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Unveiling the relationships between solitary experiences and problematic social media use in young adults: a network approach to investigating underlying motivations

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ABSTRACT

Previous research has shown that subjective and negative solitary experiences, such as loneliness, are associated with increased problematic social media use (PSMU). However, further research is needed to examine the role of other solitary experiences and motivations for solitary behavior in PSMU. Accordingly, the current study investigated the relationships between various solitary experiences (i.e., trait loneliness, perceived isolation, lack of relational connectedness, positive solitude, and frequency of solitary behavior), motivations for solitary behavior (i.e., autonomous and controlled), motives for social media use (i.e., enhancement, coping, conformity, and social), and core and peripheral symptoms of PSMU in young adults. Eight hundred twenty-nine young adults (65 % females), aged 18 to 30 years ($M = 23.76$, $SD = 3.16$), completed self-report measures assessing the variables of interest. Psychometric network analysis was performed to estimate regularized partial correlations among variables across the entire sample. Gender differences in network properties were evaluated using the network comparison test. Results showed that controlled motivations for solitary behavior and perceived isolation were indirectly linked to core symptoms of PSMU through conformity motives. Additionally, perceived isolation was also associated with core PSMU symptoms through coping motives. No significant gender differences were found in the network properties. These findings suggest that PSMU might serve as a maladaptive strategy to temporarily compensate for involuntary solitary experiences and to seek relief from perceived isolation.

1. Introduction

Social media use (SMU) is highly prevalent worldwide, with an estimated 5.24 billion users as of February 2025 (Petrosyan, 2025). While SMU offers various benefits, its impact on mental health and well-being is nuanced and influenced by psychological characteristics and usage patterns (Koh et al., 2024; Sala et al., 2024). Uncontrolled and maladaptive engagement in SMU, along with other online activities, has been conceptualized as a genuine behavioral addiction (e.g., Andreassen, 2015; Kuss, 2013; Kuss et al., 2014). For instance, the components model of addiction posits that both substance-related and non-substance-related addictions entail six hallmark symptoms: salience, tolerance, mood modification, relapse, withdrawal, and conflict (Griffiths, 2005). However, some scholars suggest that symptom-based models, such as the components model of addiction, may over-pathologize common behaviors and neglect the underlying psychological mechanisms (Billieux et al., 2015; Santoro et al., 2025a). Accordingly, alternative frameworks—such as the compensatory model (Kardefelt-Winther, 2014)—suggest that maladaptive engagement in online activities may serve as a strategy for coping with psychosocial difficulties. Supporting this view, recent findings indicate that the components model of addiction might fail to adequately discriminate

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between pathological from not-pathological SMU, advocating for a differentiation between peripheral (i.e., salience and tolerance) and core symptoms (i.e., mood modification, relapse, withdrawal, and conflict; Fournier et al., 2023). In light of this ongoing debate, the current study adopts the term "problematic social media use" (PSMU) to describe maladaptive engagement in SMU manifested through addiction-like symptoms and psychosocial impairment (Marino et al., 2021).

Recent research has examined the relationship between solitary experiences and PSMU (Wang et al., 2025; Pezzi et al., 2025). Solitary experiences encompass both subjective and objective dimensions. Subjective solitary experiences include loneliness, defined as the perceived deficiency in social relationships (Perlman & Peplau, 1998), and positive solitude (PS), defined as voluntarily spending time alone in meaningful activities (Ost Mor et al., 2021). Objective solitary experiences refer to the frequency of solitary behavior (i.e., the lack of social interactions; Galanaki, 2004; Goossens et al., 2009). Although these constructs are often conflated, they represent distinct psychological phenomena associated with specific motivations—which can be distinguished in intrinsic ("autonomous" or "self-determined") and extrinsic ("controlled"; Deci and Ryan, 1987)—and outcomes. Loneliness is a distressing experience that may be related to controlled motivations for solitary behavior (Heinrich & Gullone, 2006; Thomas & Azmitia, 2019). Relevant aspects of loneliness include trait loneliness (i.e., risk factors such as individual characteristics that increase susceptibility to loneliness), perceived isolation (i.e., a sense of dissatisfaction with one's social relationships), and lack of relational connectedness (i.e., the emotional aspect of loneliness arising from unfulfilled relational closeness; Boffo et al., 2012). PS reflects a self-determined and enriching experience (Ost Mor et al., 2021; Palgi et al., 2021). Frequency of solitary behavior, meanwhile, may reflect either voluntary or involuntary isolation depending on the motivational context (Corsano et al., 2011).

Research on young adults has largely examined how subjective negative solitary experiences, such as loneliness, are related to PSMSU (Pezzi et al., 2024a). While research generally indicates a positive association between loneliness and PSMU in young adults (O'Day & Heimberg, 2021), a recent systematic review (Pezzi et al., 2024a) highlights that this link may differ based on contextual facets of loneliness, the effects of other variables, and variations in research design. According to Pezzi et al. (2024a), assessing different forms of loneliness, as well as other solitary experiences, may provide more accurate insights into the processes underlying PSMU. Additionally, a recent study found that young adults reporting both high levels of loneliness and social isolation exhibit greater severity of PSMU than peers reporting high levels of loneliness but low social isolation, suggesting that objective solitary experiences may partly contribute to PSMU (Pezzi et al., 2025).

Schimmenti (2023) proposed a motivational framework according to which motives for engaging in certain online activities may provide further insight into the relationships between psychosocial vulnerabilities, such as loneliness, and problematic online behaviors, such as PSMU. Indeed, such behaviors may be better understood as attempts to satisfy specific psychological needs that are unmet in offline environments. Drawing from Cox and Klinger's (1988, 1990) motivational model of alcohol use, motives for problematic online behaviors can be classified along two dimensions related to the anticipated affective changes resulting from the behavior: the valence of the affect (positive or negative) and the source of the affect (internal or external). This yields four categories: enhancement, coping, conformity, and social motives. Enhancement motives involve attempts to increase positive affect in the absence of other incentives (positive valence, internal source). Coping motives entail attempts to reduce negative affect, without other incentives (negative valence, internal source). Conformity motives involve attempts to avoid negative social consequences and thereby reduce negative affect (negative valence, external source). Finally, social motives entail attempts to enhance positive affect by gaining social rewards (positive valence, external source; Bischof-Kastner et al., 2014). Research showed that coping and conformity motives are stronger predictors of PSMU than enhancement and social motives (Marino et al., 2023).

Despite these insights, prior research has largely examined solitary experiences in isolation, focusing primarily on loneliness as a unitary construct and neglecting the multidimensional nature of solitary experience and its motivational underpinnings. Moreover, the interrelations among solitary experiences, motivations for solitary behavior, motives for SMU, and PSMU have not been thoroughly investigated. This limits the understanding of the psychosocial factors involved in PSMU and hinders the development of targeted interventions. To address this gap, the present study employs a psychometric network approach to investigate the associations among these constructs.

Psychometric network analysis is a statistical method that models and visualizes regularized partial associations between variables within a network structure (Borsboom et al., 2021). According to the network approach, a network includes variables—termed "nodes"—that interact with each other, resulting in a complex system. In fact, certain circumstances can activate a specific node within the network structure, increasing the likelihood that this node fosters the activation of related nodes within the network (Borsboom, 2017). In contrast to statistical techniques that rely on predefined hypotheses about relationships between observed variables or latent factors (such as structural equation modeling), psychometric network analysis enables the exploration of reciprocal influences among nodes within a network, thereby improving the understanding of how they are related with each other. Accordingly, the current study investigated the network of associations among solitary experiences (including loneliness dimensions, PS, and frequency of solitary behavior), motivations for solitary behavior (i.e. autonomous and controlled motivations), motives for SMU (i.e., enhancement, coping, conformity, and social motives), and core and peripheral symptoms of PSMU. By integrating these constructs within a coherent theoretical framework, the study aimed to advance understanding of the psychosocial mechanisms underlying PSMU and inform targeted interventions. In fact, the motivational framework (Schimmenti, 2023) provides a foundation for formulating specific hypotheses about the properties of the network model. We hypothesized that coping and conformity motives—characterized by the expectation of reducing negative feelings through SMU—may serve as bridge nodes, connecting controlled motivations for solitary behavior and loneliness dimensions with heightened core symptoms of PSMU. Accordingly, coping and conformity motives were expected to exhibit stronger associations with the core symptoms of PSMU than controlled motivations for solitary behavior, loneliness dimensions, and other motives for SMU. In contrast, autonomous motivations and PS were expected to show weak negative, or not, associations with the core symptoms of PSMU.

Additionally, given evidence of gender differences in PSMU (Andreassen et al., 2017; Stănculescu & Griffiths, 2022), motives for SMU (Marino et al., 2023), and solitary experiences and motivations for solitary behavior (Majorano et al., 2015; Solmi et al., 2020; Yu et al., 2022), the current study explored gender-based variations in the network structures. Specifically, we estimated a network for the combined sample and then compare separate networks for males and females to identify potential differences in patterns and properties of associations between the investigated variables.

In summary, the objectives of the present study were twofold (a) to examine the network of associations among solitary experiences, motivations for solitary behavior, motives for SMU, and core and peripheral symptoms of PSMU; and (b) to investigate gender differences in these patterns by comparing the network structures of males and females.

2. Methods

2.1. Design and participants

A cross-sectional study was conducted in Italy between February and August 2024. To determine the appropriate sample size, we performed

an iterative three-step Monte Carlo power analysis following Constantin et al. (2023). Specifically, in order to achieve a sensitivity of 0.60 with a probability of 0.80 for a randomly generated true Gaussian Graphical Model with 13 nodes and an edge density of 0.50 (constant = 1), a sample size of 254 participants is required.

The final sample consisted of 829 young adults (65 % females). The mean age of the participants was 23.76 years ($SD = 3.16$, range 18–30). Regarding educational level, 43.8 % of the sample held a high school diploma, 33.1 % a Bachelor's degree, 17.2 % a Master's degree, 3 % a PhD, 2.8 % a middle school diploma, and 0.1 % an elementary school diploma. In terms of relationship status, 47.5 % were in a committed relationship, 44 % were single, 8 % reported being in a non-stable relationship, and 0.5 % identified as being in an open relationship. Participants were recruited using a snowball sampling procedure. Announcements were disseminated through social media platforms, such as Facebook and WhatsApp. Each announcement contained a link that allowed potential participants to access an informed consent schedule. Individuals were automatically administered self-report instruments upon agreeing to participate. No missing data occurred, as all responses were set to be mandatory. The study was approved by the Research Etichs Board of the University of Parma (protocol number 0022182), in accordance with the ethical standards of the Declaration of Helsinki. . All data were collected exclusively for the present study. Accordingly, the dataset has not been and will not be used for any further research.

2.2. Measures

The *Bergen Social Media Addiction Scale* (BSMAS; Andreassen et al., 2016; Italian validation by Monacis et al., 2017) is a self-report measure assessing PSMU in accordance with the components model of addiction. Participants were asked to rate each symptom on a 5-point Likert scale (1 = *very rarely*; 5 = *very often*). The unidimensional factor structure of BSMAS demonstrated good psychometric properties, such as structural and construct validity (see Bottaro et al., 2025). However, recent research found that the BSMAS might not accurately assess a unitary construct, but rather a bidimensional one comprising core and peripheral symptoms of PSMU (Fournier et al., 2023). Higher scores indicate more severe symptoms of PSMU. In this study, omega coefficients were 0.799 for peripheral symptoms and 0.764 for core symptoms.

The *Facebook Motives Questionnaire* (FMQ; Italian adaptation by Marino et al., 2016) is a self-report measure originally adapted from the *Internet Motives Questionnaire for Adolescents* (Bischof-Kastner et al., 2014) to assess four motives for Facebook use, including coping, conformity, enhancement, and social. In the current study, we employed a modified version of the FMQ in which the word "Facebook" is replaced by "social media" to assess motives for SMU. The FMQ consists of 16 items, each rated on a 5-point Likert scale (1 = *never or almost never*; 5 = *always or almost always*), with higher scores indicating greater engagement with each motivation. Previous research supported the 4-factor structure of the modified version of the FMQ used in the current study (Moretta et al., 2023). In this study, omega coefficients were 0.882 for coping, 0.761 for conformity, 0.777 for enhancement, and 0.832 for social motives.

The *UCLA Loneliness Scale, Version 3* (UCLA-LS3; Russell, 1996; Italian validation by Boffo et al., 2012) is a self-report measure that evaluates three dimensions of loneliness: trait loneliness, perceived isolation, and (lack of) relational connectedness. The UCLA-LS3 includes 20 items. Participants were asked to rate each item on a 4-point Likert scale (1 = *never*; 4 = *always*), with higher scores indicating greater severity of each loneliness dimension. The UCLA-LS3 showed adequate psychometric properties, including concurrent and discriminant validity and test–retest reliability (Durak & Senol-Durak, 2010; Zarei et al., 2015). In this study, omega coefficients were 0.865 for the perceived isolation, 0.856 for (lack of) relational connectedness, and 0.680 for the trait loneliness.

The *Positive Solitude Scale* (PSS; Palgi et al., 2021; Italian validation by Pezzi et al. (2024b) is a self-report measure that assesses PS. It comprises 9 items, rated on a 5-point Likert scale (1 = *not at all*; 5 = *extremely*). Higher scores indicate greater PS. The PS demonstrated good convergent, discriminant, and divergent validity, reliability and cross-gender invariance (Fan et al., 2024; Palgi et al., 2021; Pezzi et al., 2024b). In this study, omega coefficient was 0.884 for total scale.

The self-report measure *Frequency of and Autonomy for Solitary and Interpersonal Behavior* (FASIB; Beiswenger, 2008; Italian validation by Corsano et al., 2011) was employed to assess the frequency and motivations for solitary behavior. Four items evaluate the frequency of solitary behavior, with participants responding on a 5-point Likert scale (1 = *never*; 5 = *always*). Ten items assess autonomous motivations, and 10 items assess controlled motivations. Responses are recorded on a 4-point Likert scale from 1 (*completely false*) to 4 (*completely true*). Higher scores reflect higher levels of frequency or motivations for each scale. Previous research supported the factor structure and internal consistency of the FASIB (Corsano et al., 2011). The omega coefficients in this study were 0.778 for the frequency of solitary behavior, 0.884 for internal motivation, and 0.917 for external motivation for solitary behavior.

A socio-demographic schedule was administered to all participants to collect information on gender, age, education, and relationship status.

2.3. Data analysis

Data were analysed using JASP v.0.17.2.1 and *R* version 4.2.2 via the *bootnet* (Epskamp et al., 2018) and *qgraph* (Epskamp et al., 2012) packages. First, descriptive statistics and bivariate correlations among all study variables were calculated. Gender differences were also examined using independent samples t-tests, with effect sizes expressed as Cohen's *d*. Afterwards, the graphical LASSO (Least Absolute Shrinkage and Selection Operator; Friedman et al., 2008) was applied to estimate a sparse Gaussian graphical model, i.e., an undirected, regularized partial-correlation network. This approach uses a tuning parameter to control the degree of regularization in network estimates, which was determined based on the extended Bayesian Information Criterion (EBIC, $\gamma = 0.50$; Chen & Chen, 2008). Pearson's correlation matrix was employed as input due to the metric nature of the data and the absence of significant departures from univariate normality (i.e., skewness and kurtosis coefficients were below $|2|$; George & Mallery, 2003). The estimated network was further examined in terms of the fundamental properties of each node by calculating centrality metrics—namely strength, betweenness, and closeness—in order to identify the most central nodes within the network structure. Moreover, usual accuracy and stability checks were performed (Epskamp et al., 2018). The case-dropping bootstrap (1,000 replications) was employed to estimate the stability of the centrality metrics through a correlation stability coefficient (CS-coefficient). The CS-coefficients should be higher than 0.25, and preferably above 0.50, for stable estimation (Epskamp et al., 2018). Additionally, the edge-weight accuracy was examined by calculating non-parametric bootstrapped confidence intervals (1,000 replications).

Lastly, the Network Comparison Test (NCT; van Borkulo et al., 2023), a permutation-based procedure implemented in the *NetworkComparisonTest* R package, was employed to formally assess network invariance between males ($n = 290$) and females ($n = 539$). Specifically, NCT evaluated (1) network structure invariance (i.e., test the null hypothesis that all edges are equal across groups), (2) global strength invariance (i.e., whether the overall level of connectivity, defined as the weighted absolute sum of all edges, is equivalent between networks), and (3) edge strength invariance (i.e., whether specific edges significantly differ across subgroups). Given the large number of comparisons involved in the edge-specific tests, which inflates the family-wise Type I error rate, the sequential Bonferroni-Holm adjustment was applied to reduce capitalisation on chance (van Borkulo et al., 2023).

3. Results

3.1. Preliminary analyses

Descriptive statistics and gender differences are reported in Table 1. Negligible deviations from univariate normality were observed (skewness and kurtosis $< |2|$; George & Mallery, 2003). Significant gender differences emerged for coping, conformity and social motives, peripheral and core symptoms of PSMU, perceived isolation, autonomous motivations for solitary behavior, and PS, with females reporting higher scores compared to males (Cohen's d ranged from 0.156 to 0.447, $p <$ 0.05).

Bivariate correlations among the study variables are reported in Supplementary Table 1. More specifically, the four motives for SMU, i.e., coping, conformity, enhancement, and social, showed positive associations with both peripheral and core symptoms of PSMU (r = 0.08 to 0.61, $p < 0.05$). Coping and conformity motives were also positively related to the three loneliness dimensions (r = 0.17 to 0.34, $p < 0.05$), whereas the social motives correlated negatively with loneliness dimensions (r = –0.16 to −0.25, $p < 0.05$). Furthermore, loneliness dimensions correlated positively with peripheral and core symptoms of PSMU (r = 0.07 to 0.28, $p < 0.05$), the frequency of solitary behavior (r = 0.16 to 0.22, $p < 0.05$), and controlled motivations for solitary behavior (r = 0.23 to 0.39, $p < 0.05$). Finally, PS was negatively associated with loneliness (r = –0.12 to –0.16, $p < 0.05$) and controlled motivations for solitary behavior (r = –0.22, $p < 0.05$) but positively associated with autonomous motivations for solitary behavior (r = 0.52, $p < 0.05$).

3.2. Network structure

The EBICglasso network is displayed in Fig. 1, where 40 out of the 78 possible edges (51.3 %) were estimated to be higher than zero. The network model revealed positive associations among the three dimensions of loneliness (perceived isolation, lack of relational connectedness, and trait loneliness; $r_{partial}$ = 0.23 to 0.55), as well as among the four motives for SMU (coping, conformity, enhancement, and social; $r_{partial}$ = 0.06 to 0.28). A positive association emerged between peripheral and core symptoms of PSMU ($r_{partial}$ = 0.28). PS was associated with autonomous and controlled motivations for solitary behavior ($r_{partial}$ = 0.41 and −0.12, respectively), whilst perceived isolation was related to controlled motivations for solitary behavior ($r_{partial}$ = 0.19). Furthermore, certain motives for SMU served as bridge nodes connecting controlled motivations for solitary behavior and loneliness domains with core symptoms of PSMU. Specifically, conformity motives were associated with controlled motivations for solitary behavior, perceived isolation, and core symptoms of PSMU ($r_{partial}$ = 0.08 to 0.24), whereas coping motives were linked to perceived isolation and core symptoms of PSMU ($r_{partial}$ = 0.14 and 0.39, respectively). Detailed edge weights are displayed in Supplementary Table 2. Importantly, standardized estimates for centrality indices are reported in Fig. 2, with perceived isolation node demonstrating the highest strength, betweenness, and closeness values.

The non-parametric bootstrapped confidence intervals revealed that the network model was accurately estimated, with relatively small CIs around the estimated edge weights (see Supplementary Fig. 1). Similarly, according to the case-dropping subset bootstrap (see Supplementary Fig. 2), the CS coefficients were 0.75, 0.67, and 0.36 for strength, closeness, and betweenness, respectively, exceeding the recommended cut-off value for stable estimation (e.g., Epskamp et al., 2018; Zagaria et al., 2023).

3.3. Network comparison across gender

Fig. 3 displays the networks estimated separately for males (n = 290) and females (n = 539), using a common average layout. Visual inspection revealed a high degree of similarity between the two networks, which was corroborated by the results of the NCT. Specifically, the network structure invariance test (M = 0.113, p = 0.839) and the global strength invariance test (S = 0.779, p = 0.206) indicated no significant differences in overall structure and level of connectivity. Consistently, none of the edge-specific comparisons reached significance after applying the Bonferroni-Holm correction to handle the family-wise error rate ($p > 0.05$). Accuracy and stability analyses for the subgroup networks are presented in Supplementary Figs. 3–6.

4. Discussion

The current study examined the relationships between solitary experiences, motivations for solitary behavior, motives for SM use, and PSMU in young adults through a psychometric network approach. A psychometric network analysis was performed to examine the regularized partial correlations among variables across the entire sample. Results revealed significant associations between motivations for solitary behavior, subjective solitary experiences, and motives for SMU. Specifically, autonomous motivations for solitary behavior were positively associated with PS, whereas controlled motivations for solitary behavior were negatively associated with PS and positively associated with perceived isolation. In line with previous research (Thomas & Azmitia, 2019), young adults who are involuntarily or forcibly alone due to external reasons (e.g., for social exclusion) may be more prone to experience loneliness, specifically the perceived isolation. In contrast,

Table 1
Descriptive Statistics of the Study Variables and Standardized Mean Differences (Cohen's d) Resulting from Independent Sample T-Tests (Gender as a Grouping Variable).

	Overall sample (N = 829)				Females (n = 539)		Males (n = 290)		
	M	(*SD*)	Skewness	Kurtosis	*M*	(*SD*)	*M*	(*SD*)	Cohen's *d*
Coping motives	9.95	(4.27)	0.44	−0.75	10.61	(4.16)	8.74	(4.21)	0.447*
Conformity motives	6.62	(2.99)	1.33	1.36	6.78	(3.10)	6.32	(2.77)	0.156*
Enhancement motives	9.39	(3.39)	0.60	−0.01	9.44	(3.43)	9.30	(3.32)	0.040
Social motives	11.96	(4.12)	0.02	−0.80	12.36	(4.11)	11.23	(4.03)	0.276*
Peripheral symptoms of PSMU	5.36	(2.20)	0.09	−0.84	5.65	(2.13)	4.83	(2.24)	0.380*
Core symptoms of PSMU	8.40	(3.51)	0.75	−0.07	8.64	(3.41)	7.95	(3.65)	0.195*
Perceived isolation	14.34	(3.65)	0.14	−0.32	14.63	(3.66)	13.81	(3.57)	0.226*
(Lack of) relational connectedness	21.76	(4.94)	0.25	−0.24	21.77	(5.02)	21.73	(4.78)	0.009
Trait loneliness	8.58	(2.18)	0.36	0.02	8.61	(2.14)	8.52	(2.24)	0.043
Frequency of solitary behavior	14.28	(2.44)	−0.30	0.05	14.37	(2.49)	14.11	(2.34)	0.107
Controlled motivations for solitary behavior	7.70	(3.41)	0.58	−0.63	7.80	(3.48)	7.51	(3.28)	0.085
Autonomous motivations for solitary behavior	30.60	(5.49)	−0.35	0.06	31.04	(5.40)	29.80	(5.57)	0.226*
Positive solitude	33.59	(6.99)	−0.56	−0.20	34.09	(7.01)	32.68	(6.89)	0.202*

Note. M = mean; SD = standard deviation; PSMU = problematic social media use; * $p < 0.05$.

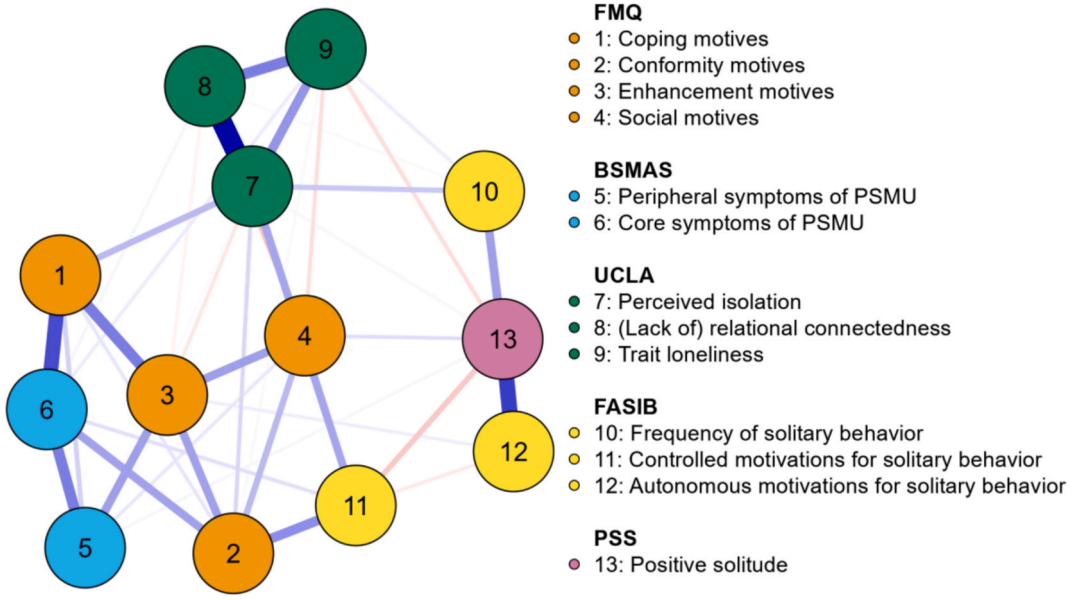

Fig. 1. Network Estimated with Ebicglasso. *Note*: Blue lines represent positive edges, while red lines represent negative edges. Edge thickness reflects edge weights. *BSMAS = Bergen Social Media Addiction Scale; FASIB = Frequency of and Autonomy for Solitary and Interpersonal Behavior; FMQ = Facebook Motives Questionnaire; PSS = Positive Solitude Scale; UCLA = UCLA Loneliness Scale.*

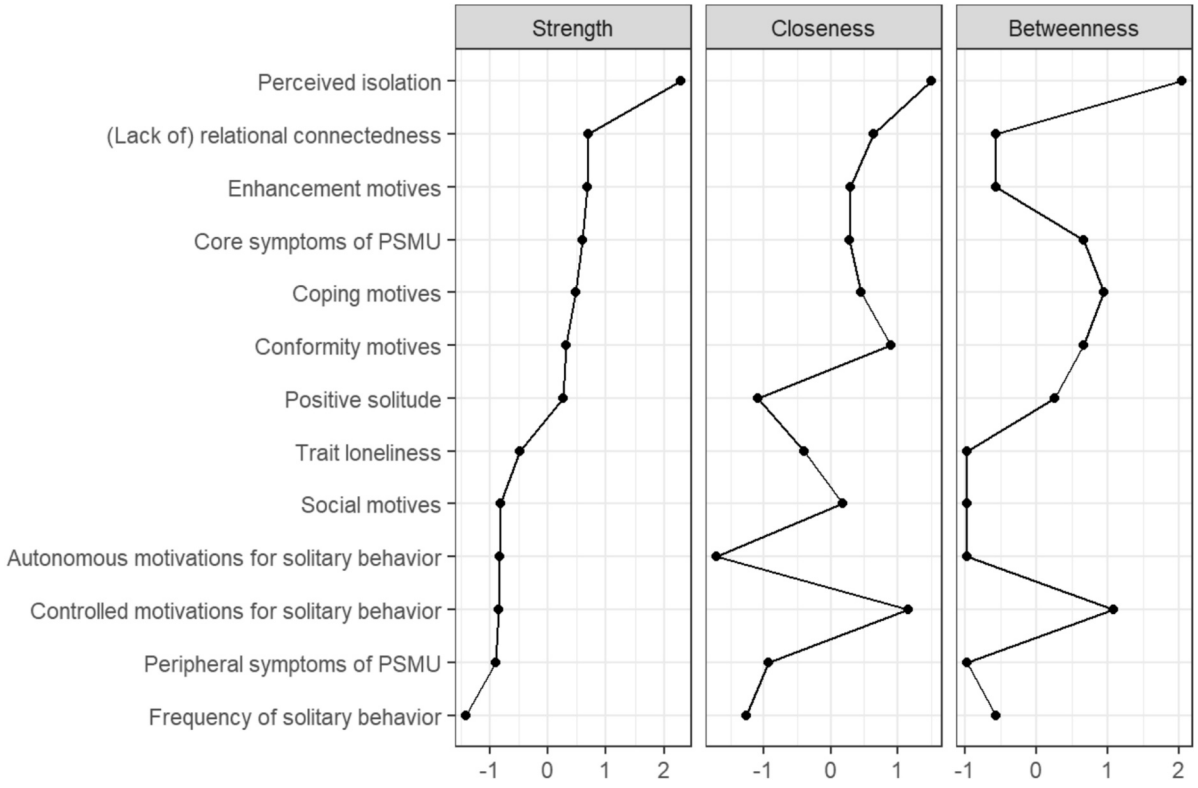

Fig. 2. Centrality Plot. *Note*: Indices were z-scored (with M = 0 and SD = 1) to facilitate interpretation. *PSMU = problematic social media use.*

the volitional choice to spend time alone is critical for engaging in meaningful activities and experiencing PS (Ost Mor et al., 2021; Palgi et al., 2021).

Furthermore, the network model showed that controlled motivations were associated with increased levels of conformity motives, and that perceived isolation was associated with increased levels of coping and conformity motives. In turn, coping and conformity motives were positively related to core symptoms of PSMU. Accordingly, motives entailing the expectations to reduce negative affects by using social media (i.e., conformity and coping) were critical bridge nodes that connected the domains of motivations for solitary behavior and loneliness with domains of PSMU. From a motivational framework (Schimmenti, 2023), controlled motivations for solitary behavior, as well as perceived isolation, might lead young adults to excessively engage in SMU as a means of conforming with others and, thereby, temporarily fulfilling their needs of belong. Notably, our results align

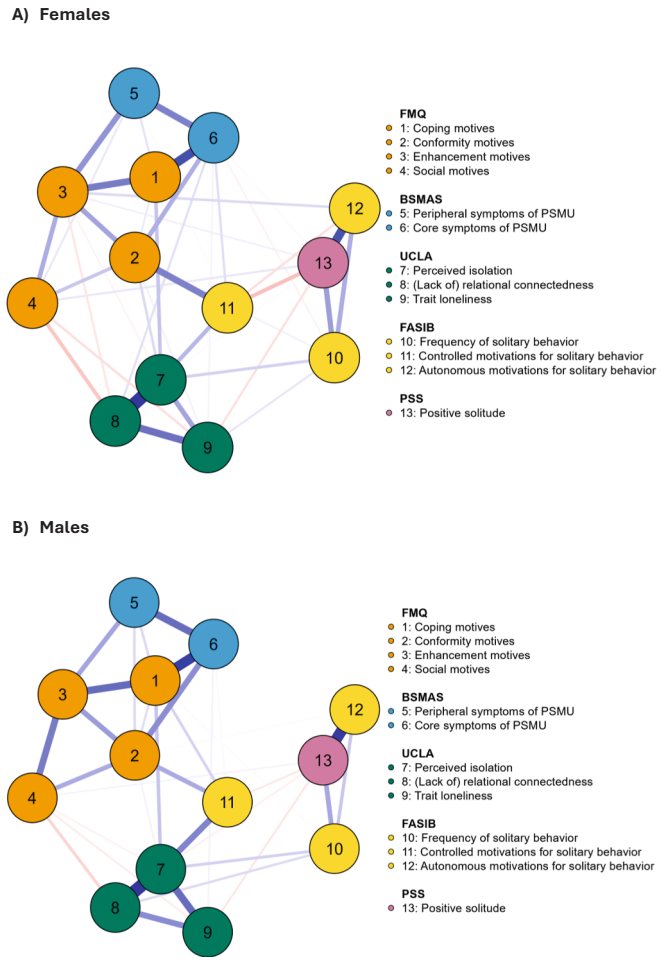

Fig. 3. EBICglasso Network on a) Females (n = 539) and b) Males (n = 290). *Note*: Blue lines represent positive edges, while red lines represent negative edges. Edge thickness reflects edge weights. *BSMAS = Bergen Social Media Addiction Scale; FASIB = Frequency of and Autonomy for Solitary and Interpersonal Behavior; FMQ = Facebook Motives Questionnaire; PSS = Positive Solitude Scale; UCLA = UCLA Loneliness Scale.*

with previous research showing that needs to belong are related to increased PSMU (Casale & Fioravanti, 2018; Stănculescu & Griffiths, 2023). The relationships between perceived isolation, coping motives, and core symptoms of PSMU in the network model extend the understanding of PSMU as a maladaptive strategy for escaping from difficulties and counteract unpleasant feelings (Pupi et al., 2024; Russo et al., 2022; Santoro et al., 2024). For example, previous research found that escapism motives and expectancies of avoiding negative feelings through SMU are associated with increased PSMU (Casale et al., 2025; Santoro et al., 2025b). The role of coping motives as bridge node in the network model suggests that young adults might rely on PSMU to temporarily alleviate feelings of dissatisfaction with their social relationships. Notably, bivariate correlations showed that core symptoms of PSMU were moderately associated with coping and conformity motives, and weakly associated with enhancement and social motives. However, the network model revealed that both enhancement and social motives—reflecting expectations of achieving positive feelings through SMU—were not related to core symptoms of PSMU. These findings suggest that individuals driven by controlled motivations for solitary behavior or experiencing loneliness may not primarily engage in potentially pathological SMU to achieve increased positive feelings, but rather to find relief from negative feelings.

Also, perceived isolation was the node in the network with the highest centrality indices values, suggesting that this node might be more likely to be triggered by and to trigger other nodes within the network. Previous research predominantly examined loneliness as a unitary construct in relation to PSMU among young adults, limiting the understanding of how different solitary experiences relate to PSMU. Although several cross-sectional studies found a positive association between loneliness and PSMU among young adults (see Pezzi et al., 2024a), the causal relationship between loneliness and PSMU remained contentious (Lu et al., 2025; Yang et al., 2020). However, a recent study showed that loneliness and PSMU may foster each other among college students (Wu et al., 2024). Our findings suggest that perceived isolation may represent a critical solitary experience in explaining not only the relationships between dimensions of loneliness and PSMU, but also between other solitary experiences, motivations for solitary behavior and SMU, and PSMU.

It is noteworthy that significant gender differences were found in certain variables of the study. Females reported higher levels of autonomous motivations for solitary behavior, PS, and perceived isolation than males. These findings are consistent with previous research showing that females are more prone to experience loneliness and exhibit autonomous motivations for solitary behavior and PS (Majorano et al., 2015; Solmi et al., 2020; Yu et al., 2022). Additionally, females reported higher levels of coping, conformity and social motives for SMU, partially supporting previous research that showed significant associations between being female and coping and enhancement motives for SMU (Marino et al., 2023). Finally, the highest levels of peripheral and core symptoms of PSMU were found among females. Although meta-analytic findings revealed no gender differences in PSMU (Casale et al., 2023), several studies found that being female is associated with increased PSMU (e.g., Andreassen et al., 2017; Stănculescu and Griffiths, 2022). It can be hypothesized that the gender differences observed in our sample may reflect distinct patterns of associations among the variables of interest. Psychometric network analyses and NCT were performed to assess potential gender differences for the properties of network model, including network structure and global strength. Results showed no significant gender differences in terms of the overall edges and degree of connectivity in the network, suggesting that the relationships between variable of interests were consistent across genders. In line with a motivational framework (Schimmenti, 2023), although females may be more prone to exhibit PSMU, maladaptive engagement in social media may be understood as an attempt to temporarily satisfy certain needs closely related to individual psychosocial difficulties, such as controlled motivations for solitary behavior and perceived isolation, beyond gender differences.

Some limitations of the current study should be considered. First, participants were young adults from the community, reducing the generalizability of our results. Future studies might investigate the relationships among the variables of interest in young adults exhibiting clinically significant levels of PSMU. Relatedly, although both the male and female subsamples satisfied the criteria for power and centrality stability, the unequal group sizes may still impact the comparison of network structures. This potential source of bias should be taken into account when interpreting the results of the invariance analyses. Second, the variables of interest were assessed through self-report instruments, which increase the risk for response bias. Furthermore, the cross-sectional design of the study prevents to ascertain potential causal relationships between motivations, solitary experiences, and PSMU. Moreover, longitudinal research might investigate the causal effects of controlled motivations for solitary behavior and loneliness in fostering coping and conformity motives for SMU, which, in turn, might lead to PSMU. Additionally, future research might explore whether maladaptive engagement in SMU as a compensatory strategy might mutually reinforce motives for SMU with negative valence and loneliness, potentially resulting in a vicious cycle. Finally, future studies might adopt a qualitative design to explore the role of solitary experiences and motivations for solitary behavior and SMU in potentially maladaptive engagement with SMU.

Its limitations notwithstanding, our findings have relevant implications. The assessment of solitary experiences and motivations for solitary behavior and SMU may assist clinicians in designing targeted interventions for PSMU. Clinical interventions might promote awareness of maladaptive engagement with social media as a means of attempting to fulfill unmet needs in social relationships and to avoid loneliness. Accordingly, clinicians can support individuals with PSMU in adopting more effective coping strategies to manage negative feelings. Furthermore, interventions aimed at processing difficulties in social relationships and enhancing social competencies may reduce the tendency to engage in PSMU. This could be important to decrease controlled motivations for solitary behavior and perceived loneliness. Such interventions may not only address the symptoms of PSMU but also target the underlying emotional and relational vulnerabilities that sustain them. For example, programs based on fostering mentalizing abilities among children and adolescents might promote emotional awareness, empathy, and theory of mind, which are essential for establishing and maintaining meaningful relationships (Chelouche-Dwek & Fonagy, 2025). Accordingly, prevention programs aimed at fostering mentalizing abilities and, concurrently, promoting healthy social media usage behaviors might reduce the risk of overreliance on social media and support the development of more adaptive and reciprocal forms of social engagement throughout later developmental stages, including young adulthood.

5. Conclusion

The current study aimed to investigate the relationships among solitary experiences, motivations for both solitary behavior, motives for SMU, and peripheral and core symptoms of PSMU in young adults using a psychometric network approach. Results showed that controlled motivations were linked to perceived isolation and conformity motives for SMU, and that perceived isolation was related to both coping and conformity motives. These motives, in turn, were associated with increased core symptoms of PSMU. Accordingly, PSMU might serve as a dysfunctional compensatory strategy for alleviating negative feelings in individuals who exhibit controlled motivations for solitary behavior and perceived isolation. Clinical interventions that support the development of more adaptive coping strategies and address social difficulties may be critical in reducing PSMU.

CRediT authorship contribution statement

Gianluca Santoro: Writing – review & editing, Writing – original draft, Supervision, Methodology, Data curation, Conceptualization. **Andrea Zagaria:** Writing – original draft, Methodology, Formal analysis, Data curation. **Mattia Pezzi:** Writing – review & editing, Writing – original draft, Data curation, Conceptualization. **Paola Corsano:** Writing – review & editing. **Alessio Gori:** Writing – review & editing. **Alessandro Musetti:** Writing – review & editing, Writing – original draft, Supervision, Methodology.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.addbeh.2025.108508.

Data availability

Data will be made available on request.

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