



“Don’t Leave me Behind!” Problematic Internet Use and Fear of Missing Out Through the Lens of Epistemic Trust in Emerging Adulthood

Ilaria Maria Antonietta Benzi¹ · Andrea Fontana² · Vittorio Lingiardi³ · Laura Parolin⁴ · Nicola Carone¹

Accepted: 9 November 2023
© The Author(s) 2023

Abstract

The present study investigates the association between Fear of Missing Out (FoMO) and Problematic Internet Use (PIU) in a sample of 358 cisgender emerging adults (74.58% females assigned at birth; $M_{age}=25.02$, $SD=2.60$; age range: 18–29 years), with a specific focus on the roles of various stances of Epistemic Trust, including Trust, Mistrust, and Credulity. The aim is to explore the complexities of these relationships and their implications for the psychological well-being of this population. We computed a mediation model to examine the relationships among PIU as the dependent variable, FoMO as the predictor, and Epistemic Trust, Mistrust, and Credulity as the mediating factors. Covariates such as age, gender, and sexual orientation were also considered in the analysis. The results revealed significant indirect effects for both Mistrust and Credulity. Specifically, higher levels of FoMO were associated with increased Mistrust and Credulity, leading to greater PIU. In contrast, the indirect effect of Trust was not significant. Also, FoMO had a direct effect on PIU. The results highlight the importance of considering Mistrust and Credulity as potential risk factors for Internet addiction in emerging adults. These findings have practical implications for clinical practice, psychological assessment, and intervention strategies, emphasizing the need to address FoMO and its associated vulnerabilities within different therapeutic settings. By doing so, mental health professionals can better support the psychological well-being of emerging adults and assist them in navigating the challenges inherent to this crucial developmental stage.

Keywords Emerging adulthood · Fear of missing out (FoMO) · Epistemic Trust · Problematic internet use (PIU) · Internet addiction · Mistrust · Credulity

Introduction

Developmental tasks of emerging adulthood

Emerging adulthood is a distinct life phase characterized by identity explorations, instability, self-focus, feeling in-between, and perceived possibilities (Arnett, 2007). Roughly from the end of adolescence through their twenties, emerging adults generally try to explore and consolidate their identity while establishing adult-like relationships with peers, seeking companionship, emotional security, love, and physical intimacy, and ultimately aiming to find long-term mates: indeed, in this phase of experimenting with “what it means to be an adult,” peers and romantic relationships gain greater importance than family connections, significantly influencing an individual’s development (Barlett et al., 2020).

However, being an emerging adult has also been notably shaped by socioeconomic changes in Western societies,

Ilaria Maria Antonietta Benzi and Andrea Fontana have contributed equally to this work.

✉ Ilaria Maria Antonietta Benzi
ilariamariaantonietta.benzi@unipv.it

¹ Department of Brain and Behavioral Sciences, University of Pavia, Piazza Botta Adorno Antoniotto, 11, Pavia 27100, Italy

² Department of Human Science, LUMSA University, Rome, Italy

³ Department of Dynamic and Clinical Psychology, and Health Studies, Faculty of Medicine and Psychology, Sapienza University of Rome, Rome, Italy

⁴ Department of Psychology, University of Milano-Bicocca, Milan, Italy

leading to increasing educational demands, delayed marriage, and prolonged dependency on families (Sica et al., 2016; Cerutti et al., 2022). Furthermore, the COVID-19 pandemic has exacerbated these difficulties, hindering emerging adults from achieving their developmental tasks, i.e., promoting higher levels of anxiety during the pandemic and experiencing intense feelings of insecurity and powerlessness, which led to heightened concern or avoidance of interpersonal situations (e.g., Germani et al., 2020; Hawes et al., 2022). Indeed, as societies navigate the aftermath of the pandemic, a nuanced understanding of emerging adulthood and its unique challenges might be timely and useful. Thus, as the pandemic has been recently declared to be over by the World Health Organization, an updated perspective on emerging adults' interpersonal experiences is vital to consider. Indeed, the satisfaction (or not) of their need for meaningful and fulfilling relationships with peers or romantic mates can profoundly impact emerging adults' developmental trajectories, potentially affecting their emotional well-being and overall growth (Lisitsa et al., 2020; Roisman et al., 2004).

Fear of missing out and problematic internet use

Fear of Missing Out (FoMO) is a psychological construct that has recently received increasing research attention, particularly concerning its associations with mental health and social media use (Akbari et al., 2021; Milyavskaya et al., 2018). A widely used definition of FoMO is characterized by a feeling of potentially being left out, a constant apprehension that one might miss out on rewarding experiences that others are having, which might lead to anxiety, stress, and the feeling of being left behind (Przybylski et al., 2013). In light of the recent societal shifts and digitalization, investigating the dynamics between FoMO and PIU becomes central to providing new insights into how emerging adults navigate their interpersonal and online worlds.

Some authors highlighted the need for an “unsatisfied relatedness” that FoMO entails and suggested that it might be associated with the fear of “not mattering,” i.e., the individuals' perception of not being significant for others and valued by them (Casale & Flett, 2020; Carone et al., 2023a, b). Moreover, researchers have argued that FoMO might be context- or situation-dependent; thus, its levels might decrease if social experiences are reduced or forbidden, such as during the COVID-19 pandemic (Casale & Flett, 2020). However, another study has shown that during the pandemic, the strength of the association between FoMO and problematic social media use was similar to that observed before the pandemic, suggesting that the fear of being excluded from social experiences “outside” might have been shifted to the online world (Gioia et al., 2021).

Indeed, several studies have examined the relationship between FoMO and Problematic Internet Use (PIU), and the results consistently show a strong positive association between these constructs (Akbari et al., 2021). PIU is an umbrella construct that refers to excessive or maladaptive Internet use patterns associated with negative outcomes (Kamolthip et al., 2022), characterized by a loss of control over Internet use, preoccupation with online activities, and withdrawal symptoms when Internet access is limited or unavailable. PIU is associated with various adverse outcomes, including depression, anxiety, stress, loneliness, social isolation, sleep disturbances, academic and occupational problems, and impaired interpersonal relationships (Anderson et al., 2017).

Evidence suggests an association between Problematic Internet Use (PIU) and interpersonal problems in emerging adults (Spada, 2014). While digital mediums can enhance social connections and foster creativity, they may also amplify internalizing and externalizing issues, particularly in individuals with specific vulnerabilities (Selfhout et al., 2009). The nexus between interpersonal relationship quality and PIU has been underscored, with research suggesting that deficient peer interactions may precipitate PIU. Furthermore, loneliness has been identified as a precursor to and a consequence of PIU (Kim et al., 2009). Additionally, PIU has been correlated with a spectrum of psychopathological conditions, including anxiety, depression, personality disorders, and substance-related disorders (Anderson et al., 2017; Fontana et al., 2018, 2023).

A widespread interpretation is that the online world might serve as both a refuge and a means of self-validation, particularly for emerging adults with fragile self-esteem and identity. Such individuals often gravitate towards social networks to circumvent real-life difficulties, seeking satisfaction and validation without the discomfort of direct social exchanges (Benzi et al., 2023; Musetti et al., 2022a). Indeed, for these emerging adults, digital platforms have become the preferred avenue to test their social standing and enhance their self-representation. This trend is notably pronounced in the presence of narcissistic characteristics, where vulnerable narcissism has been robustly linked to maladaptive social media practices, with a particular emphasis on Facebook-related addictive behaviors (Casale & Banchi, 2020).

In this scenario, FoMO represents an interpersonal disposition that multiple studies associated with problems navigating the online world (Elhai et al., 2020; Kamolthip et al., 2022; Müller et al., 2020; Wolniewicz et al., 2018). For example, a recent meta-analysis analyzed data from 33 studies and found a significant positive correlation between FoMO and Problematic Social Networking Site Use, consistent across different geographical locations, age groups, and genders (Fioravanti et al., 2021).

Interpersonal dispositions through the lens of epistemic trust

Epistemic trust is a concept that refers to an individual's capacity to trust the relevance and generalizability of intentional communication (Milesi et al., 2023). Fonagy and colleagues argued that psychopathology, insecure attachment, and impaired mentalizing are interconnected due to difficulties in establishing epistemic trust (ET) (Fonagy et al., 2017). A healthy ET enables individuals to remain alert to deception while preserving confidence in information conveyed through interpersonal interactions. In contrast, limited ET can manifest as epistemic hypervigilance or naïveté, leading to rigid mental states and behavior or increased susceptibility to deception. Campbell and colleagues (2021) suggested that individuals can adopt three overlapping stances in social communication related to socially transmitted knowledge: Trust, Mistrust, and Credulity. Epistemic Trust involves a selective and judicious openness to social learning within relationships, essentially affirming the dependability and utility of information received from others. In opposition, Epistemic Mistrust reflects a stance where all information is deemed suspect or malevolent, leading to a dismissal of external influences in communication (Campbell et al., 2021). Finally, in the case of Epistemic Credulity, a deficient critical stance makes one prone to accepting misinformation and being susceptible to manipulation.

Available evidence suggests that the way individuals navigate the interpersonal world (i.e., in borderline subjects in a dysregulated way, in anxious subjects with overwhelming preoccupation) is entangled with a specific capacity to find information coming from others' reliable and valuable, and nuances in this experience (i.e., epistemic stances) (Orme et al., 2019; Fonagy et al., 2017). This might prove exceptionally informative when exploring the perceived dissatisfaction of emerging adults' need for interpersonal connections (i.e., FoMO) and its consequences. However, given the novelty of the operationalization of this construct, only a few contributions have explored the different facets of ET in association with maladaptive outcomes (Locati et al., 2023; Tanzilli et al., 2022). This opens up a pivotal avenue for exploration of the interplay of these variables in the current socio-digital scenario.

The present study

In summary, developmental tasks of emerging adulthood entail, amongst others, establishing meaningful relationships with peers and romantic mates (Arnett, 2007; Roisman et al., 2004). However, in recent years, these tasks have been challenged by the pandemic and socio-economical crisis (Barlett et al., 2020; Germani et al., 2020), fostering

emerging adults' interpersonal dispositions to entail fear of being left out (i.e., FoMO) (Elhai et al., 2020), which has been associated with resorting to the online world in maladaptive ways (i.e., PIU) (Akbari et al., 2021). Research also suggests that the individual's ability to trust information from others as helpful and valid (i.e., ET) might be a valuable lens to better understand these associations (Fonagy et al., 2015; Campbell et al., 2021).

Thus, the present study explores the associations between individuals' FoMO and PIU, accounting for the contribution of Epistemic Trust stances. More specifically, we aim to explore the role of Trust, Mistrust, and Credulity in this association. In line with the available literature (Akbari et al., 2021), we hypothesize that FoMO will be significantly associated with PIU. Also, we expect that Trust will negatively affect this association (Fonagy et al., 2015). Finally, we expect Mistrust and Credulity to have no indirect effect on the relationship between FoMO and PIU (Campbell et al., 2021; Tanzilli et al., 2022).

Materials and methods

Study design and procedures

Participants for this cross-sectional research were enlisted via snowball sampling methods, including word-of-mouth referrals and disseminating the study link across social media platforms. Upon reviewing and agreeing to the online informed consent, they completed the questionnaires hosted on the Qualtrics online platform. The survey took approximately 30 min. Voluntary participation was emphasized among all study participants, and measures were taken to ensure privacy and anonymity through the survey design. Participants received no material/monetary incentives for participating in the study. Inclusion criteria for participation were 18 or older and no older than 29 years old (Arnett, 2007).

Moreover, participants should have been fluent in Italian. Participants aged 30 or more were excluded from the study. Confidentiality of information was also strictly maintained, and data were presented in an aggregated format. The study was conducted per the Ethical Code of the American Psychological Association (APA) and the Declaration of Helsinki. The Ethics Committee of *the University of Milano-Bicocca* approved all materials and procedures.

Participants

In this study, a non-random community sample consisting of 358 cisgender emerging adults who regularly used the internet was examined (Mean age = 25.02 years,

SD=2.60; age range: 18–29 years). Of these participants, 267 (74.58%) were assigned females at birth. To determine the minimum sample size needed to identify at least small effect sizes, a preliminary power analysis was conducted using G*Power version 3.1.9.7 (Faul et al., 2009), with the significance threshold set at 0.05. The analysis determined that a sample of 204 participants would provide 80% power to detect small effects. Therefore, the achieved sample size of 358 participants was deemed adequately powered for the research objectives.

About two-thirds ($n=232$, 64.80%) reported a heterosexual orientation, with the remaining identifying as gay/lesbian ($n=70$, 19.55%) or bisexual ($n=56$, 15.64%). All resided in Italy and spoke Italian fluently; almost all ($n=350$, 97.77%) were Italian citizens. Almost half of the sample ($n=174$, 48.61%) had a master's degree, while 147 subjects (41.06%) had a bachelor's degree, 10 participants had a Ph.D. (2.80%), 26 participants had a secondary school diploma (7.26%), and 1 participant had a middle school certificate (0.28%).

The demographic breakdown of occupation and living arrangements showed that 259 participants (72.35%) were students. Among the remaining participants, 67 (18.72%) were employed, 18 (5.03%) balanced employment with studies, and 14 (3.91%) were unemployed. Residential

situations were diverse: 157 individuals (43.86%) lived with both parents, 36 (10.06%) with one parent (32 with only the mother and 4 with only the father), 73 (20.39%) lived alone, 45 (12.57%) with friends, 42 (11.73%) were in cohabiting arrangements, and 5 (1.40%) resided with other relatives. See Table 1 for an overview of demographic characteristics

Materials

Problematic Internet use. The Internet Addiction Test (IAT) (Ferraro et al., 2006; Young, 2016) was administered to assess Problematic Internet Use (PIU). Participants self-report their internet use on 20 items rated on a 5-point Likert scale (1 = *never* to 5 = *always*) (e.g., “How often do you choose to spend more time online over going out with others?”). A total score ≥ 50 indicates a problematic use. In the present study, McDonald's ω was 0.89.

Fear of Missing Out. FoMO was examined and measured utilizing the Fear of Missing Out scale (FoMO) as developed by Casale and Fioravanti (2020) and Przybylski et al. (2013). The scale includes ten items (e.g., “I get anxious when I don't know what my friends are up to,” “It bothers me when I miss an opportunity to meet up with friends”), with responses rated on a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). Elevated scores on this scale are indicative of greater levels of FoMO. Within the scope of this research, the reliability of the FoMO scale was quantified using McDonald's omega (ω) with a value of 0.88, denoting high internal consistency.

Epistemic Trust, Mistrust, Credulity. The ability to view information shared by others as important, relevant to oneself, and applicable in different situations was measured through the Epistemic Trust, Mistrust, Credulity Questionnaire (ETMCQ) (Campbell et al., 2021; Liotti et al., 2023). In the original form, the ETMCQ is a 15-item self-report questionnaire. The present study used 14 items (excluding item 11) according to the Italian version (Liotti et al., 2023), rated on a 7-point Likert scale (1 = *strongly disagree* to 7 = *strongly agree*). The ETMCQ yields three scales: (a) Trust, which encompasses being open to learning from others in social situations; (b) Mistrust, which entails a habit of doubting or fearing information and communication from others being unreliable or ill-intentioned; (c) Credulity, which indicates a tendency to easily believe things, making one prone to false information and possible exploitation. In the present study, the ETMCQ scales showed good internal consistency: $\omega=0.70$, 0.69, and 0.79, respectively, for Trust, Mistrust, and Credulity.

Table 1 Demographic Characteristics of the Study Sample (N=358)

Characteristic	N (%)
Gender	
Assigned female at birth	267 (74.58)
Sexual Orientation	
Heterosexual	232 (64.80)
Gay/Lesbian	70 (19.55)
Bisexual	56 (15.64)
Citizenship	
Italian	350 (97.77)
Education Level	
Middle school certificate	1 (0.28)
Secondary school diploma	26 (7.26)
Bachelor's degree	147 (41.06)
Master's degree	174 (48.61)
PhD	10 (2.80)
Occupational Status	
Students	259 (72.35)
Employed	67 (18.72)
Employed and students	18 (5.03)
Unemployed	14 (3.91)
Living Situation	
With both parents	157 (43.86)
With one parent	36 (10.06)
Alone	73 (20.39)
With friends	45 (12.57)
Cohabiting	42 (11.73)
With relatives	5 (1.40)

Data analyses

Analyses were conducted in R (Core Team, 2021), and significant effects at $p < .05$ were interpreted. The dataset was explored for outliers using the interquartile range approach, yet none were detected. Normal data distribution was confirmed by assessing skewness and kurtosis, with all study variables remaining within the acceptable range (skewness within ± 2 and kurtosis within ± 7). Sociodemographic features and variables related to the study were summarized using percentages, mean scores, and standard deviations for descriptive clarity. To investigate differences across gender and sexual orientation, we conducted two separate analyses of variance (ANOVAs) with Problematic Internet Use (PIU) and Fear of Missing Out (FoMO) as dependent variables, as well as a multivariate analysis of variance (MANOVA) considering Epistemic Trust, Mistrust, and Credulity as outcomes. Bivariate correlations were also employed to explore the relationship between participants' age and the variables under study. Significant correlations led to the inclusion of age, gender, and sexual orientation as covariates in subsequent analyses.

In line with the procedures outlined by Hayes (2017), a mediation analysis was carried out using the R mediation package. This involved computing 95% confidence intervals based on bootstrap percentiles and 5,000 bootstrap samples. The analysis mapped out three pathways: 'a' assessed the connection between FoMO (X) and potential mediators (M), namely Epistemic Trust, Mistrust, and Credulity; 'b' explored the relationship between these mediators (M) and PIU (Y) while controlling for FoMO (X); and 'c' focused on the direct impact of FoMO (X) on PIU (Y), considering the mediators (M). The indirect influence of FoMO on PIU through the mediators was quantified by multiplying coefficients a and b, with the bootstrap method validating the statistical significance. Indirect effects were evaluated with 95% confidence intervals derived from 5,000 bootstrap samples.

To test the statistical power of the indirect effects, a post-hoc Monte Carlo power simulation was executed utilizing the 'shiny' and 'MASS' supplementary R packages.

Results

Preliminary analyses

Out of the 358 participants, 94 (26.26%) emerging adults fell in the range of a moderate to severe level of PIU (score ≥ 50). An ANOVA with PIU as an outcome, and participants' gender (female, male), sexual orientation (heterosexual, lesbian/gay, bisexual), and their interaction as factors

indicated that male participants reported higher levels of PIU relative to female participants, $F(1,352) = 13.143$, $p < .001$, $\eta^2_p = 0.036$. Also, both sexual orientation, $F(2,352) = 4.804$, $p = .009$, $\eta^2_p = 0.027$, and the interaction between gender and sexual orientation were significant, $F(2,352) = 4.518$, $p = .012$, $\eta^2_p = 0.025$. Post-hoc analyses (with Bonferroni's correction) indicated that bisexual participants reported higher PIU than heterosexual participants, $t(352) = 3.097$, $p = .006$. Also, bisexual males reported higher PIU than heterosexual females, $t(352) = 4.206$, $p < .001$, heterosexual males, $t(352) = 3.575$, $p = .006$, $d = 1.018$, lesbian females, $t(352) = 3.999$, $p = .001$, and bisexual females, $t(352) = 3.653$, $p = .004$.

A further ANOVA with FoMO as an outcome showed that sexual orientation had a significant effect, $F(2,352) = 2.957$, $p = .011$, $\eta^2_p = 0.025$, with bisexual participants reporting higher FoMO than heterosexual participants, $t(352) = 0.402$, $p = .009$. Conversely, neither gender, $F(1,352) = 0.525$, $p = .469$, $\eta^2_p = 0.001$, nor the interaction between gender and sexual orientation, $F(2,352) = 0.340$, $p = .712$, $\eta^2_p = 0.002$, had a significant effect.

Finally, a MANOVA with Epistemic Trust, Mistrust, and Credulity as outcomes indicated that both gender, *Wilks' λ* (3,350) = 0.973, $p = .021$, $\eta^2_p = 0.027$, and sexual orientation, *Wilks' λ* (6,700) = 0.948, $p = .004$, $\eta^2_p = 0.027$, had a significant effect. At the same time, their interaction was not significant, *Wilks' λ* (6,700) = 0.977, $p = .218$, $\eta^2_p = 0.012$. Univariate effects showed that female participants reported higher epistemic trust than male participants, $F(2,352) = 6.999$, $p = .009$, $\eta^2_p = 0.019$, while post-hoc comparisons showed that bisexual participants reported higher Epistemic Mistrust, $t(352) = 0.451$, $p = .019$. Table 2 displays mean scores, standard deviations, and associations among PIU, FoMO, Epistemic trust, Mistrust, Credulity, and age by participants' gender, sexual orientation, and their interaction.

Fear of missing out and problematic internet use: epistemic mistrust and credulity as mediating mechanisms

One mediation model was run with PIU as an outcome, FoMO as a predictor, and Epistemic Trust, Mistrust, and Credulity as mediators. Given the significant association between participants' age and PIU and gender and sexual orientation differences in PIU, these three variables were entered as covariates. Bootstrap percentile methods were utilized to calculate confidence intervals, with the data being resampled 5,000 times to ensure the robustness of the results.

The results indicated that FoMO directly affected emerging adults' PIU (estimate = 3.328, SE = 0.871, 95% CI

Table 2 Mean Scores, Standard Deviations, and Associations Among Emerging Adults' Problematic Internet Use, Fear of Missing Out, Epistemic Trust, Mistrust, and Credulity, and Age, by Gender, Sexual Orientation, and Their Interaction (N = 358)

	1.	2.		3.		4.		5.		6.		Sexual orientation						Interaction						
		Full sample (N = 358)	Gender		M		H		LG		B		HF		HM		LF		GM		BF		BM	
			M (SD)	F (n = 267)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
1. PIU	1.000	42.587 (11.324)	41.678 (10.619)	45.252 (12.875)	41.966 (10.822)	42.414 (10.411)	45.375 (13.960)	41.758 (10.772)	42.648 (11.059)	41.163 (8.683)	45.333 (12.214)	41.758 (10.772)	42.648 (11.059)	41.163 (8.683)	45.333 (12.214)	41.758 (10.772)	42.648 (11.059)	41.163 (8.683)	45.333 (12.214)	41.758 (10.772)	42.648 (11.059)	41.163 (8.683)	45.333 (12.214)	41.758 (10.772)
2. FoMO	0.395***	2.475 (0.808)	2.463 (0.804)	2.512 (0.825)	2.398 (0.776)	2.509 (0.883)	2.775 (0.792)	2.404 (0.773)	2.378 (0.791)	2.480 (0.916)	2.705 (0.873)	2.404 (0.773)	2.378 (0.791)	2.480 (0.916)	2.705 (0.873)	2.404 (0.773)	2.378 (0.791)	2.480 (0.916)	2.705 (0.873)	2.404 (0.773)	2.378 (0.791)	2.480 (0.916)	2.705 (0.873)	2.404 (0.773)
3. ET	0.017	4.878 (1.042)	4.965 (1.020)	4.624 (1.071)	4.835 (1.081)	5.080 (0.923)	4.804 (1.004)	4.916 (1.081)	4.570 (1.050)	5.106 (0.867)	4.288 (1.061)	4.916 (1.081)	4.570 (1.050)	5.106 (0.867)	4.288 (1.061)	4.916 (1.081)	4.570 (1.050)	5.106 (0.867)	4.288 (1.061)	4.916 (1.081)	4.570 (1.050)	5.106 (0.867)	4.288 (1.061)	4.916 (1.081)
4. EM	0.366***	3.886 (1.115)	3.847 (1.136)	4.000 (1.046)	3.802 (1.146)	3.871 (0.947)	4.253 (1.123)	3.800 (1.173)	3.809 (1.060)	3.888 (0.953)	4.865 (0.642)	3.800 (1.173)	3.809 (1.060)	3.888 (0.953)	4.865 (0.642)	3.800 (1.173)	3.809 (1.060)	3.888 (0.953)	4.865 (0.642)	3.800 (1.173)	3.809 (1.060)	3.888 (0.953)	4.865 (0.642)	3.800 (1.173)
5. EC	0.288***	2.747 (1.391)	2.794 (1.419)	2.608 (1.301)	2.700 (1.339)	2.952 (1.507)	2.685 (1.451)	2.749 (1.355)	2.537 (1.284)	2.966 (1.499)	2.438 (0.941)	2.749 (1.355)	2.537 (1.284)	2.966 (1.499)	2.438 (0.941)	2.749 (1.355)	2.537 (1.284)	2.966 (1.499)	2.438 (0.941)	2.749 (1.355)	2.537 (1.284)	2.966 (1.499)	2.438 (0.941)	2.749 (1.355)
6. Age	-0.163**	25.017 (2.596)	24.760 (2.504)	25.760 (2.730)	25.170 (2.611)	24.79 (2.587)	24.680 (2.358)	24.800 (2.496)	26.390 (2.631)	24.800 (2.483)	24.940 (2.380)	24.800 (2.496)	26.390 (2.631)	24.800 (2.483)	24.940 (2.380)	24.800 (2.496)	26.390 (2.631)	24.800 (2.483)	24.940 (2.380)	24.800 (2.496)	26.390 (2.631)	24.800 (2.483)	24.940 (2.380)	24.800 (2.496)

Note. PIU = Problematic Internet Use. FoMO = Fear of Missing Out. ET = Epistemic Trust. EM = Epistemic Mistrust. EC = Epistemic Credulity. F = Female. M = Male. H = Heterosexual. LG = Lesbian/Gay. B = Bisexual. HF = Heterosexual females. HM = Heterosexual males. LF = Lesbian females. BF = Bisexual females. BM = Bisexual males. *p < .05. **p < .01. ***p < .001

[1.635, 5.056], $\beta = 0.238, p < .001$), demonstrating the direct impact of FoMO on PIU without considering the mediators. The indirect effects showed how FoMO impacted PIU through Mistrust (estimate = 1.111, SE = 0.363, 95% CI [0.442, 1.863], $\beta = 0.079, p = .002$) and Credulity (estimate = 0.869, SE = 0.295, 95% CI [0.329, 1.496], $\beta = 0.062, p = .003$). Conversely, Trust's indirect effect was insignificant (estimate = -0.155, SE = 0.179, 95% CI [-0.525, 0.198], $\beta = -0.011, p = .388$).

Considering the significant indirect effects and the direct effect, the total effect of FoMO on PIU, which encompasses the cumulative impact considering all possible paths, was significant (estimate = 5.145, SE = 0.689, 95% CI [3.796, 6.495], $\beta = 0.367, p < .001$), highlighting the robust association between FoMO and PIU when accounting for all pathways. Emerging adults reporting higher levels of FoMO showed greater Mistrust and Credulity, which, in turn, reflected in greater PIU. A Monte Carlo power analysis for the indirect effects showed a large power of 92% (with epistemic Mistrust as a mediator) and 96% (with epistemic Credulity as a mediator) (based on a 95% CI). The full model explained 25% of the variance ($p < .001$). Figure 1 displays a graphical representation of the model.

Discussion

This study aimed to provide further evidence on the associations between emerging adults' FoMO and PIU. More specifically, it aimed to explore the contribution of different stances of Epistemic Trust in this association (i.e., Trust, Mistrust, and Credulity). More than one out of four emerging adults in our sample displayed moderate to severe PIU with significant gender differences. This entails often losing control over the amount of time spent online, prioritizing online relationships to the detriment of in-person ones, and resorting to the internet world to find consolation from negative thoughts (Ferraro et al., 2006; Young, 2016). The prevalence in our study is comparable to available epidemiological findings that highlight that male emerging adults are more prone to PIU. The underlying causes behind the gender disparities in problematic internet use (PIU) remain largely elusive. However, it is theorized that these differences may partially stem from gender-specific preferences for specific online activities. For instance, the literature suggests that men tend to consume more online pornography (Cooper et al., 2000) and engage more frequently in online gaming (Wang et al., 2015). These patterns suggest that a deeper investigation into how gender influences the variety and nature of internet activities could be beneficial.

Corroborating our original hypothesis, a significant relationship was found between Fear of Missing Out (FoMO)

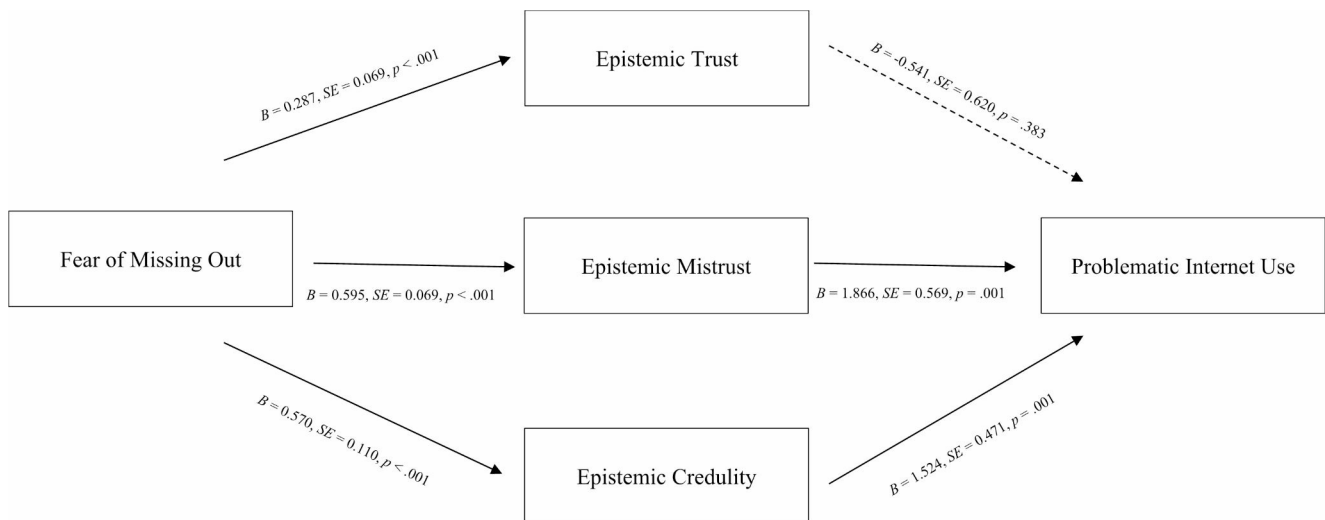


Fig. 1 Epistemic Trust, Mistrust, and Credulity as mediators in the Association Between Fear of Missing Out and Problematic Internet Use in Emerging Adults ($N=358$). *Note.* B =unstandardized betas.

and PIU, indicating that the more individuals are concerned about not partaking in rewarding experiences their peers are engaged in, the more pronounced their difficulties with internet use become. This observation is consistent with existing studies that delve into the factors contributing to PIU (Akbari et al., 2021; Fioravanti et al., 2021; Milyavskaya et al., 2018).

Second, we explored the different contributions of Epistemic stances to this association. Interestingly, preliminary data showed that the higher FoMO corresponded to higher levels of all Epistemic standpoints (i.e., Trust, Mistrust, and Credulity). These direct associations suggest that individuals who experience FoMO are open to all possible communication stances, meaning they might trust the information provided to them by others, be skeptical of the information they receive, or be credulous and accept it without questioning it. Looking more specifically at the association with Credulity, we might argue that the more emerging adults fear missing out on essential experiences, the more they would try to conform to others' opinions and points of view. On the other hand, Mistrust can also be a solution to protect themselves from the fear of others' rejection. However, a more fine-grained explanation might be possible when looking at the broader picture of the context of PIU.

In line with our initial hypothesis, both Mistrust and Credulity indirectly affected the relationship between FoMO and PIU. Thus, emerging adults reporting higher FoMO also reported greater Mistrust and Credulity, which, in turn, reflected in greater PIU. These results suggest the importance of considering the role of Mistrust and Credulity as risk factors for behavioral addictions and subsequent withdrawal from developmental tasks (Campbell et al., 2021; Locati et al., 2023).

The mediational analysis was controlled for participants' age, $B = -0.468, SE = 0.218, p = .033$

In emerging adults who seek refuge in the “protected” online environment, an increased interpersonal disposition to insecurity toward the social world (i.e., fear of missing out on something in the relational realm), probably accompanied by a sense of “not mattering” for others, may lead to disinvestment not only in the in-person world but also in communicative openness (Casale & Flett, 2020; Fioravanti et al., 2021). Indeed, some emerging adults might read information coming from outside as unreliable and potentially harmful (i.e., Mistrust). In contrast, others might translate their relational insecurity into difficulties appreciating their perspective, probably not recognizing it, thus uncritically relying on external communications and being vulnerable to the possibility of being manipulated (i.e., Credulity). These difficulties configure obstacles to the essential tasks of emerging adulthood, such as consolidating relationships outside the family and building trust in the ties that accompany them into adulthood (Arnett et al., 2014; Roisman et al., 2004).

As hypothesized, Trust did not contribute to the relationship between FoMO and PIU. Campbell and colleagues (2021) provided a valuable interpretation of this finding as they also found no associations between Trust and mental health symptoms. Indeed, they hypothesized that Trust is an innate characteristic of social behavior, thus bearing no specific value in explaining psychopathology and providing other benefits for social functioning, such as an increased ability to acquire novel information through social communication (Campbell et al., 2021).

The interpretation of our findings must consider the study's limitations. First, the relevant variables were measured through self-reporting. Given the complex nature of individual presentations, semi-structured interviews and

a multi-informant approach would be useful. Second, the analyses were cross-sectional, meaning only associations can be inferred, and no causal implications can be made. Third, further studies should ensure the generalizability of the study results in clinical samples and larger, culturally diverse populations. Fourth, we did not collect data on participants' socio-economic status (SES), which might serve as a potential confounder or moderator in understanding the dynamics of FoMO and PIU. Future research should incorporate the exploration of SES, considering potential differences across economic strata. Fifth, findings are embedded in a specific socio-temporal context where the pandemic was almost declared to be over. However, we did not control for specific aspects of the pandemic, such as stressors and individual experiences, that might have influenced participants' responses. Future research is essential to replicate our findings in light of a more in-depth assessment of possible COVID-19 pandemic-related aspects. Finally, future studies should consider further variables that may explain the antecedents of FoMO, as well as the implicit mechanisms involved, such as attachment, defenses, parenting styles, and personality traits (e.g., Musetti et al., 2022b), to unpack relational dispositions in the relation between FoMO and PIU.

In conclusion, the study provides additional insights into the association between Fear of Missing Out (FoMO) and problematic internet use (PIU), explicitly offering a developmentally relevant framework that applies to emerging adults. This framework may help in understanding the nuances of how FoMO influences PIU within this age group. First, it aligns with previous research highlighting the association between FoMO and PIU, a maladaptive behavior that is moderate to severe in one out of four emerging adults. Second, it underlines the importance of considering the contribution of both Mistrust and Credulity as transmission mechanisms for behavioral addictions and subsequent withdrawal from crucial developmental tasks. Indeed, the disinvestment in interpersonal relations might result from perceiving incoming communication as unreliable and potentially harmful (i.e., Mistrust) or from a lack of vigilance and discrimination in evaluating information (i.e., Credulity).

The present study's results have implications for clinical practice and intervention in different therapeutic settings (Steele et al., 2020; Parolin et al., 2021). Despite its widespread usage in everyday language, FoMO is a multifaceted interpersonal disposition that must be recognized in emerging adults' psychological assessment and intervention. In this scenario, as a larger alphabetization is made available for clinicians on this construct and its association with other variables, it is also essential to refine assessment protocols to include a nuanced assessment of FoMO, its impact on

interpersonal dispositions, and maladaptive behaviors. Moreover, results also highlight the potential vulnerabilities associated with excessive mistrust or credulity, which must be considered in terms of their impact on the quality of emerging adults' relationships and their implications on both the development and maintenance of the therapeutic relationship and the psychotherapeutic outcomes. Finally, we argue the importance of considering the challenge of overcoming FoMO as a developmental step, especially for current generations of emerging adults.

Authors contribution The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Funding Open access funding provided by Università degli Studi di Pavia within the CRUI-CARE Agreement.

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Data availability The datasets generated during and analyzed during the current study are not publicly available due to privacy restrictions. They are available from the corresponding author upon reasonable request.

Declarations

Conflict of interest The authors have no conflicts of interest to declare.

Ethics approval and consent to participate The Ethical Committee approved all materials and procedures.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

References

- Akbari, M., Seydavi, M., Palmieri, S., Mansueto, G., Caselli, G., & Spada, M. M. (2021). Fear of missing out (FoMO) and internet use: A comprehensive systematic review and meta-analysis. *Journal of Behavioral Addictions, 10*(4), 879–900.
- Anderson, E. L., Steen, E., & Stavropoulos, V. (2017). Internet use and problematic internet use: A systematic review of longitudinal research trends in adolescence and emergent adulthood. *International Journal of Adolescence and Youth, 22*(4), 430–454. <https://doi.org/10.1080/02673843.2016.1227716>.

- Arnett, J. J. (2007). Emerging adulthood: What is it, and what is it good for? *Child Development Perspectives*, 1(2), 68–73. <https://doi.org/10.1111/j.1750-8606.2007.00016.x>.
- Arnett, J. J., Žukauskienė, R., & Sugimura, K. (2014). The new life stage of emerging adulthood at ages 18–29 years: Implications for mental health. *The Lancet Psychiatry*, 1(7), 569–576.
- Barlett, C. P., Barlett, N. D., & Chalk, H. M. (2020). Transitioning through emerging adulthood and physical health implications. *Emerging Adulthood*, 8(4), 297–305.
- Benzi, I. M. A., Carone, N., Fontana, A., & Barone, L. (2023). Problematic internet use in emerging adulthood: The interplay between narcissistic vulnerability and environmental sensitivity. *Journal of Media Psychology*, 35(5), 316–324. <https://doi.org/10.1027/1864-1105/a000386>.
- Campbell, C., Tanzer, M., Saunders, R., Booker, T., Allison, E., Li, E., O’Dowda, C., Luyten, P., & Fonagy, P. (2021). Development and validation of a self-report measure of epistemic trust. *PLoS One*, 16(4), e0250264.
- Carone, N., Benzi, I. M. A., Muzi, L., Parolin, L. A. L., & Fontana, A. (2023b). Problematic internet use in emerging adulthood to escape from maternal helicopter parenting: Defensive functioning as a mediating mechanism. *Research in Psychotherapy: Psychopathology Process and Outcome*, 26(3), 693. <https://doi.org/10.4081/ripppo.2023.693>.
- Carone, N., Benzi, I. M. A., Parolin, L., & Fontana, A. (2023a). I can’t miss a thing – the contribution of defense mechanisms, grandiose narcissism, and vulnerable narcissism to fear of missing out in emerging adulthood. *Personality and Individual Differences*, 214, 112333. <https://doi.org/10.1016/j.paid.2023.112333>.
- Casale, S., & Banchi, V. (2020). Narcissism and problematic social media use: A systematic literature review. *Addictive Behaviors Reports*, 11, 100252. <https://doi.org/10.1016/j.abrep.2020.100252>.
- Casale, S., & Fioravanti, G. (2020). Factor structure and psychometric properties of the Italian version of the fear of missing out scale in emerging adults and adolescents. *Addictive Behaviors*, 102, 106179.
- Casale, S., & Flett, G. L. (2020). Interpersonally-based fears during the COVID-19 pandemic: Reflections on the fear of missing out and the fear of not mattering constructs. *Clinical Neuropsychiatry*, 17(2), 88.
- Cerutti, R., Fontana, A., Ghezzi, V., Menozzi, F., Spensieri, V., & Tambelli, R. (2022). Exploring psychopathological distress in Italian university students seeking help: A picture from a university counselling service. *Current Psychology*, 41(3), 1382–1394. <https://doi.org/10.1007/s12144-020-00665-9>.
- Cooper, A., Delmonico, D. L., & Burg, R. (2000). Cybersex users, abusers, and compulsives: New findings and implications. *Sexual Addiction & Compulsivity: The Journal of Treatment and Prevention*, 7(1–2), 5–29.
- Core Team, R. (2021). *R: A language and environment for statistical computing*.
- Elhai, J. D., Yang, H., & Montag, C. (2020). Fear of missing out (FOMO): Overview, theoretical underpinnings, and literature review on relations with severity of negative affectivity and problematic technology use. *Brazilian Journal of Psychiatry*. <https://doi.org/10.1590/1516-4446-2020-0870>.
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G* power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, 41(4), 1149–1160.
- Ferraro, G., Caci, B., D’amico, A., & Blasi, M. D. (2006). Internet addiction disorder: An Italian study. *CyberPsychology & Behavior*, 10(2), 170–175.
- Fioravanti, G., Casale, S., Benucci, S. B., Probstamo, A., Falone, A., Ricca, V., & Rotella, F. (2021). Fear of missing out and social networking sites use and abuse: A meta-analysis. *Computers in Human Behavior*, 122, 106839. <https://doi.org/10.1016/j.chb.2021.106839>.
- Fonagy, P., Luyten, P., & Allison, E. (2015). Epistemic petrification and the restoration of epistemic trust: A new conceptualization of borderline personality disorder and its psychosocial treatment. *Journal of Personality Disorders*, 29(5), 575–609.
- Fonagy, P., Luyten, P., Allison, E., & Campbell, C. (2017). What we have changed our minds about: Part 2. Borderline personality disorder, epistemic trust and the developmental significance of social communication. *Borderline Personality Disorder and Emotion Dysregulation*, 4(1), 1–12.
- Fontana, A., Benzi, I. M. A., & Ciproso, P. (2023). Problematic internet use as a moderator between personality dimensions and internalizing and externalizing symptoms in adolescence. *Current Psychology*, 42, 19419–19428. <https://doi.org/10.1007/s12144-021-02409-9>.
- Fontana, A., Callea, A., Casini, E., & Curti, V. (2018). Rejection sensitivity and internet addiction in adolescence: Exploring the mediating role of emerging personality disorders. *Clinical Neuropsychiatry*, 15(4), 206–214.
- Germani, A., Buratta, L., Delvecchio, E., Gizzi, G., & Mazzeschi, C. (2020). Anxiety severity, perceived risk of COVID-19 and individual functioning in emerging adults facing the pandemic. *Frontiers in Psychology*, 11, 567505.
- Gioia, F., Fioravanti, G., Casale, S., & Boursier, V. (2021). The effects of the fear of missing out on people’s social networking sites use during the COVID-19 pandemic: The mediating role of online relational closeness and individuals’ online communication attitude. *Frontiers in Psychiatry*, 12. <https://doi.org/10.3389/fpsy.2021.620442>.
- Hawes, M. T., Szenczy, A. K., Klein, D. N., Hajcak, G., & Nelson, B. D. (2022). Increases in depression and anxiety symptoms in adolescents and young adults during the COVID-19 pandemic. *Psychological Medicine*, 52(14), 3222–3230.
- Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford.
- Kamolthip, R., Chirawat, P., Ghavifekr, S., Gan, W. Y., Tung, S. E., Nurmalia, I., Nadhiroh, S. R., Pramukti, I., & Lin, C. Y. (2022). Problematic internet use (PIU) in youth: A brief literature review of selected topics. *Current Opinion in Behavioral Sciences*, 46, 101150.
- Kim, J., LaRose, R., & Peng, W. (2009). Loneliness as the cause and the effect of problematic internet use: The relationship between internet use and psychological well-being. *Cyberpsychology & Behavior*, 12(4), 451–455.
- Liotti, M., Milesi, A., Spitoni, G. F., Tanzilli, A., Speranza, A. M., Parolin, L., Campbell, C., Fonagy, P., Lingardi, V., & Giovannardi, G. (2023). Unpacking trust: The Italian validation of the Epistemic Trust, Mistrust, and Credulity Questionnaire (ETMCQ). *PLoS One*, 18(1), e0280328.
- Lisitsa, E., Benjamin, K. S., Chun, S. K., Skalsky, J., Hammond, L. E., & Mezulis, A. H. (2020). Loneliness among young adults during Covid-19 pandemic: The mediational roles of social media use and social support seeking. *Journal of Social and Clinical Psychology*, 39(8), 708–726. <https://doi.org/10.1521/jscp.2020.39.8.708>.
- Locati, F., Milesi, A., Conte, F., Campbell, C., Fonagy, P., Ensink, K., & Parolin, L. (2023). Adolescence in lockdown: The protective role of mentalizing and epistemic trust. *Journal of Clinical Psychology*, 79(4), 969–984.
- Milesi, A., De Carli, P., Locati, F., Benzi, I. M., Campbell, C., Fonagy, P., & Parolin, L. (2023). How can I trust you? The role of facial trustworthiness in the development of Epistemic and Interpersonal Trust. *Human Development*. <https://doi.org/10.1159/000530248>.

- Milyavskaya, M., Saffran, M., Hope, N., & Koestner, R. (2018). Fear of missing out: Prevalence, dynamics, and consequences of experiencing FOMO. *Motivation and Emotion, 42*(5), 725–737. <https://doi.org/10.1007/s11031-018-9683-5>.
- Müller, S. M., Wegmann, E., Stolze, D., & Brand, M. (2020). Maximizing social outcomes? Social zapping and fear of missing out mediate the effects of maximization and procrastination on problematic social networks use. *Computers in Human Behavior, 107*, 106296.
- Musetti, A., Grazia, V., Alessandra, A., Franceschini, C., Corsano, P., & Marino, C. (2022a). Vulnerable narcissism and problematic social networking sites use: Focusing the lens on specific motivations for social networking sites use. *Healthcare, 10*(9), 9. <https://doi.org/10.3390/healthcare10091719>.
- Musetti, A., Manari, T., Billieux, J., Starcevic, V., & Schimmenti, A. (2022b). Problematic social networking sites use and attachment: A systematic review. *Computers in Human Behavior, 107*199. <https://doi.org/10.1016/j.chb.2022.107199>.
- Orme, W., Bowersox, L., Vanwoerden, S., Fonagy, P., & Sharp, C. (2019). The relation between epistemic trust and borderline pathology in an adolescent inpatient sample. *Borderline Personality Disorder and Emotion Dysregulation, 6*(1), 13. <https://doi.org/10.1186/s40479-019-0110-7>.
- Parolin, L. A. L., Benzi, I. M. A., Fanti, E., Milesi, A., Cipresso, P., & Preti, E. (2021). Italia Ti Ascolto [Italy, I am listening]: An app-based group psychological intervention during the COVID-19 pandemic. *Research in Psychotherapy: Psychopathology Process and Outcome, 24*(1).
- Przybylski, A. K., Murayama, K., DeHaan, C. R., & Gladwell, V. (2013). Motivational, emotional, and behavioral correlates of fear of missing out. *Computers in Human Behavior, 29*(4), 1841–1848.
- Roisman, G. I., Masten, A. S., Coatsworth, J. D., & Tellegen, A. (2004). Salient and emerging developmental tasks in the transition to adulthood. *Child Development, 75*(1), 123–133. <https://doi.org/10.1111/j.1467-8624.2004.00658.x>.
- Selfhout, M. H., Branje, S. J., Delsing, M., ter Bogt, T. F., & Meeus, W. H. (2009). Different types of internet use, depression, and social anxiety: The role of perceived friendship quality. *Journal of Adolescence, 32*(4), 819–833.
- Sica, L. S., Crocetti, E., Ragozini, G., Sestito, A., L., & Serafini, T. (2016). Future-oriented or present-focused? The role of social support and identity styles on futuring in Italian late adolescents and emerging adults. *Journal of Youth Studies, 19*(2), 183–203.
- Spada, M. M. (2014). An overview of problematic internet use. *Addictive Behaviors, 39*(1), 3–6.
- Steele, R. G., Hall, J. A., & Christofferson, J. L. (2020). Conceptualizing digital stress in adolescents and young adults: Toward the development of an empirically based model. *Clinical Child and Family Psychology Review, 23*, 15–26.
- Tanzilli, A., Cibelli, A., Liotti, M., Fiorentino, F., Williams, R., & Linggiardi, V. (2022). Personality, defenses, mentalization, and epistemic trust related to pandemic containment strategies and the COVID-19 vaccine: A sequential mediation model. *International Journal of Environmental Research and Public Health, 19*(21), 21. <https://doi.org/10.3390/ijerph192114290>.
- Wang, C. W., Ho, R. T., Chan, C. L., & Tse, S. (2015). Exploring personality characteristics of Chinese adolescents with internet-related addictive behaviors: Trait differences for gaming addiction and social networking addiction. *Addictive Behaviors, 42*, 32–35.
- Wolniewicz, C. A., Tiamiyu, M. F., Weeks, J. W., & Elhai, J. D. (2018). Problematic smartphone use and relations with negative affect, fear of missing out, and fear of negative and positive evaluation. *Psychiatry Research, 262*, 618–623.
- Young, K. (2016). *Internet addiction test (IAT)*. Stoelting.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.