3a) and FPE (H3b) with PSMU severity.

H4: ED will mediate the relationships between FNE (H4a) and FPE (H4b) with PSMU severity.

Figure 1. *Hypothesized Model.*



Note. FNE = Fear of Negative Evaluation; FPE = Fear of Positive Evaluation; IU = Intolerance of Uncertainty; ED = Emotion Dysregulation; PSMU = Problematic Social Media Use. Squares represent observed variables, while the latent variable is depicted with a circle.

Methods

Participants

Our initial sample consisted of 396 participants, aged 18–25. In total, 24 participants were removed from the sample due to careless response style, duplicate response ID, substantial missingness (e.g., missing > 50% of survey responses), not possessing a social media account, or falling outside of the proposed age limits of 18–25 years of age. Our final sample consisted of 372 participants with a mean age of 19.9 (*SD* = 4.3). Sample size was adequate for our SEM analyses based on MacCallum's power analysis tables for SEM (MacCallum et al., 1996).

The majority of our sample were assigned female at birth (*n* = 244, 65.6%), 2.4% reported they are non-binary (*n* = 9), and 0.5% reported they are transgender (*n* = 2). Gender, race, and ethnicity were non-mutually exclusive categories, so participants were able to select multiple options in order to most accurately describe their identity. Most of our sample was white (*n* = 257, 69.1%). Other racial and ethnic groups represented (not necessarily mutually exclusive) were primarily black (*n* = 65, 17.5%), Asian (*n* = 54, 14.5%), and Hispanic/Latino (*n* = 28, 7.5%). The majority of our samples reported being in their first year of undergraduate education (*n* = 251, 67.5%). Further, 56.7% of our participants reported part-time employment (*n* = 211), and 35.8% reported working full-time (*n* = 133).

Procedure

The present study used a web survey-based cross-sectional design with the above sample of emerging adults. Participants were recruited from a pool of introductory psychology students at a medium-sized Midwestern U.S. University via the university's research website listing available departmental research studies, over two semesters in 2022. Students were awarded course research points in exchange for participation. Those who chose to participate completed an online consent form, subsequently routed to a web survey hosted on PsychData.com. The first author's university Institutional Review Board approved this study.

Measures

Demographics included age, sex at birth, gender, and race/ethnicity; participants were also queried about employment and years of education. Additionally, the following measures were used, using summed scores except when using a latent factor to model PSMU as detailed below. Coefficient alphas for internal consistency within the present study are presented for all scales below in the text.

Intolerance of Uncertainty Scale–Short Form (IUS-12)

The Intolerance of Uncertainty Scale-Short Form (IUS-12; Carleton, Norton, et al., 2007) consists of 12 items measuring responses to uncertainty, ambiguous situations, and the future. Items include: *Unforeseen events upset me greatly* and *When it's time to act, uncertainty paralyses me.* Response options range from 1 = *Not at all characteristic of me* to 5 = *Entirely characteristic of me*. The IUS displayed excellent internal consistency in our sample (α = .91, ω = .93), and has demonstrated convergent validity against similar scales (McEvoy & Mahoney, 2011).

Difficulties in Emotion Regulation Scale (DERS)

The Difficulties in Emotion Regulation Scale (DERS) is a 36-item scale assessing ED and use of emotion regulation strategies (Gratz & Roemer, 2004). Items include: *When I'm upset, I have difficulty concentrating* and *When I'm upset, my emotions feel overwhelming*. All items are scored on a five-point Likert scale from 1 = *Almost never* to 5 = *Almost always*. The DERS exhibited excellent internal consistency in our sample (α = 0.94, ω = .95).

Fear of Positive Evaluation Scale (FPES)

The Fear of Positive Evaluation scale (FPES; Weeks, Heimberg & Rodebaugh, 2008) assesses fear and discomfort with positive evaluation (e.g., compliments, feedback) and includes 10 items. Items include: *If I was doing*

something well in front of others, I would wonder whether I was doing 'too well,' and *I generally feel uncomfortable when people give me compliments*. While we used a 10-item Likert scale ranging from 0 to 9, rather than an 11-item Likert scale from 0 to 10 as in the original measure, the performance of a 10-item scale in this instance will likely not differ from an 11-item scale as explained by Simms et al. (2019). The FPES demonstrated good internal consistency (α = .82, ω = .87) in our sample.

Brief Fear of Negative Evaluation Scale - Straightforward (BFNE-S)

The Brief Fear of Negative Evaluation Scale-Straightforward (BFNE-S; Rodebaugh, Woods, et al., 2004), an 8-item revised version of Leary's Brief Fear of Negative Evaluation scale (Leary, 1983), was used for measuring FNE. Sample items include: *I am afraid that others will not approve of me*, and *I worry about what other people will think of me even when I know it doesn't make any difference*. Items are rated on a 5-point Likert scale ranging from 0 = *Not at all characteristic of me* to 4 = *Extremely characteristic of me*. The BFNE-S correlates highly with the BFNE (Carleton, Collimore, et al., 2007; Rodebaugh, Woods, et al., 2004) and displayed excellent internal consistency in our sample (α = .95, ω = .96).

Bergen Social Media Addiction Scale (BSMAS)

The 6-item Bergen Social Media Addiction Scale (BSMAS), is an adaptation of the Bergen Facebook Addiction Scale (BFAS), replacing "Facebook" with the phrase "social media" (Andreassen et al., 2012, 2016). The BSMAS is a widely-used measure of PSMU, reflecting core elements of problematic use shared with behavioral addictions (Griffiths, 2020; Kuss & Griffiths, 2017) and demonstrates good validity (Andreassen et al., 2016), and demonstrated good internal consistency in our sample (α = .82, ω = .91) Response options range from 1 = *Very rarely* to 5 = *Very often*. Items include: *How often during the last year have you used social media in order to forget about personal problems?* and *How often during the last year have you used social media so much that it has had a negative impact on your job/studies?*

Social Media Use Questions

Participants were asked to report their frequency of use of multiple popular social media sites, using items developed by Primack and colleagues (Primack et al., 2017). Seven response options ranged from 1 = *I do not use this platform* to 7 = *I use this platform 5 or more times a day*. Data from this measure were collected for descriptive purposes and were not included in analyses.

Analytic Approach

Preliminary analyses and data cleaning were conducted with R software, v4.1.1 (R Core Team, 2023), using the following packages: fmsb (coefficient alphas), pastecs (normality, descriptive statistics), and corrplot (scale intercorrelations). Data was first cleaned by removing 24 participants from the initial sample due to consecutive response style, duplicate participation, survey non-response, or not meeting participation criteria (e.g., not ages 18–25, not possessing a social media account). Maximum likelihood (ML) estimation was used to impute missing item-level data for each scale separately before summing items to produce scale scores. Cases of missing data were generally no more than 1–2 items per scale.

Preliminary analyses were conducted to assess for deviations from the parametric assumption of normality in the primary variables. The data did not display substantial evidence of non-normality, with fear of negative evaluation scores having the largest absolute value for kurtosis (−1.038) and all other values for skewness and kurtosis being under an absolute value of one. All scale scores were normally distributed (Cain et al., 2017). Pearson correlation analyses were conducted in R to assess relationships between variables.

Confirmatory factor analytic (CFA) and structural equation modeling (SEM) analyses were conducted in Mplus version 8 (Muthén & Muthén, 2017). First, we computed a fully observed variable model. Next, as the sample did not have sufficient power to create a fully latent model, CFA was used to compute a measurement model for the primary dependent variable, PSMU. Items on the BSMAS were treated as ordinal (Rhemtulla et al., 2012). Weighted least squares estimation with a mean- and variance-adjusted chi-square (WLSMV) was used, utilizing a

polychoric covariance matrix. Factor loadings were estimated using probit regression (DiStefano & Morgan, 2014); after estimating factor variance, the first unstandardized factor loading was fixed to a value of one for scaling purposes. Residual error covariances were fixed to zero.

We next tested SEM model fit with latent PSMU as the dependent variable and examined direct associations between variables. All other variables were specified as observed, to preserve power. IU, ED, FPE and FNE were specified to predict PSMU severity, and FPE and FNE were also specified to predict IU and ED, adjusting for age and sex (Figure 1). We tested an alternate model version, removing the paths from FPE and FNE to PSMU.

Mediation was tested in Mplus v8, examining IU and ED as mediators between both FNE and FPE with PSMU severity. We computed the cross-product of two direct path coefficients, estimating the standard error for indirect (mediation) path coefficients with the Delta method. A z-test assessing statistical significance of each mediating effect was produced by dividing the indirect effect's path coefficient by its Delta method-estimated standard error. One thousand bootstrapped, non-parametric samplings were used for accurate estimates.

Results

Descriptive statistics and internal consistency for target variables, separated by sex at birth, are displayed below in Table 1. Individuals assigned female at birth scored higher on most scales, though effect sizes were small. Pearson correlations for scale scores are presented below in Table 2. *P*-values were not corrected for multiple testing as these analyses were for descriptive purposes, and SEM evaluates overall fit of the model rather than individual relationships in isolation. Additionally, there were a large number of correlations *p*s < .001, suggesting very strong relationships. While all our sample was screened for having an active social media account, 89.8% of our sample reported using at least one social media network per week (*n* = 334). On our 7-item frequency scale, the most popular apps were Snapchat (*M* = 5.9, *SD* = 1.7), Instagram (*M* = 5.2, *SD* = 1.9), and TikTok (*M* = 5.1, *SD* = 2.3), with the median of participants reporting checking both Instagram and TikTok 2–4 times per day, and Snapchat 5 or more times per day.

Table 1. *Descriptive Statistics and Internal Consistency Estimates Separated by Sex at Birth for Primary Continuous Variables.*

Variable	Total *M* (*SD*)	Female *M* (*SD*)	Male *M* (*SD*)	Sex *F*(1,371)	*p*	η^2_p
1. FPE	31.22 (13.03)	32.02 (12.4)	29.54 (14.2)	2.83	.094	< .001
2. FNE	23.26 (9.12)	24.31 (9.18)	21.04 (8.62)	10.25	.002	.03
3. IU	31.67 (10.22)	32.83 (10.23)	29.21 (9.80)	9.89	.002	.03
4. ED	90.02 (23.57)	92.62 (24.13)	84.5 (21.42)	9.31	.003	.03
5. PSMU	14.41 (5.29)	14.95 (5.23)	13.25 (5.14)	7.68	.006	.02

Note. Sex at birth was coded "1" for female, and "2" for male. FPE = Fear of positive evaluation, FNE = Fear of negative evaluation. IU = Intolerance of uncertainty, ED = Emotion Dysregulation, PSMU = Problematic social media use.

Table 2. *Pearson's r Correlations Between Primary Variables.*

Variable	1	2	3	4	5
1. Age					
2. FPE	.06 [−.05, .16]				
3. FNE	−.06 [−.16, .05]	.54** [.46, .61]			
4. PSMU	−.09 [−.20, .02]	.22** [.11, .31]	.33** [.24, .43]		
5. IU	−.03 [−.13, .07]	.48** [.40, .56]	.57** [.50, .64]	.42** [.33, .51]	
6. ED	−.01 [−.11, .10]	.43** [.34, .51]	.50** [.42, .57]	.40** [.30, .48]	.58** [.50, .64]

Note. FPE = Fear of positive evaluation, FNE = Fear of negative evaluation. PSMU = Problematic social media use, IU = Intolerance of uncertainty, ED = Emotion Dysregulation. Values in square brackets indicate the 95% confidence interval for each correlation. * *p* < .05. ** *p* < .01. Aside from age, all correlation *p*s < .001.

Use of a fully observed model resulted in poor fit (Appendix). Consequently, we conducted a CFA for PSMU, for subsequent use within the context of a larger SEM. The measurement model for the PSMU CFA demonstrated evidence for good fit overall, $\chi^2(8) = 42.60$, $p < .001$, CFI = .99, TLI = .97, RMSEA = .095, 90% CI [0.04, 0.15], SRMR = .028, based on accepted fit index benchmarks (Hu & Bentler, 1999). Only RMSEA did not show evidence for excellent fit, which is as to be expected when using ordinal items (Shi et al., 2020).

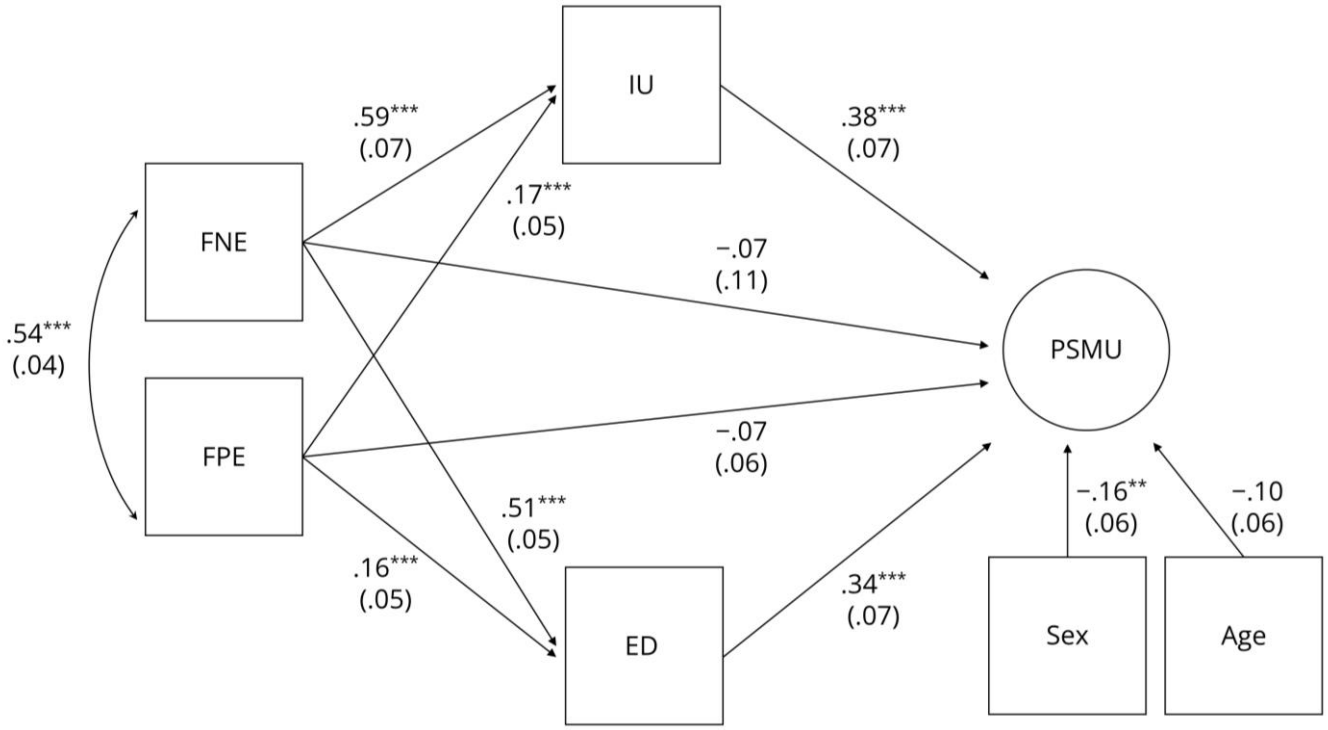
Table 3. *Standardized Factor Loadings for the Problematic Social Media Use (PSMU) Measurement Model.*

BSMAS item	Standardized Loading
1. Spent a lot of time thinking about social media or planned use of social media	.57
2. Felt an urge to use social media more and more	.69
3. Used social media in order to forget about personal problems	.63
4. Tried to cut down on the use of social media without success	.62
5. Become restless or troubled if you have been prohibited from using social media	.90
6. Used social media so much that it has had a negative impact on your job/studies	.75

Note. BSMAS = Bergen Social Media Addiction Scale.

A SEM (with only PSMU as a latent variable) including direct pathways between FNE/FPE and PSMU (from Figure 1) was conducted. The fit of this model was good, $\chi^2(47, N = 356) = 122.7$, $p < .001$, CFI = .96, TLI = .94, RMSEA = .07, 90% CI [0.05, 0.08], SRMR = .10 (see Figure 2 for results). WLSMV estimation was used. Surprisingly, the direct pathways between both FNE and PSMU (β = −.07, *E* = .12, *p* = .491) and FPE and PSMU (β = −.07, *SE* = .06, *p* = .265) were not significant in this model, though both FNE and FPE were significantly, though weakly, correlated with PSMU in earlier bivariate analyses with Pearson's *r* (*r* = .33 and *r* = .22, respectively; both *p*s < .01). A broad body of research supports the direct relationship of SAD with PSMU (Marino et al., 2023; Wu et al., 2024; Zsido et al., 2021), and of FNE with PSMU (Ali et al., 2021; Casale et al., 2024; Naidu et al., 2023), contradicting our non-significant paths between FNE/FPE and PSMU in this model. These non-significant pathways were removed in an additional, subsequent SEM.

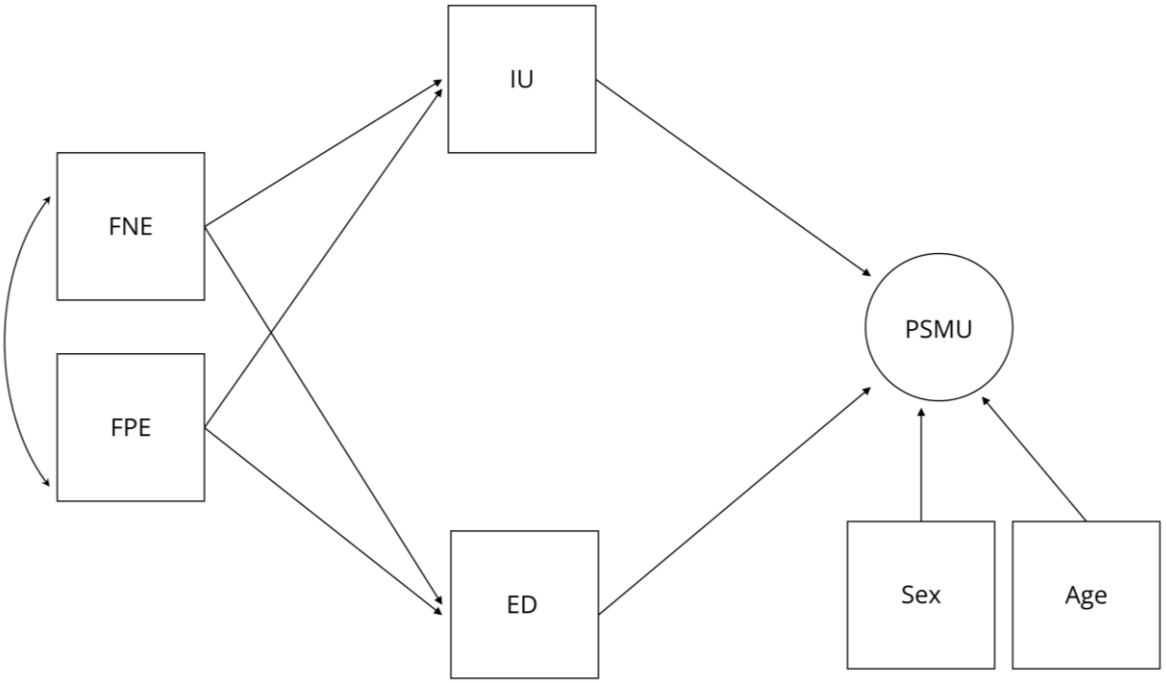
Figure 2. *Hypothesized Model With Resulting Standardized Path Coefficients.*



Note. Circles represent latent variables, while squares represent observed variables. FPE = Fear of positive evaluation, FNE = Fear of negative evaluation. IU = Intolerance of uncertainty, ED = Emotion Dysregulation, PSMU = Problematic social media use. SEs are displayed in parentheses below path coefficients. For visual clarity, the latent PSMU variable's observed items are not pictured (but see Table 3 for factor loadings). Sex at birth was coded "1" for female, and "2" for male. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

A SEM without direct paths between FNE/FPE and PSMU was conducted (Figure 3), to reduce number of parameters and to compare model fit with the hypothesized model from Figures 1 and 2.

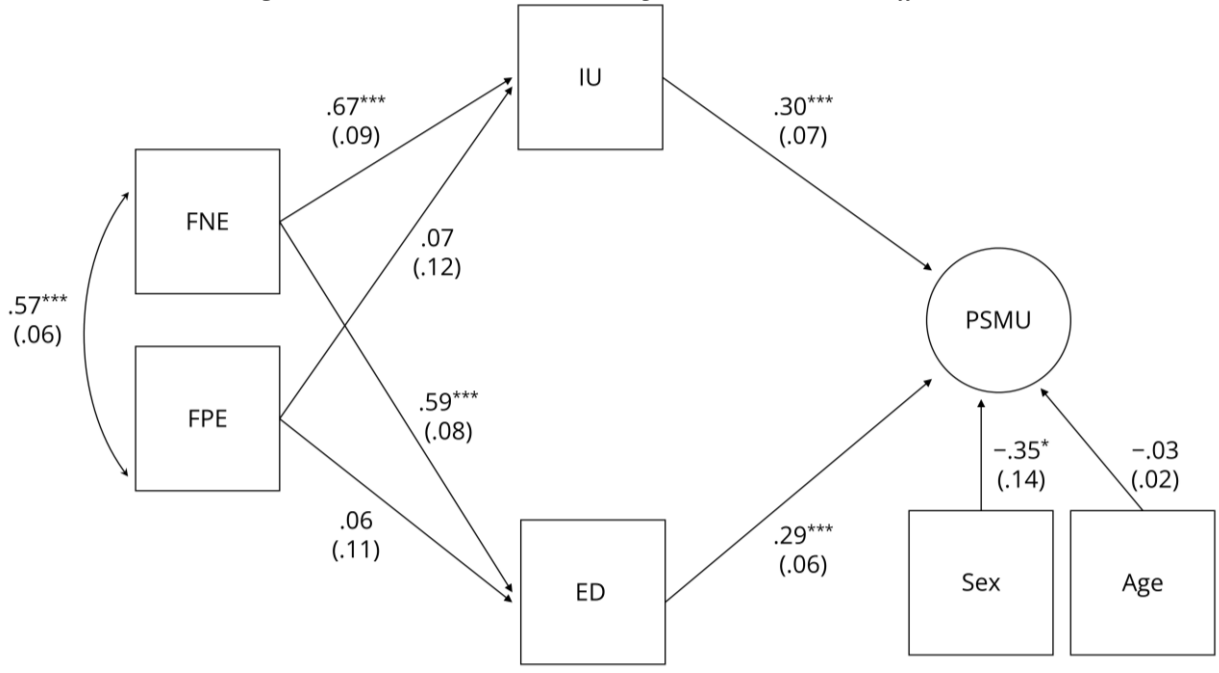
Figure 3. *Revised Model.*



Note. FNE = Fear of Negative Evaluation; FPE = Fear of Positive Evaluation; IU = Intolerance of Uncertainty; ED = Emotion Dysregulation; PSMU = Problematic Social Media Use. Squares represent observed variables, while the latent variable is depicted with a circle.

This revised SEM (Figure 3) showed evidence of good fit, robust $\chi^2(49, N = 356) = 123.88$, $p < .001$, CFI = .96, TLI = .95, RMSEA = .07, 90% CI [0.051, 0.08], SRMR = .028. Standardized parameter estimates from the model are included in Figure 4. However, using robust chi-square difference testing with Mplus' DIFFTEST command, the revised model did not fit significantly worse than our hypothesized model (Figures 1 and 2), $\chi^2\text{diff}(2, N = 356) = 1.9$, $p = .368$). Therefore, to reduce number of parameters in the SEM and for the sake of parsimony, this revised model was used going forward. PSMU severity was related to female sex at birth, though not to age, possibly due to the truncated age range of our sample.

Figure 4. *Revised Model With Resulting Standardized Path Coefficients.*



Note. Circles represent latent variables, while squares represent observed variables. FPE = Fear of positive evaluation, FNE = Fear of negative evaluation. IU = Intolerance of uncertainty, ED = Emotion Dysregulation, PSMU = Problematic social media use. SEs are displayed in parentheses below path coefficients. For visual clarity, the latent PSMU variable's observed items are not pictured (but see Table 3 for factor loadings). Sex at birth was coded "1" for female, and "2" for male. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

In this revised model, path coefficients demonstrate that, after adjusting for sex and age, both IU and ED predicted PSMU severity (H1 and H2). FNE was significantly associated with IU and ED in this model, and FNE was significantly related to FPE. However, FPE was not significantly associated with IU or ED.

Examining indirect effects of this model, IU mediated relations between FNE and PSMU severity (H3a), but not between FPE and PSMU severity (H3b). ED mediated the pathway between FNE to PSMU severity (H4a), but not between FPE and PSMU (H4b). Mediation results are displayed in Table 4, with *p*-values displayed for statistical significance of indirect effects.

Table 4. *Mediation Results With Standardized Estimates.*

Indirect Effect	β	*SE*	*z*	*p*
H3a) FNE → IU → PSMU	.21	.04	4.60	< .001***
H3b) FPE → IU → PSMU	.02	.04	0.55	.586
H4a) FNE → ED → PSMU	.17	.04	4.23	< .001***
H4b) FPE → ED → PSMU	.02	.03	0.54	.588

Note. FNE = Fear of negative evaluation. FPE = Fear of positive evaluation, IU = Intolerance of uncertainty, ED = Emotion Dysregulation, PSMU = Problematic social media use.

Discussion

The significant pathways identified within this study's SEM provide additional support for the relationship of FNE with PSMU severity, particularly as mediated by IU and ED. Notably, this study provides a novel contribution to the literature by establishing IU as a mediator between FNE and PSMU severity, as IU's mediating role between psychopathology and PSMU has not yet been investigated. It is important to emphasize that with a cross-sectional design, this study cannot to speak to directional effects, but creates a building block for future longitudinal research by delineating the possible mediating effects of IU and ED in the relationship between SAD and PSMU.

As hypothesized, the pathway between IU and PSMU severity in our final SEM was significant in a positive direction. High levels of IU have related to PSMU severity in previous research (Sun et al., 2022), as well as to problematic smartphone and internet use more broadly (Brown & Medcalf-Bell, 2022; Rozgonjuk et al., 2019; Wojtaszek & Saules, 2022). The relationship between IU and PSMU fits within the context of I-PACE, with IU as a mediator contributing to PSMU. Individuals with SAD may find it difficult to tolerate uncertainty in social situations, and attempt to regulate their anxiety with PSMU. Our study suggests that there are relationships between SAD, IU, and PSMU, encouraging future research in this area. One possible area for further study is worry in relation to PSMU, as IU is also a well-researched construct in relation to worry (Buhr & Dugas, 2006; Dugas et al., 2001; Yook et al., 2010).

Higher levels of ED were also positively related to PSMU severity in our SEM, supporting our hypothesis and literature identifying this relationship (Drach et al., 2021; Hormes et al., 2014; Rasmussen et al., 2020; Zsido et al., 2021). Within I-PACE, FNE would function as an underlying psychopathology (predictor) variable, and ED as a mediating variable leading to the decision to use social media and ultimately to PSMU. Use of social media may function as a mechanism for anxious individuals to regulate their emotions; individuals with greater difficulties in ER may rely more heavily on maladaptive behaviors such as PSMU to cope with negative emotions. While FNE has been related to PSMU severity previously (Ali et al., 2021; Casale et al., 2018), our results suggest that ED may function as a mediator in this relationship.

While mediation analyses supported our hypotheses pertaining to the relationship between FNE and PSMU, contrary to our hypotheses, path coefficients did not demonstrate a significant relationship between FPE and PSMU, nor elevated IU or ED mediate relations between FPE and PSMU severity. Previous research has shown that FPE was related to problematic smartphone use severity, but not to PSMU severity (Wolniewicz et al., 2018), and thus consistent with our study. A potential explanation for these non-significant findings regarding FPE is that FPE relates more strongly to performance aspects rather than social interaction aspects of SAD, therefore individuals high in FPE may not feel anxious about using social media to socialize or feel driven to cope with anxiety via social media as frequently as those with high levels of FNE (Fredrick & Luebbe, 2020). Individuals with FNE are generally more distressed about social interactions than those with FPE (Trower & Gilbert, 1989; Turner et al., 1992), supporting the theory that those with higher FNE may choose to use these sites passively (e.g.,

scrolling through content) as a maladaptive coping mechanism, while those with high FPE may use these sites socially with adaptive consequences (e.g., messaging others to foster social connection).

A possibility is that individuals with greater performance concerns are less likely to engage in passive, non-social social media use (i.e., using social media as a source of entertainment via scrolling and viewing others' posts), which more strongly relates to PSMU than social use (i.e., using social media to communicate, message, comment, and post one's own content; Lopes et al., 2022; Myruski et al., 2019; Verduyn et al., 2015). In other words, individuals high in FNE, but not necessarily FPE, might choose to use social media platforms non-socially more often, in a way that is more likely to become problematic, as a coping mechanism for SAD symptoms (Reichenberger et al., 2018).

Another consideration is the breakdown of which social media sites or apps our participants used, as certain platforms have been associated with greater impairment (e.g., Instagram, WhatsApp; Rozgonjuk et al., 2021). In our sample, the most frequently used social media sites were Snapchat, Instagram, and TikTok. All of these applications can be used passively and/or socially and center on photo or video content, introducing the possibility of appearance-based evaluation or comparisons about appearance is related to PSMU (Papapanou et al., 2023), and using social media can exacerbate appearance-related distress, leading to a vicious cycle (Hawes et al., 2020).

Our results also bear possible implications for clinical practice, specifically for treatment of SAD and/or internet addictions. While further longitudinal research is needed to clarify the processes by which SAD and PSMU relate, these findings suggest the importance of evaluating PSMU for those already in treatment for SAD. If PSMU is a maladaptive coping mechanism, it should be monitored in treatment to ascertain whether PSMU exacerbates distress and interference initially caused by FNE. Both SAD (Heimberg, 2002; Rodebaugh, Holaway, et al., 2004) and PSMU (Winkler et al., 2013; Zhou et al., 2021) have been effectively treated with cognitive-behavioral therapy (CBT) interventions. Treatment with CBT has been found efficacious for a variety of psychopathology (Hofmann et al., 2012), including for problematic internet and social media use (Winkler et al., 2013; Young, 2013; Zhou et al., 2021), suggesting that CBT interventions would have great benefit for individuals presenting with both SAD and PSMU. Furthermore, our results suggest that treatment focused on transdiagnostic processes such as ED or IU may possibly have beneficial effects for both FNE and PSMU, by targeting mechanisms by which these concerns are related. Treatment with CBT has been associated with reductions in IU and improved ER skills in SAD treatment (Goldin et al., 2014; Jazaieri et al., 2017; Mahoney & McEvoy, 2012b).

The sample for this study consisted of college undergraduate students, which provides unique insights into the emerging adult demographic. However, university students make up approximately 4.5% of the US population (Hanson, 2024), limiting generalizability of our results and speaking to the need for further research on PSMU outside the university setting. Our findings fit within the overall body of research associating PSMU with anxiety, depression, stress, and overall decreased wellbeing in emerging adults (Shannon et al., 2022). University students are impacted by PSMU in multiple activities of daily living (Kolhar et al., 2021), lending vulnerabilities for increased mental health symptoms and possibly increased use of social media to cope. The majority of our sample (65.6%) was also female, with slightly higher scores than males on most measures, which may speak to a general association between female sex and PSMU (Jeong et al., 2016) and a limit in the generalizability of our sample, though not all research has found a significant association between sex and PSMU (Shannon et al., 2022). Our findings suggest the need for further research among more diverse and representative age, socioeconomic, and cultural demographics to improve the generalizability of findings.

As noted above, a significant limitation is the cross-sectional design of our study. As with any cross-sectional study, our study cannot determine directionality of results, so further longitudinal research on FNE, IU, ED, and PSMU longitudinally throughout emerging adulthood is needed. Finally, this study used survey-based assessment of PSMU via retrospective report, which may be more prone to recall bias or response error when compared to other methods such as ecological momentary assessment (EMA; Cingel et al., 2022; Wadsley & Ihssen, 2023) or objective assessment of social media use like digital biomarkers (Montag et al., 2021). As reviewed by Parry et al. (2021), self-report screen-time estimations can be unrealistic. For example, self-reported duration of social media use has only a moderate effect relationship with objective tracked time spent on social media (Rozgonjuk et al., 2023), and self-report measures of PSMU are even more weakly related to objective use, speaking to the need for further research utilizing objective measures of social media use (Parry et al., 2021). The use of self-report measures also invites the possibility of social desirability bias impacting reports of psychopathology or PSMU (Latkin et al., 2017).

Despite limitations, the present study provides new contributions to the current literature on SAD and PSMU by highlighting the mediating roles of IU and ED in PSMU for individuals with high FNE, a relationship which has not been previously established for IU. These results speak to the need for longitudinal research to provide information on the directionality of this relationship over time. Further longitudinal research on the relationship of IU and ED with PSMU in a diverse sample, particularly within the context of other psychopathology variables, is a promising direction for further study.

Conflict of Interest

Dr. Elyse Hutcheson does not have any conflicts of interest to report.

Dr. Montag reports no conflict of interest. However, for reasons of transparency Dr. Montag mentions that he has received (to Ulm University and earlier University of Bonn) grants from agencies such as the German Research Foundation (DFG). Dr. Montag has performed grant reviews for several agencies; has edited journal sections and articles; has given academic lectures in clinical or scientific venues or companies; and has generated books or book chapters for publishers of mental health texts. For some of these activities he received royalties, but never from gaming or social media companies. Dr. Montag mentions that he was part of a discussion circle (Digitalität und Verantwortung: https://about.fb.com/de/news/h/gespraechskreis-digitalitaet-und-verantwortung/) debating ethical questions linked to social media, digitalization and society/democracy at Facebook. In this context, he received no salary for his activities.

Dr. Jon Elhai does not report any conflicts of interest with this paper. But for transparency, he does report that he earns royalties on books published on trauma and PTSD, occasionally serves as a forensic expert on PTSD cases, and has recently been funded on grants from the U.S. National Institutes of Health.

Use of AI Services

The authors declare they have not used any AI services to generate any part of the manuscript or data.

Authors' Contribution

Elyse F. Hutcheson: conceptualization, formal analysis, investigation, methodology, visualization, writing—original draft, writing—review & editing. **Christian Montag:** conceptualization, supervision, writing—review and editing. **Jon D. Elhai:** conceptualization, data curation, methodology, supervision, writing—review & editing.

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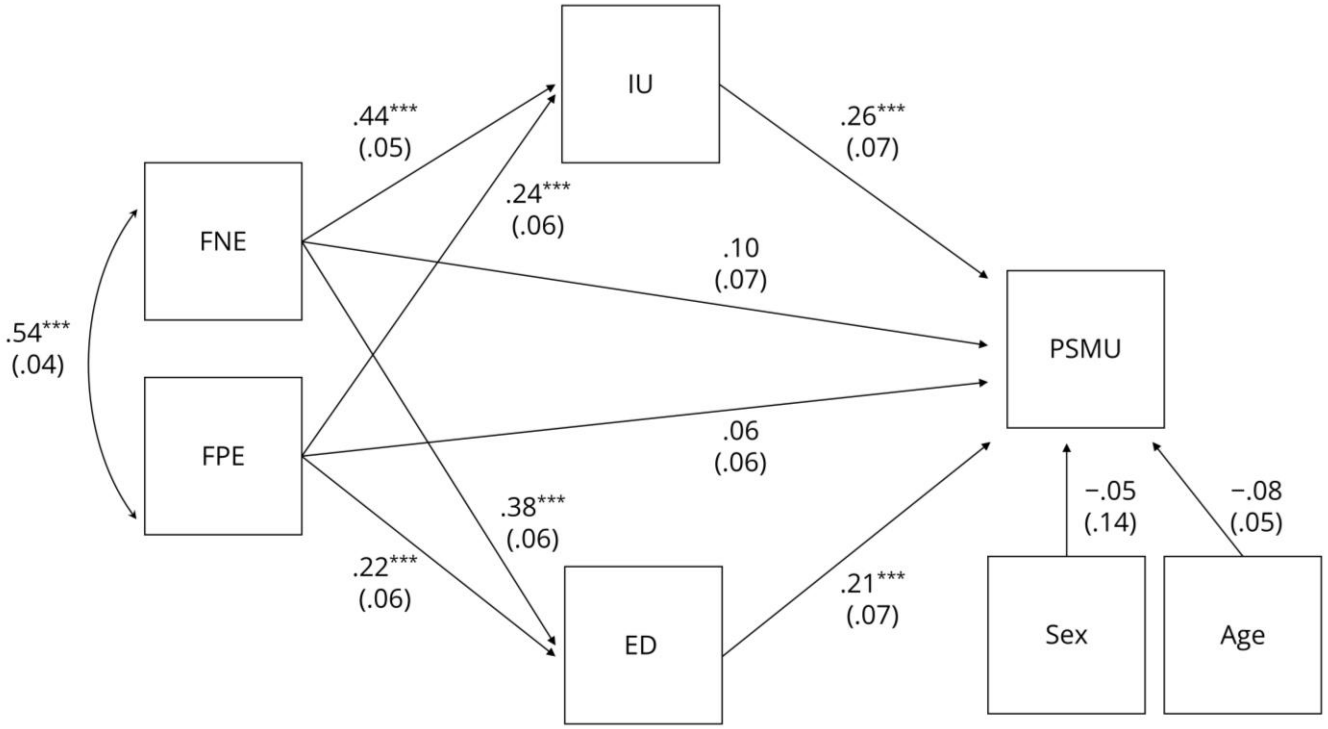
Appendix

Figure S1. *SEM With Observed Variables With Resulting Standardized Path Coefficients.*



Note. Squares represent observed variables. FPE = Fear of positive evaluation, FNE = Fear of negative evaluation. IU = Intolerance of uncertainty, ED = Emotion Dysregulation, PSMU = Problematic social media use. SEs are displayed in parentheses below path coefficients. For visual clarity, the latent PSMU variable's observed items are not pictured (but see Table 3 for factor loadings). Sex at birth was coded "1" for female, and "2" for male. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

This SEM (with observed variables only) showed evidence of poor fit, robust $\chi^2(9, N = 356) = 73.49$, $p < .001$, CFI = .84, TLI = .74, RMSEA = .14, 90% CI [0.11, 0.17], SRMR = .08. Standardized parameter estimates from the model are shown here.

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