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Emerging Adults' Social Media Use: Exploring Self-Efficacy, Critical Thinking and Digital Literacy.

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EMERGING ADULTS' SOCIAL MEDIA USE:

EXPLORING SELF-EFFICACY, CRITICAL THINKING AND DIGITAL LITERACY.

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Resumo

As redes sociais assumem hoje um papel omnipresente na vida contemporânea, contudo, a sua utilização excessiva e desregulada tem vindo a ser associada a padrões de uso problemático e a impactos negativos na saúde mental da população, sobretudo entre adultos emergentes. Este estudo examinou o papel protetor da autoeficácia, do pensamento crítico e da literacia digital no uso problemático das redes sociais (PSMU), dividido em cinco dimensões: preferência por interação online, regulação de humor, preocupação cognitiva, uso compulsivo, outcomes negativos, assim como, o possível papel moderador da literacia digital nas associações anteriores. A amostra foi constituída por 311 (65.9% feminino e 29.9% masculino) adultos emergentes lusófonos com idades entre os 18 e os 35 anos (M = 23.2, SD = 3.6). Os participantes completaram medidas de autorrelato online avaliando dimensões de PSMU e dos três fatores protetores. Os resultados dos modelos de equações estruturais revelaram que o pensamento crítico se associou negativamente à preocupação cognitiva e ao uso compulsivo, enquanto a autoeficácia se associou negativamente com a dimensão das consequências negativas. Contrariamente às expectativas, a literacia digital não demonstrou ligações diretas significativas com nenhuma das dimensões do uso problemático das redes sociais. Contudo, a análise de moderação revelou que a literacia digital modera a ligação entre a autoeficácia e a dimensão das consequências negativas. Os resultados sublinham a natureza multidimensional do PSMU e destacam a necessidade de integrar a educação em literacia digital com esforços para desenvolver autoeficácia e pensamento crítico em programas de prevenção.

Palavras-chave: Uso problemático, redes sociais, autoeficácia, pensamento crítico, literacia digital.

Abstract

Social media now plays an omnipresent role in contemporary life, yet its excessive and unregulated use has been linked to problematic usage patterns and negative impacts on the mental health of the population, especially among emerging adults. This study examined the protective role of self-efficacy, critical thinking, and digital literacy in problematic social media use (PSMU), divided into five dimensions: preference for online interaction, mood regulation, cognitive preoccupation, compulsive use, negative outcomes, as well as the possible moderating role of digital literacy in the above associations. The sample consisted of 311 (65.9% female and 29.9% male) Portuguese-speaking emerging adults aged between 18 and 35 years (M = 23.2, SD = 3.6). Participants completed online self-report measures assessing dimensions of PSMU and the three protective factors. The results of the structural equation models revealed that critical thinking was negatively associated with cognitive preoccupation and compulsive use, while self-efficacy was negatively associated with the negative consequences dimension. Contrary to expectations, digital literacy did not show significant direct links with any of the dimensions of problematic social media use. However, moderation analysis revealed that digital literacy moderates the link between self-efficacy and the negative consequences dimension. The results underscore the multidimensional nature of PSMU and highlight the need to integrate digital literacy education with efforts to develop self-efficacy and critical thinking in prevention programmes.

Keywords: Problematic use, social media, self-efficacy, critical thinking, digital literacy.

Introduction

Social media has become an integral aspect of contemporary life, serving as a means of communication with friends, family, and wider communities, as well as a platform for entertainment, shopping, and information seeking (Heo et al., 2015; Schivinski et al., 2019; Wang et al., 2019). Given its multiplicity of functions, maintaining a healthy use of social media has become increasingly challenging. In recent years, platforms have incorporated features aligned with emerging user preferences, such as the growing demand for short-form content following the rise of TikTok in 2020 (Duarte & Dias, 2021). Within a short period, leading platforms such as Instagram and Facebook (Instagram, 2020), as well as YouTube (Jaffe, 2020), integrated, promoted, and incentivised these new formats among their creators. As a result, short-form content has rapidly gained popularity, raising concerns about its addictive potential (Liao, 2024; Xie et al., 2023; Zhang et al., 2023).

Emerging adults, typically encompassing the developmental period between 18 and 35 years of age, share a distinctive experience with technology, having been the first generation to grow up in a digitally saturated environment. Born from the early nineties, often referred to as "digital natives" (Bjornsen et al., 2018; Coyne et al., 2013), these individuals are considered adept at navigating the complexities of the digital era, adapting easily to rapid technological change (Dingli & Seychell, 2015; Prensky, 2001). Social media use is particularly prominent during this stage of life, with approximately 70% of emerging adults reporting daily use of at least one social media platform (Auxier & Anderson, 2021). In 2023, Eurostat data indicated that young people aged 16 to 29 years across the 27 European Union member states were around 30% more likely to participate in social networking activities than the general adult population. In Portugal, this difference was smaller, at approximately 20%, though participation among young adults still reached 90% (Eurostat, 2023a). These numbers illustrate how emerging adults tend to be both heavy and early users of social media, employing these platforms primarily to maintain social connections with peers (Mukherjee, 2020; Tarullo, 2020).

The age at which individuals first begin to engage with social media platforms, as well as their current age during emerging adulthood, are crucial variables for understanding patterns of problematic social media use (PSMU). Early initiation may coincide with ongoing cognitive and socio-emotional development, potentially shaping behavioural habits

and self-regulatory capacities that persist into adulthood. Empirical evidence suggests that obtaining a smartphone at a later age is associated with more positive behavioural outcomes, such as longer sleep duration and earlier bedtimes (Charmaraman et al., 2021). Furthermore, problematic technology use during early adolescence has been shown to predict conduct problems and difficulties in self-regulation over time (George et al., 2018), which may similarly manifest in social media use during emerging adulthood. Therefore, examining both the age of onset and the developmental stage of users offers a more comprehensive understanding of how vulnerability to PSMU may evolve across time.

Nevertheless, experiences within this group are far from being homogenous. Earlier cohorts of emerging adults first encountered the internet and social networking platforms in the mid-2000s, when these technologies were relatively simplistic and lacked algorithmic personalisation. In contrast, contemporary platforms are heavily shaped by algorithm-driven content delivery, infinite scrolling, and auto-play mechanisms, features that characterise what has been described as a "data business model" (Montag et al., 2019). Such design features can undermine users' autonomy and agency, often fostering negative behaviours and outcomes (Lukoff et al., 2021). Empirical evidence demonstrates that these mechanisms create highly engaging experiences that may contribute to addictive patterns of use (Lee et al., 2018; Qin et al., 2022). Even in less extreme cases, problematic social media use has been consistently associated with reduced psychological well-being among adolescents and young adults (Shannon et al., 2022).

Problematic social media use

Problematic Social Media Use (PSMU) is typically conceptualised across four key dimensions: (1) excessive use, when time spent on social media interferes with daily responsibilities and activities; (2) loss of control, referring to the inability to reduce or regulate use despite attempts to do so; (3) negative consequences, such as significant disruptions in personal, social, academic, or professional domains due to social media engagement; and (4) withdrawal symptoms, including anxiety, irritability, or sadness when access to social media is restricted (Bányai et al., 2017). The impact of PSMU on mental health has been documented in various forms, including heightened risks of depression, anxiety, stress (Hou et al., 2019; Kuss & Griffiths, 2017), attention-deficit/hyperactivity disorder (Lahti et al., 2023; Settanni et al., 2018), and general health difficulties (Brailovskaia et al., 2020; Pontes, 2017). Furthermore, PSMU has been associated with a

range of poor health indicators, including frequent headaches, musculoskeletal pain (e.g., in the shoulders and neck), irritability, loneliness, physical inactivity, morning fatigue, poor or insufficient sleep, and lower self-rated health (Paakkari et al., 2021; Peng & Liao, 2023). Concerns regarding the prevalence of PSMU have intensified, particularly in adolescents and young adults, who may be especially vulnerable to its detrimental effects on well-being and developmental outcomes (Marciano & Viswanath, 2023; Shannon et al., 2022). In a large cross-national study involving 29 countries, including Canada and several European nations, Boer et al. (2020) reported that the prevalence of intense social media use by youth ranged from 17.35% in Switzerland to 49.87% in Italy, whereas the prevalence of problematic social media use varied from 3.2% in the Netherlands to 14.1% in Spain. In Portugal, the rates were 40.36% for intense use and 5.92% for PSMU (Eurostat, 2023a). Given the widespread nature of social media in daily life, such negative consequences highlight the importance of identifying and understanding the underlying factors and mechanisms contributing to this behaviour, and mainly protective factors that may contribute to a more adaptative use of social media. Protective factors reduce such risks or buffer individuals against them (Dailey et al., 2020). However, comparatively fewer studies have addressed protective factors. Identifying such positive factors may provide valuable insights for developing strategies to foster healthier engagement with social media, particularly among vulnerable populations. In this context, the present study focuses on three protective factors of particular relevance: self-efficacy (SE), critical thinking (CT), and digital literacy (DL).

Self-efficacy, Critical Thinking, and Digital Literacy as Protective Factors

Self-efficacy (SE), defined as an individual's judgement of their capacity to perform a specific behaviour and as the belief in one's ability to carry out the actions required to manage future situations (Bandura, 2006a), is one of the most widely studied factors associated with positive engagement with social media (Jia et at., 2024). Higher levels of self-efficay foster persistence and effort in the face of challenges, which are essential for goal attainment and the reinforcement of personal agency (Bandura, 2006b). This sense of agency is closely related to the ability to regulate behaviour effectively, including responsible engagement with social media (Hu et al., 2018).

Research has consistently linked self-efficacy to healthier patterns of digital engagement. For example, it has been associated with more effective management of social

media use and reduced negative outcomes (Jia et al., 2024). Empirical studies further demonstrate a negative association between perceived self-efficacy and excessive or addictive internet use (Berte et al., 2021; Cao et al., 2011). In educational contexts, self-efficacy has also been found to influence students' vulnerability to problematic smartphone use, with higher self-efficacy predicting lower addiction-like behaviours (Gökçearslan et al., 2016). This study aimed to continue to explore self-efficacy role on social media behaviour but bring a new approach introducing the dimensions of PSMU seeking to understand self-efficacy specific contribution for this population.

Critical thinking (CT), understood as the ability to objectively analyse information and make reasoned judgements, is especially important when navigating the overwhelming volume of information available online (Gigerenzer, 2020). Critical thinking fosters selective information processing, enabling individuals to discern reliable content and reject misinformation (Parijkova, 2020). Improved critical thinking skills may also encourage more reflective and intentional online behaviours (Sutoyo et al., 2023). Users with well-developed critical thinking abilities are better prepared to manage their time and online interactions, recognise harmful content, and avoid problematic patterns of behaviour (Raj et al., 2022). In this way, the capacity to critically evaluate digital information can support more informed decision-making and reduce the risk of problematic social media use (Marin & Copeland, 2022). Findings also suggest that excessive attachment to social media may affect negatively the development of critical thinking among university students (Cheng et al., 2022; Thomas, 2020), and also have reported a negative correlation between social media dependency and the development of critical thinking skills (Thomas, 2020). At the same time, other studies highlight that social networks can also function as valuable tools for developing critical thinking skills when used intentionally within educational contexts (Galindo-Domínguez et al., 2024). Even if critical thinking had already been demonstrated as an important factor for regulating of attitudes, even in online behaviours, it's role in social media use still underexplored specially on the digital native's population. Existing evidence mainly highlights the ability to evaluate online content; however, by considering the dimensions of problematic social media use (PSMU), we aimed to explore whether critical thinking also plays a regulatory role, and whether this influence is general or more domain-specific

Digital literacy (DL) is defined as the ability to use information and communication technologies to locate, evaluate, create, and communicate information (Gilster, 1997; Littlejohn et al., 2012). Digital literacy equips young people with the skills required to optimise their online interactions and build supportive networks. A general understanding of how social media platforms function, alongside the technical skills necessary to personalise one's digital experience, is essential for developing healthier patterns of use (Eg et al., 2022). Without such competencies, individuals may recognise the need for change but struggle to implement it, particularly when attempting to modify default settings designed to maximise user engagement and retention.

The acquisition of digital literacy involves both cognitive and technical skills, which enable individuals to evaluate the credibility of online content, manage their digital presence, and use social media to strengthen social support networks (van Laar et al., 2017). Recognised as one of the most important skills for the 21st century, digital literacy has been integrated into educational and policy frameworks since at least 2008 (Battelle for Kids, 2019; National Research Council, 2012). More recently, the World Health Organization (2024) highlighted the importance of embedding digital literacy education within health-promoting school environments, recommending evidence-based programmes that address responsible social media use, online safety, critical thinking, and healthy gaming practices.

Digital literacy has been emphasised as a crucial preventive approach, equipping adolescents with the competencies to engage with technology responsibly and mitigate associated psychological risks (Sechi et al., 2025). Evidence also indicates that so-called digital natives can be taught digital literacy effectively, challenging assumptions that such skills develop automatically through exposure to technology (Ng, 2012). According to Eurostat (2023b), 70.7% of Europeans aged 16 to 29 reported basic or above-basic overall digital skills, a figure that rises to 82% among young adults in Portugal. Strengthening DL is thus viewed as a pathway towards empowering young people to become responsible digital users, equipped with the ability to critically assess online information and consciously select the content they engage with (Isnaini et al., 2025). Besides the wide recognition of the importance of digital literacy on online wellbeing there are still not many studies exploring the social media environments or that explore differences between the vast age range of emerging adulthood that in the present is composed by the diverse population of digital natives.

Digital Literacy as a Moderating Factor

Given the challenges associated with problematic social media use (PSMU), it is essential to consider not only individual protective factors, such as self-efficacy and critical thinking, but also the conditions that enable their effective application. In this context, digital literacy may play a crucial moderating role. Without adequate digital skills, individuals may recognize the need for change or feel confident in regulating their behavior, yet struggle to translate this capacity into concrete actions, such as managing online interactions or adjusting platform settings.

The literature supports the positive correlation between digital literacy and self-efficacy, and that there is a positive interplay, where improving one facilitate the improvement of the other (Hengst et al., 2025; Peng et al., 2024). Studies in educational contexts also highlight how digital literacy fosters academic self-efficacy and reduces procrastination (Yuan et al., 2024), and how attitudes towards technology and digital literacy shape self-efficacy in online learning (Barton & Dexter, 2020; Prior et al., 2016). These findings indicate that self-efficacy alone may be insufficient unless accompanied by digital literacy, which provides the operational capacity to enact regulation and resist maladaptive patterns of use.

A similar relationship is observed between digital literacy and critical thinking that has been described as a core component of digital literacy (van Laar et al., 2017), equipping individuals to process digital information more effectively and engage with social media in a balanced way. Empirical evidence shows that the use of social media can actively support the development of critical thinking, particularly in higher education, by evaluating digital content, analysing problems, and forming opinions foster both competencies (Galindo-Domínguez et al., 2024), we want to explore further to understand if this use also indicates digital literacy competences that may moderate these relationship. These results would corroborate with the educational frameworks that emphasise the joint cultivation of digital literacy and critical thinking as both fundamental 21st century skills (van Laar et al., 2017).

By strengthening cognitive and behavioural resources, digital literacy may amplify the protective effects of self-efficacy and critical thinking against PSMU. In this sense, self-efficacy provides the confidence to regulate behaviour, critical thinking offers the reasoning to evaluate online content, and digital literacy supplies the practical tools necessary to put these capacities into action for both.

Objectives and Hypotheses

The current study aims to examine the role of self-efficacy, critical thinking and digital literacy on problematic social media use, as well as analyze the potential moderating role of digital literacy in mentioned associations. Based on literature we expect that higher levels of self-efficacy, critical thinking and digital literacy would be negatively associated with PSMU dimensions. We also expected that digital literacy would moderate the links between self-efficacy and critical thinking with PSMU dimensions. More specifically, we expected that the negative association between self-efficacy and PSMU and between critical thinking and PSMU would be stronger when digital literacy is high.

Method

Participants

The sample comprises 311 emerging adults aged 18 to 35 (M = 23.20; SD = 3.65). Of those, 205 self-identified as women (65.9%), 98 as men (29.9%), 5 as non-binary (1.6%), and 8 preferred not to disclose their gender (2.6%). See table S1 for more information. Participants started using social media at age M = 12.35 SD = 2.37; minimum = 6 maximum = 24. The most used social media is Instagram (n = 297; 95.5%), followed by YouTube (n = 276; 88.7%) and further with similar popularity TikTok (n = 134; 43.1%), closely followed by Facebook (n = 133; 42.8%). Regarding the characterization of social media use, participants most frequently use when they want to watch short content, the order maintained first with Instagram (n = 152; 48.9%), followed by YouTube (n = 65; 20.9%), TikTok (n = 51; 16.4%). The time spent watching short content is an average of 3 hours and 20 minutes per day [SD = 1.75; minimum = 0 (n = 2; 0.6%); maximum = 8 (n = 1; 0.3%)].

Concerning watching short video content, 305 stated to watch, the majority affirming to consume it every day (n = 225, 70,3%), in an average of one hour and 26 minutes. When it comes to the users' preferences, the most ranked interests were comedy and humor (n = 165, 53.1%), animals and pets (n = 83, 26.7%) and cinema and movies (n = 81, 26.0%). See table S2 and S3 for more information.

Measures

The protocol consisted of a quantitative online survey.

Sociodemographic information and social media usage: This section included questions on age, gender. Questions aimed to determine whether participants use social media, which platforms they use, which one they use most frequently, the age at which they created their first social media account, and how much time they typically spend on social media. When focusing specifically on social media, the questions addressed short-form content platforms or features (e.g., TikTok, Reels, Shorts). Participants were asked how often they watch this type of content, how much time they spend watching it, and what their top three topics of interest are when consuming this content.

Generalised Problematic Internet Use Scale 2 - GPIUS2 (Caplan, 2010; Portuguese version by Assunção & Matos, 2016). This scale is composed of 15 items and assesses five dimensions of problematic social media use, namely: Preference for Online Social Interaction (POSI; 3 items; e.g., 'I prefer online social interaction to face-to-face communication'); Mood Regulation (MR; 3 items; e.g., 'I have used social media to make myself feel better when I was down'); Cognitive Preoccupation (CP; 3 items; e.g., 'I would feel lost if I was unable to go to social media'); Compulsive Use (CU; 3 items; e.g., 'I find it difficult to control my social media use'); Negative Outcomes (NO; 3 items; e.g., 'My social media use has created problems for me in my life'). The language was adapted to match the study theme, therefore the word "internet" present in the original scale was replaced with "social media". Participants answered the items on a 7-point Likert scale (1 = Strongly disagree; 7 = Strongly agree). A higher score indicates a greater level of problematic social media use. All dimensions internal consistency analysis showed the following Cronbach's alpha values: POSI = .83, M*R* = .77, CP = .83, CU = .85 and NO = .76. Scale scores demonstrated an acceptable fit to the data ($\chi^2_{(77)} = 255.61$, $p > .001$, CFI = .93, TLI = .91, RMSEA = .09, SRM*R* = .06).

Perceived General Self-Efficacy Scale (Schwarzer & Jerusalem, 1981; adapted by Nunes et al., 1999). This is a self-report unidimensional questionnaire designed to assess self-efficacy beliefs. It consists of 10 items (e.g., I can solve most problems if I invest the necessary effort') and answers are presented on a 4-point Likert scale (1- Not at all true; 4 - Exactly true). Higher scores indicate a higher perception of self-efficacy. This scale showed a good internal consistency ($\alpha = .88$). Scale scores demonstrated a good fit to the data ($\chi^2_{(34)} = 88.96$, $p > .001$, CFI = .96, TLI = .94, RMSEA = .07, SRM*R* = .04).

Critical Thinking Dispositions Scale - New Version (Lopes et al., 2021). This scale consists of 35 items distributed across seven dimensions and a total score of critical thinking. Within the scope of this project, only 20 items, distributed on the following four from the original seven dimensions were assessed: Truth-seeking (4 items; e.g., 'I am constantly researching to learn new things'), Self-confidence in reasoning (5 items; e.g., 'I pride myself on being a person who thinks very accurately'), Intellectual curiosity (7 items; e.g., 'I like to develop original ideas'), and Cognitive maturity (4 items; e.g., 'People say that I am very careful when making decisions'). Participants answer the items on a 5-point Likert scale (1-Totally disagree; 5-Totally agree). Higher scores indicate a greater predisposition to critical thinking. In the current study, we analyzed the total score and decided to remove items 14 and 19, as they did not contribute significantly to the total score. The total score revealed a good internal consistency (α = .83) and an acceptable fit to the data ($\chi^2_{(131)}$ = 316.35, p >.001, CFI = .86, TLI = .84, RMSEA = .07, SRMR = .06).

Digital Literacy Scale (Montenegro et al., 2024). Based on the tools that are available on online platforms and personal devices and the common risks and their associated harms to which individuals are exposed on the online environment, we developed a measure to assess digital literacy within the scope of this study. It comprises 19 items (e.g., 'When a new feature or application appears, I feel confident in exploring it and learning how to use it without needing outside help') which aim to assess skills such as the user's dexterity and adaptability with digital devices, as well as whether they recognize the principles for ensuring their online security and privacy. The participants answer the items on a 5-point Likert scale (1 = Strongly disagree; 5 = Strongly agree). A higher score reflects greater digital literacy. The scale revealed a good internal consistency (α = .88). Scale scores demonstrated an acceptable fit to the data ($\chi^2_{(148)}$ = 382.28, p >.001, CFI = .87, TLI = .85, RMSEA = .07, SRMR = .06).

Procedures

The protocol for the present study was hosted on the *LimeSurvey* platform via the domain inqueritos.up.pt, which enables the coding of data sources in a manner that ensures participants' anonymity. The study received ethical approval from both the Ethics Committee of the Faculty of Psychology and Education Sciences at the University of Porto (Ref. 2025-02-08b) and the Data Protection Unit at the University of Porto (Opinion A-102/2025). Data collection took place between April 2025 and June 2025. Dissemination

was carried out through the institutional email list system of the University of Porto and via social media platforms, specifically Facebook, WhatsApp, Instagram, TikTok, and LinkedIn. Participants were asked to disseminate to their friends, colleagues and acquaintances that would fit into the profiling, according to a snowball effect. All participants were informed about the aims of the study via the informed consent as well as the guarantees of anonymity and confidentiality, as well as the voluntary nature of participation where they would not receive any compensation for the participation and could give up or ask to exclude their answers at any point of the study. Additionally, an email address was provided should participants wish to contact the researcher for further clarification. Recognizing the importance of directly sharing the study's results with interested participants, an option was provided for them to submit an email address through a separate questionnaire, the link to which was presented at the end of the main survey. To ensure participants' anonymity was not compromised, this information was collected independently from the main dataset and will be used solely for the purpose of disseminating the study's findings to those who expressed an interest in receiving them.

Data analysis strategy

Data analysis was performed using the software Statistical Package for Social Sciences (SPSS, 29.0) and R (R Core Team, 2020) using the lavaan (Rosseel, 2012). The answers to the self-report measures were mandatory for participants to proceed with filling out the protocol; thus, there were no missing values. However, in the sociodemographic questionnaire, the answers were not mandatory.

The univariate outliers were identified through Z score < -3 or > 3, while the multivariate outliers were identified by calculating the distance of Mahalanobis. One participant identified as outlier was not considered in the statistical analysis. The normality distribution was analyzed and skewness and kurtosis values were within the range of -1 to +1 and therefore considered to indicate non-significant departure from normality (Kline, 2015).

We calculated means, standard deviation, and correlations among variables. We run a Pearson correlation analysis on PSMU dimensions and five independent variables (Chronological Age, Age Social Media, Self-Efficacy, Critical Thinking, Digital Literacy). We also tested confirmatory factor analysis (CFA) for each self-report measure used in the current study. The CFA results were analyzed using several fit indices: Comparative Fit

Index (CFI), Tucker-Lewis Index (TLI), Standardized Root Mean Square Residual (SRMR) and Root Mean Square Error of Approximation (RMSEA). The following cutoffs guided the interpretation of CFA results: CFI and TLI ≥ 0.80, RMSEA and SRMR < 0.10 to indicate an acceptable fit (Kline, 2015). We also tested the internal consistency of all measures by calculating Cronbach's alpha. Furthermore, we tested the main hypotheses of the current study using structural equation modeling (SEM). Although the chi-square statistics were significant, this is commonly expected in large samples and does not necessarily indicate poor model fit when other indices are within acceptable ranges (Kline, 2015). We used latent variables only for the dependent variables to obtain more accurate estimates by accounting for measurement errors, while the independent variables were introduced as manifest variables.

Results

Correlations

Table 1 presents the descriptive statistics and associations among all study variables. The bivariate correlations revealed significant positive associations among all PSMU dimensions, supporting the theoretical expectation of their interrelatedness. Chronological age demonstrated significant negative correlations with preference for online social interection (r = –.82, p < .01), mood regulation (r = –.17, p < .01), compulsive use (r = –.16, p < .01), and negative outcomes (r = –.12, p < .05), indicating that older participants reported lower levels of problematic use. However, the association between chronological age and cognitive preoccupation was non-significant (r = –.10, p <.05). Age started using social media (Age SM) revealed significant negative correlations with mood regulation (r = –.20, p < .01) and significant positive correlation with chronological age (r = .32, p < .01), suggesting that older participants tended to start using social media later. The remaining associations were non-significant. Self-efficacy showed significant negative correlations with all PSMU dimensions (from r = –.15 from r = -.23, p < .01), with exception of mood regulation. Critical thinking demonstrated significant negative correlations with several PSMU dimensions: preference for online social interaction (r = –.23, p < .01), cognitive preoccupation (r = –.23, p < .01), compulsive use (r = –.23, p <.01), and negative outcomes (r = –.21, p < .01), while its association with mood regulation was non-significant (r = .00, p > .05). Critical thinking was strongly and positively associated with digital literacy (r = .62, p < .01). Finally, digital literacy showed significant negative correlations with all PSMU

dimensions, including preference for online social interaction ($r = –.13$, $p < .05$), cognitive preoccupation ($r = –.16$, $p < .01$), compulsive use ($r = –.14$, $p < .05$), and negative outcomes ($r = –.15$, $p < .01$). The association between digital literacy and mood regulation was non-significant ($r = –.05$, $p < .05$). Additionally, digital literacy correlated negatively with age started using social media ($r = –.16$, $p < .01$) and positively with critical thinking ($r = .62$, $p < .01$).

Table 1.

Pearson Correlation between variables (*n = 311)*

	1	2	3	4	5	6	7	8	9	10
1. PU_POSI	-									
2. PU_MR	.23**	-								
3. PU_CP	.22**	.35**	-							
4. PU_CU	.14*	.36**	.65**	-						
5. PU_NO	.08	.29**	.50**	.57**	-					
6. Age (Chrolological)	-.82	-.17**	-.10	-.16**	-.12*	-				
7. Age SM	-.03	-.20**	-.01	-.06	-.06	.32**	-			
8. Self-efficacy	-.23**	-.02	-.19**	-.15**	-.19**	.05	-.05	-		
9. Critical Thinking	-.23**	.00	-.23**	-.23**	-.21**	.06	-.03	.62**	-	
10. Digital Literacy	-.13*	-.05	-.16**	-.14*	-.15**	-.02	-.16**	-.47**	.56**	-
MD	2.51	5.01	2.55	3.71	2.91	23.20	12.35	2.90	3.81	3.91
SD	1.35	1.48	1.32	1.59	1.54	3.65	2.37	.50	.47	.57

Note: ** = Correlation is significant at the 0.01 level (2-tailed); * = Correlation is significant at the 0.05 level (2-tailed); PU_POSI = Problematic Use – Preference for Online Social Interaction:, PU_MR= Problematic Use – Mood Regulation , PU_CP = Problematic Use - Cognitive Preoccupation, PU_CU = Problematic Use – Compulsive Use, PU_NO = Problematic Use – Negative Outcomes, Age SM = Age started using social media, MD = mean, SD = standard deviation.

Structural Equation Model and Moderation

We tested a model including all direct paths among chronological age, age when started using social media, self-efficacy, critical thinking, digital literacy, as well as the interactions between digital literacy and self-efficacy with critical thinking and the dimensions of problematic social media use (PSMU). To minimize potential

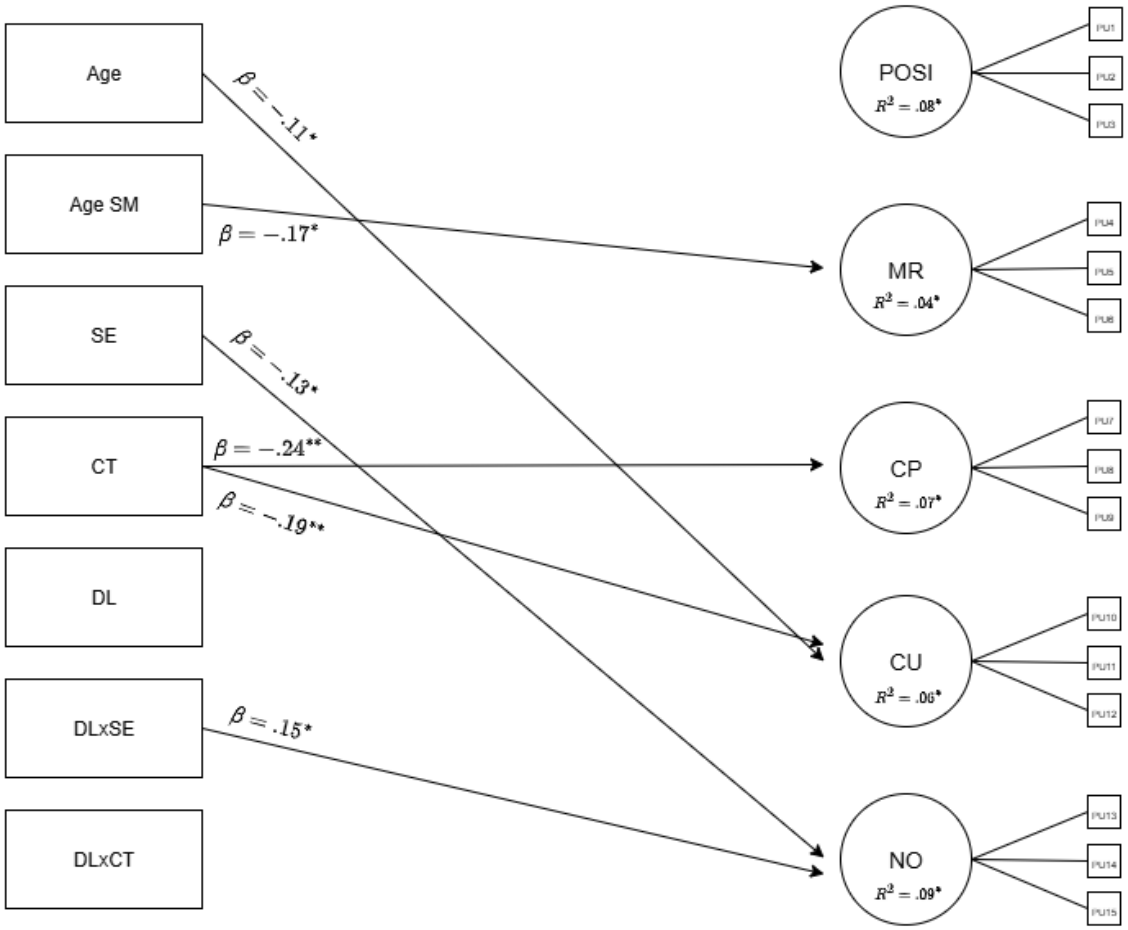
multicollinearity issues, all independent variables were standardized prior to analysis. The model showed an acceptable fit ($\chi^2_{(147)} = 345.28$, $p < .001$; CFI = .92; TLI = .88; RMSEA = .07; SRMR = .05), explaining 9% of preference for online interaction 5% of mood regulation, 9% of cognitive preoccupation, 8% of compulsive use and 11% of negative outcomes. Nonetheless this acceptable fit, we decided to trim the nonsignificant paths, with very low magnitude (close to zero). The trimmed model did not show a significantly worse adjustment to the data than the original model ($\Delta\chi^2_{(22)} = 7.66$, $p < 998$). As such, we decided to retain this more parsimonious model which also revealed an acceptable fit ($\chi^2_{(169)} = 353.88$, $p <$ .001; CFI = .93; TLI = .91; RMSEA = .06; SRMR = .05), explaining 8% of preference for online social interaction 4% of mood regulation, 7% of cognitive preoccupation, 6% of compulsive use and 9% of negative outcomes (figure 1).

The results demonstrate a negative link between age started using social media and mood regulation ($\beta = -.17$, $p = .014$). We also found a negative link between critical thinking and cognitive preoccupation ($\beta = -.24$, $p < .001$). Further, our results indicate a negative link between critical thinking and chronological age with compulsive use (respectively $\beta = -.19$, $p < .001$; $\beta = -.11$, $p = .019$). We also found that self-efficacy was negatively linked with Negative Outcomes ($\beta = -.13$, $p = .049$). The moderation analysis revealed that digital literacy significantly moderated the relationship between self-efficacy and negative outcomes ($\beta = -.15$, $p = .008$; see Figure 2). Among individuals with low digital literacy, self-efficacy showed only a weak protective effect against negative outcomes, with the association remaining relatively stable across different levels of negative outcomes. For participants with average levels of digital literacy, this relationship became moderately negative, suggesting that self-efficacy exerts a stronger protective influence when supported by adequate digital competencies. In contrast, individuals with high digital literacy displayed the steepest negative slope, indicating that higher levels of digital literacy substantially enhance the protective role of self-efficacy in mitigating negative outcomes. This pattern highlights a synergistic interaction between self-efficacy and digital literacy, whereby the combination of both competencies most effectively reduces the adverse consequences associated with social media use. Moreover, the convergence of slopes at higher levels of negative outcomes suggests that the moderating effect of digital literacy is particularly salient when negative outcomes are relatively low, reinforcing its preventive and buffering role in the context of problematic social media use.

Figure 1.

Structural Equation Modeling (SEM)

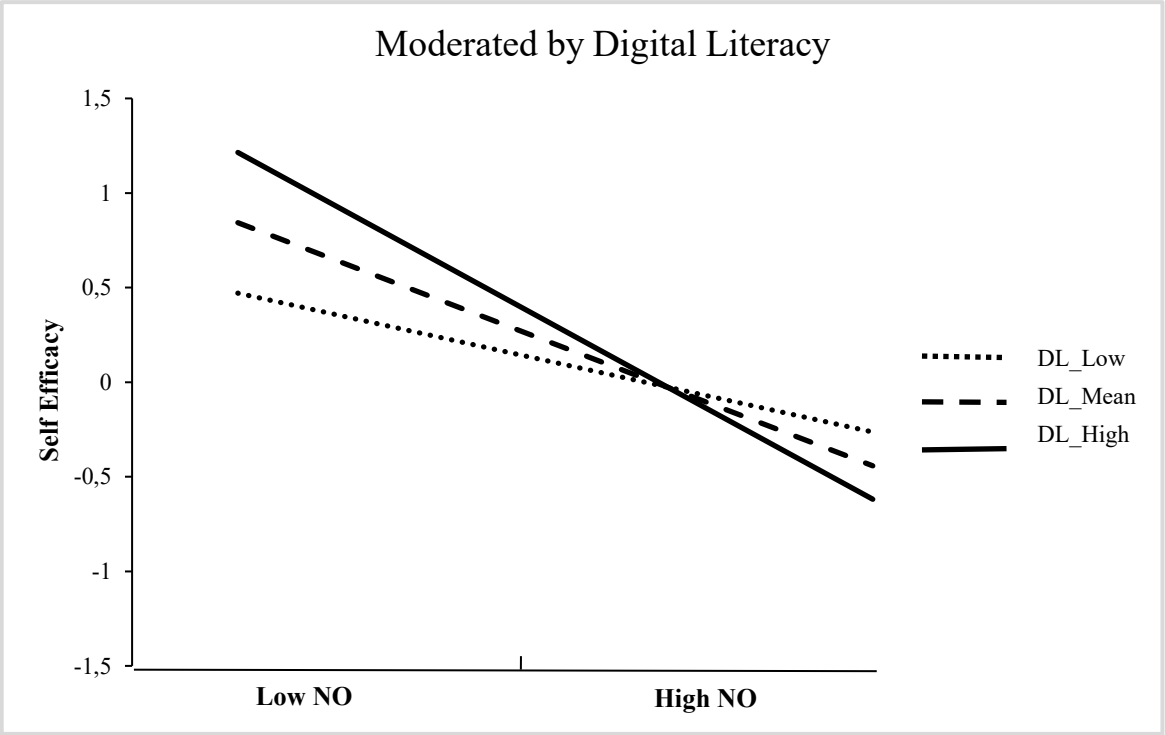
$$\chi^2_{(169)} = 353.88, \rho < .001, \text{rmsea} = .06, \text{srmr} = .05, \text{cfi} = .93, \text{tli} = .91$$



Note: Age = Chronological Age, Age SM = age started using social media, SE = Standardized Self-Efficacy, CT = Standardized Critical Thinking, DL = Standardized Digital Literacy, DLxSE = Interaction Digital Literacy vs. Self-Efficacy, DLxCT = Interaction Digital Literacy vs. Critical Thinking; POSI = Problematic Use – Preference for Online Social Interaction:, MR= Problematic Use – Mood Regulation , CP = Problematic Use - Cognitive Preoccupation, CU = Problematic Use – Compulsive Use, NO = Problematic Use – Negative Outcomes.

Figure 2.

Moderation Digital Literacy vs. Self-Efficacy Plot



Discussion

The present study aimed to examine the role of self-efficacy, critical thinking, and digital literacy as protective factors against problematic social media use (PSMU) amongst emerging adults. Additionally, we sought to investigate whether digital literacy moderates the relationships between self-efficacy and critical thinking and PSMU dimensions.

A significant negative association was found between age of social media initiation and mood regulation, indicating that individuals who began using social media at younger ages were more likely to rely on these platforms for emotional regulation purposes. This finding is particularly concerning given that early exposure occurs during a critical period of socio-emotional development when emotion regulation strategies are still being established (Coyne et al., 2013). Children and young adolescents who begin using social media at earlier ages may come to depend on these platforms as primary sources of emotional comfort, potentially at the expense of developing more adaptive offline coping strategies. Even though there is not much research on how early initiation of social media affects children's socio-emotional development, a recent study demonstrated that obtaining a smartphone at a later age (e.g., 13 instead of 10) was associated with positive behavioral

health outcomes, such as increased sleep time and earlier bedtimes (Charmaraman et al., 2021). In addition, prior research demonstrates that problematic digital technology use during early adolescence predicts conduct problems over time and eventually issues with self-regulation (George et al., 2018) which might indicate this behaviour can be replicated on the social media use.

The results are consistent with previous studies, revealing a significant negative association between chronological age and compulsive use, indicating that older emerging adults reported lower levels of compulsive social media use. This result may reflect maturation processes related to the development of emotional and behavioural self-regulation skills, which tend to consolidate during late adolescence and early adulthood. As individuals progress along this trajectory, they are expected to show greater ability to manage impulses, set priorities, and balance the time devoted to online and offline interactions (Bermudez, 2016). In addition, older participants would have first encountered social media platforms when these technologies were less sophisticated and lacked algorithm-driven engagement mechanisms now ubiquitous across platforms (Montag et al., 2019).

The results also revealed a significant negative association between self-efficacy and negative outcomes, suggesting that individuals with higher confidence in their capacity to perform specific behaviours (Bandura, 2006a) experience fewer adverse consequences related to their social media use. This finding supports our hypothesis and aligns with Social Cognitive Theory (Bandura, 2006b), which posits that higher levels of self-efficacy foster persistence and effort in the face of challenges, thereby reinforcing personal agency and behavioural regulation. Individuals with higher self-efficacy may be more confident in their ability to set boundaries around their social media use and to implement strategies to prevent it from interfering with other life domains. This finding is consistent with empirical evidence demonstrating that self-efficacy is associated with more effective management of social media use and reduced negative outcomes (Jia et al., 2024) and corroborates research showing a negative association between perceived self-efficacy and excessive or addictive internet use (Berte et al., 2021; Cao et al., 2011).

Our findings also demonstrate a significant negative association between critical thinking and cognitive preoccupation, indicating that individuals with higher critical thinking abilities report lower levels of preoccupation with social media. This result suggests

that the capacity to objectively analyse information and make reasoned judgements (Gigerenzer, 2020) enables individuals to maintain psychological distance from social media platforms, thereby reducing obsessive thoughts about online engagement. This finding aligns with theoretical propositions that critical thinking fosters more reflective and intentional online behaviours (Sutoyo et al., 2023), allowing individuals to resist the cognitive capture that characterises problematic engagement patterns. This result corroborates previous research suggesting that well-developed critical thinking abilities enable users to manage their time and online interactions more effectively (Raj et al., 2022). Individuals with stronger critical thinking skills may be better equipped to recognise when their thoughts are excessively focused on social media and to employ metacognitive strategies to redirect their attention. This capacity appears particularly relevant in the context of algorithm-driven content delivery and infinite scrolling mechanisms (Montag et al., 2019), which are specifically designed to capture users' attention. These findings support our hypothesis, corroborating the protective role of critical thinking against the cognitive preoccupation dimension of PSMU.

Further, critical thinking demonstrated a significant negative association with compulsive use indicating that individuals with higher critical thinking abilities are less likely to experience difficulties controlling their social media use. The capacity to evaluate information critically and make reasoned judgements appears to extend to behavioural regulation, enabling individuals to resist compulsive patterns of engagement despite the highly engaging design features of contemporary platforms (Lee et al., 2018; Qin et al., 2022). This result is consistent with the theoretical framework suggesting that critical thinking enables more informed decision-making regarding social media use (Marin & Copeland, 2022). Individuals who can critically evaluate the value of their online interactions may be better positioned to recognise when their behaviour is becoming compulsive and to implement self-regulatory strategies. Corroborating with previously mentioned studies these findings support our hypothesis, confirming the protective role of critical thinking against specific dimensions of PSMU.

One of the central aims of this study was to investigate whether digital literacy moderates the relationships between self-efficacy and PSMU, as well as between critical thinking and PSMU. The rationale was grounded in the understanding that whilst self-efficacy reflects the belief in one's ability to act (Bandura, 1997) and critical thinking enables critical evaluation of information (Gigerenzer, 2020), both require digital literacy to be

translated into practical behaviours in digital environments (Gilster, 1997; van Laar et al., 2017).

The moderation analysis indicated a significant interaction between digital literacy and self-efficacy in relation to negative outcomes, thereby supporting our hypothesis. The simple slopes analysis suggested that the association between self-efficacy and negative outcomes was strongest among individuals with higher levels of digital literacy, as reflected by the steepest negative slope. In contrast, among those with lower digital literacy, the association between self-efficacy and negative outcomes appeared weaker. This pattern implies that digital literacy may strengthen the buffering role of self-efficacy, enhancing its potential to mitigate the negative correlates associated with problematic social media use. These findings are consistent with previous research suggesting a mutually reinforcing relationship between digital literacy and self-efficacy (Hengst et al., 2025; Peng et al., 2024), and extend this evidence to the context of emerging adults' social media use. It is possible that, without sufficient digital literacy, individuals who believe they can regulate their social media use (i.e., those with high self-efficacy) may nonetheless lack the practical knowledge and technical skills required to translate these beliefs into effective behaviour, such as modifying algorithmic recommendations or adjusting notification settings. The theoretical rationale for this moderating effect can be traced to Social Cognitive Theory (Bandura, 2006a), which highlights the interdependence of self-efficacy beliefs and behavioural capabilities in shaping outcomes. The present findings contribute to this framework by indicating that digital literacy may enhance the functional role of self-efficacy, underlining the importance of considering both psychological and practical competencies in efforts to promote healthier patterns of social media use. The nonsignificant direct association between digital literacy and negative outcomes, coupled with its significant moderating effect, suggests that digital literacy may operate primarily as an enabling competency rather than as an independent protective factor.

Conclusions and Implications

The findings carry several important implications for understanding and preventing PSMU amongst emerging adults. First, the selective nature of protective roles, whereby different factors target specific dimensions of PSMU, underscores the multidimensional nature of problematic social media engagement. Interventions may need to address multiple protective factors simultaneously to comprehensively address the various components of

problematic use. Second, the finding that digital literacy functions primarily as a moderator rather than an independent protective factor has crucial implications for intervention design. Digital literacy education alone may be insufficient to prevent PSMU; rather, it must be integrated with efforts to build self-efficacy and critical thinking. This synergistic approach aligns with the World Health Organization's (2024) recommendation to embed digital literacy education within health-promoting environments that also address critical thinking and responsible use. Third, the finding that earlier age of social media initiation is associated with greater reliance on social media for mood regulation suggests that prevention efforts should focus on delaying initial exposure where possible and ensuring that young people are equipped with alternative emotion regulation strategies. Finally, the protective effects of critical thinking against both cognitive preoccupation and compulsive use reinforce the value of critical thinking education as a fundamental 21st-century skill (Battelle for Kids, 2019; National Research Council, 2012).

Specifically, the present findings indicate that self-efficacy predicted fewer negative outcomes, while critical thinking was associated with lower levels of cognitive preoccupation and compulsive use. Digital literacy did not function as a direct protective factor but significantly moderated the relationship between self-efficacy and negative outcomes, suggesting that strong digital competencies amplify individuals' capacity to translate confidence into effective self-regulation. This synergistic relationship highlights the importance of integrating psychological and practical skill-building within interventions aimed at promoting healthier social media use. Educational institutions and health promotion programmes are well positioned to foster these protective capacities by simultaneously cultivating self-efficacy, critical thinking, and digital literacy. Given the developmental sensitivity of emerging adulthood and the pervasive presence of social media, such multidimensional approaches represent a vital public health and educational priority.

Limitations and Future Research

Several limitations warrant consideration. First, the cross-sectional design precludes causal inferences about the relationships amongst variables. Whilst we have discussed these findings in terms of protective roles, it is equally plausible that PSMU shapes the development of self-efficacy, critical thinking, and digital literacy, or that bidirectional relationships exist. Longitudinal research is essential to disentangle these potential causal pathways. Second, the study relied exclusively on self-report measures, which are subject to

biases such as social desirability and recall inaccuracies. Future research would benefit from incorporating objective measures of social media use alongside self-report assessments. Third, participants were primarily recruited through university networks and social media platforms, potentially introducing selection biases. Future research should strive to recruit more representative samples. Fourth, the study did specifically distinguish between different types of content formats, nevertheless was not possible to compare between formats since it specified to short-form video content since we had theoretical reasons to expect that short-form video content may be particularly conducive to addictive engagement patterns (Liao, 2024; Xie et al., 2023; Zhang et al., 2023). Future research should examine and compare whether the protective role of self-efficacy, critical thinking, and digital literacy vary across different types of social media environments, formats or specific platforms. Finally, the explained variance in PSMU dimensions ranged from 4% to 9%, indicating that whilst significant, the protective factors examined account for only a modest proportion of variability. This suggests that other factors not measured, such as personality traits, mental health symptoms, and parental mediation, also play important roles.

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