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The Chicken-and-Egg Dilemma of Adult Social Anxiety and Compulsive Social Media Use

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Abstract. *Background.* Social media is characterized by a habit-forming virtual architecture, which leads some users to exhibit compulsive behavior. There are clear links between social anxiety and compulsive online behavior, but it is not evident whether social anxiety is a risk factor for compulsive behavior or a consequence of time spent on social media. *Aim.* This study aimed to investigate the longitudinal cross-lagged relationship between different types of social anxiety and compulsive social media use. *Method.* The longitudinal sample consisted of 220 social media users who filled out the questionnaire twice with an approximate interval of 8 months between the data points. Compulsive use of social networks and four types of social anxiety arising from content sharing, privacy concerns, interactions with unfamiliar persons, and negative evaluation were assessed. We tested for autoregressive and cross-lagged effects between key study variables using structural equation modeling. *Results.* The results revealed that initial interaction and self-evaluation anxiety predicted later compulsive social media use but not vice versa, compulsive use predicted later content-sharing anxiety but not vice versa, and there were no cross-lagged associations between compulsive use and privacy concern anxiety. *Conclusion.* Such results suggest that the chicken-and-egg dilemma between social anxiety and compulsive online behavior may have different solutions, depending on the specific forms of social anxiety. Theoretical and practical implications of the obtained results are also discussed.

Keywords: social media, compulsive social media use, social anxiety.

Vištos ir kiaušinio dilema nagrinėjant suaugusiųjų socialinį nerimą ir kompulsyvų socialinių tinklų naudojimą

Santrauka. *Įvadas.* Socialiniams tinklams būdinga įpročius formuojanti virtuali architektūra, dėl kurios kai kurie vartotojai pradeda ją vartoti kompulsyviai. Aiškiai matomas ryšys tarp socialinio nerimo ir kompulsyvaus elgesio internete, tačiau nėra aišku, ar socialinis nerimas yra kompulsyvaus elgesio rizikos veiksnys, ar veikiau pasekmė, atsirandanti dėl laiko, praleidžiamo socialiniuose tinkluose.*Tikslas.* Šio tyrimo tikslas buvo ištirti ilgalaikį kryžminį

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ryšį tarp skirtingų socialinio nerimo tipų ir kompulsyvaus socialinių tinklų naudojimo. *Metodas.* Ilgalaikiame (*longitudiniame*) tyrime dalyvavo 220 socialinių tinklų vartotojų, kurie klausimyną pildė du kartus, maždaug su 8 mėnesių pertrauka tarp matavimų. Buvo vertinamas kompulsyvus socialinių tinklų naudojimas ir keturi socialinio nerimo tipai, kylantys dėl dalijimosi turiniu, privatumo klausimų, bendravimo su nepažįstamais asmenimis ir neigiamo vertinimo. Autoregresiniams ir kryžminiams ryšiams tarp pagrindinių tyrimo kintamųjų nustatyti buvo taikytas struktūrinių lygčių modeliavimas. *Rezultatai.* Rezultatai parodė, kad pradinis nerimas dėl bendravimo ir savęs vertinimo prognozavo vėlesnį kompulsyvų socialinių tinklų naudojimą, bet ne atvirkščiai; kompulsyvus naudojimas prognozavo vėlesnį nerimą dėl dalijimosi turiniu, bet ne atvirkščiai; kryžminių ryšių tarp kitų kintamųjų nenustatyta.

Pagrindiniai žodžiai: socialiniai tinklai, kompulsyvus socialinių tinklų naudojimas, socialinis nerimas.

Social Media Use (SMU) is becoming an integral part of everyday communication, and it is increasingly hard to find a person who does not have an account on at least one of the most popular social networks. In 2023 alone, an average of 8.4 new users per second started using social media, whereas, at the beginning of 2024, there were already more than 5 billion social media users worldwide (Kemp, 2024). Although the average time spent on social media has stabilized in recent years, it remains high at more than two hours per day (Chaffey, 2024). Such trends indicate that social media will remain an essential aspect of everyday life; therefore, there is a clear need to understand better the benefits and risks associated with social media-related behaviors.

Researchers investigating the effects of social media have increasingly focused on its habit-forming and addictive nature, which can lead some users to engage in compulsive online behavior (Anderson & Wood, 2021; Bayer et al., 2022). One significant risk factor for this behavior is social anxiety, which may drive individuals to seek fulfillment of their social needs through online platforms (Caplan, 2005; Poley & Luo, 2012). Conversely, existing research also indicates that social media use (SMU) can contribute to and worsen the users' social anxiety (Rauch et al., 2014; Lambert et al., 2022). Although the link between these two issues is evident, it remains unclear which one predisposes the other. A recent review by O'Day and Heimberg (2021) concluded that, due to reliance on cross-sectional survey data, there is no "direct evidence that social anxiety predicts problematic SMU or problematic SMU predicts social anxiety" (p. 8). To the best of our knowledge, no studies have addressed this knowledge gap since that review. Therefore, in this study, we aimed to assess the longitudinal relationships between various forms of social anxiety and compulsive social media use among adult users.

By using data from a small heterogeneous sample, we have contributed to the existing literature by showing that different forms of social anxiety can both predict and be predicted by compulsive SMU. Specifically, interaction and social evaluation anxiety predispose compulsive SMU, and the latter longitudinally predicts greater anxiety in sharing online content. Additionally, we emphasize the importance of examining different aspects of social anxiety when investigating its relationship with compulsive SMU, as their nomological networks are not the same. Lastly, we discuss the practical implications of our findings for professionals working with individuals who are socially anxious or exhibit compulsive social media behaviors.

Compulsive SMU

Social media companies have a clear financial interest in maintaining the number and activity of their users. Therefore, all successful social media platforms are characterized by an architecture that shapes habits through behavioral reinforcements (Bayer et al., 2022). For example, machine learning algorithms profile social media users and present relevant and emotion-inducing posts to them randomly among less relevant information, thus exploiting intermittent reinforcement principles (Andreassen, 2015). Similarly, the pursuit of social approval (in the form of 'likes', 'upvotes', or comments) encourages frequent checking for reactions to the posted content (Anderson & Wood, 2021). Moreover, various notifications sent by social networks encourage SMU by exploiting the natural bias toward new and unexpected stimuli (Fitz et al., 2019). These and various other reinforcements encourage habitual social networking behavior that becomes disconnected from the user's conscious goals (Wood & Runger, 2016). Instead, SMU becomes automated behavior in response to a variety of cues, which may be emotional (e.g., boredom, anxiety), technological (e.g., notifications, exposure to smartphones), or related to places and events (e.g., riding on the bus, waking up in the morning) (Anderson & Wood, 2021).

Because of its habit-forming effects, SMU can become a compulsive activity for users with predisposing risk factors (Lervik-Olsen et al., 2024). Compulsive SMU (frequently called 'social media addiction') refers to the excessive and compulsive use of social media, where much time is spent on online social networks, and this behavior causes damage to other important areas of life (Andreassen, 2015; Griffiths et al., 2014). While the term 'compulsive behavior' is often associated with addictive disorders in everyday language, it is crucial to understand that this phenomenon exists on a continuum. Current research strongly supports the idea that compulsive social media use is influenced by various behavioral, psychological, and social factors, rather than being a simple binary condition (Lervik-Olsen et al., 2024). Studies have identified multiple levels and manifestations of this behavior, such as frequency (like 'always being logged in') and intensity (described as 'excessive use'). These behaviors can gradually escalate, rather than quickly shifting from non-compulsive to compulsive (Andreassen, 2015).

Although research on compulsive SMU is scarce, the available evidence suggests that this form of compulsive behavior is characterized by all the standard features of behavioral addictions, such as preoccupation with a behavior, mood modification goals, increased tolerance over time, withdrawal symptoms, neglecting other areas, and unsuccessful attempts to control the behavior (Andreassen et al., 2016). Compulsive social media users are more likely to use social media to escape from responsibilities, check their profiles more frequently during the day, and typically desire to reduce their time on social media (Powel et al., 2013). They are also more likely to experience a variety of difficulties in psychological and social functioning, such as depression, anxiety, sleep problems, low work performance, and poor social relationships (Andreassen et al., 2016; Marttila et al., 2021; Tandor et al., 2020; Zivnuska et al., 2019).

Social anxiety and compulsive SMU

Social anxiety is an individual experience characterized by the fear of being judged by others in social situations. This fear can reach a level that interferes with daily functioning and is then referred to as social anxiety disorder or social phobia (Morrison & Heimberg, 2013). In this study, we focus on social anxiety arising specifically in the context of social networks. Although social anxiety is often considered a unidimensional phenomenon, social media users face various manifestations of this difficulty, which may not be equally expressed. Alkis et al. (2017) distinguished among four types of anxiety experienced by social media users. *Interaction anxiety* arises when interacting with people (especially new, i.e., not previously known, ones) on social networks. Similar to it, *self-evaluation anxiety* describes the concern about avoiding negative evaluation by others. *Shared content anxiety* arises when sharing personal content or watching content posted by others about an individual. Finally, privacy concerns anxiety describes tension arising from the possible unsafe dissemination of personal information.

A recent systematic review by O'Day and Heimberg (2021) showed that there is a clear link between social anxiety and compulsive SMU. Specifically, socially anxious subjects use social networks more often (Shaw et al., 2015), use social media to escape problems and feel unable to reduce the time they spend online (Honnekeri et al., 2017), ruminate about social networks and experience fear of missing out more intensely (Dempsey et al., 2019). However, we must keep in mind that most such studies are exclusively cross-sectional, which means that possible causal relationships should be interpreted cautiously, as the associations obtained can be interpreted in several ways. Generally speaking, the research field presents a chicken-and-egg dilemma in which social anxiety can be considered either as a risk factor or a consequence of compulsive SMU.

One possible solution to this dilemma is to treat social anxiety as a risk factor that predisposes to compulsive SMU. Davis (2001) formulated a cognitive-behavioral model of pathological Internet use, according to which, various anxiety-provoking problems promote inappropriate coping and maladaptive cognitions, which, in turn, deepen the problems. In such circumstances, the use of the Internet and social networks functions as avoidance-based coping, and this behavior is continuously reinforced until it becomes compulsive. Caplan (2005) proposed an addition to this model emphasizing the importance of social skill deficit and related social anxiety. This social anxiety and related difficulties in forming relationships lead to reliance on coping strategies that do not require social support or seeking communication in a virtual environment. Similar ideas are also expressed in social compensation theory (Poley & Luo, 2012), according to which, social networks become an attractive alternative to live communication for socially anxious individuals. Furthermore, authors examining the habit-forming effect of social networks note that social anxiety can be a cue for automatic SMU behavior (Anderson & Wood, 2020). Collectively, these models explain how social anxiety associated with low interpersonal skills can lead to engagement in and compulsive use of social media.

On the other hand, there is a growing body of research indicating that SMU may increase social anxiety. Rauch et al. (2014) found that subjects experienced greater physiological arousal (assessed by changes in skin conductance) when meeting face-to-face with a person whose photos they had previously viewed on Facebook, and this effect was more pronounced among socially anxious subjects. A study by Carruthers et al. (2021) revealed an interaction effect between *Facebook* use and initial social anxiety when predicting maladaptive cognitions and behavior. While using *Facebook*, subjects prone to social anxiety experienced a greater relative increase in anxiety, negative thinking, and the use of safety behaviors (e.g., rewording one's post multiple times), as well as tended to interpret ambiguous online social scenarios in a negative way. In other words, exposure to social media (in this case, *Facebook*) had a greater anxiety-inducing effect on individuals who already have social anxiety. Recently, Lambert et al. (2022) showed that a one-week break from social media reduced anxiety symptoms by nearly half a standard deviation and increased well-being by more than a full standard deviation. Thus, even temporary withdrawal from online social activity can have a positive effect on users' well-being, prompting a re-evaluation of possible causal links between social anxiety and compulsive SMU.

Given the knowledge gap regarding the direction of prognostic relationships between compulsive SMU and social anxiety, we pose the following research question:

RQ1: *What is the direction of the longitudinal cross-lagged relationship between different types of adult social anxiety and compulsive social networking use?*

Methods

Sample and procedure

The first wave of data gathering was done in September and October 2022. The second wave was conducted approximately 8 months later on May 2023. Previous research does not identify a universal timeframe for the development of compulsive social media use. However, short-term longitudinal studies in students show that rumination and social comparison increases can predict higher compulsive use within a single academic year (Yang et al., 2019). This suggests that problematic patterns may emerge in a few months. Longer-term studies in children and adolescents indicate that heavy social media use and its associated behavioral and neurological changes can accumulate over several years (Nivins et al., 2024). Most research in this area is cross-sectional, making it difficult to establish exact timelines (Pellegrino et al., 2022). Without clear guidelines from previous studies, an 8-month interval was chosen as an intermediate option between several months and a year.

The invitation to participate in the survey was shared on social media through the researchers' social media accounts and widely distributed across various psychology-related platforms. This strategy aimed to reach a diverse and relevant audience, thereby ensuring that a wide range of experiences were represented. By utilizing social media, we sought to engage individuals who actively use these channels for communication.

A sample of 388 participant completed the initial survey, of whom, 220 agreed to participate in the second study wave by providing their emails. After sending out the invitations to participate in the second wave, 86 respondents filled out the questionnaire for a second time.

We conducted a dropout analysis by comparing sociodemographic and psychological variables of those who participated in both study waves with those who initially agreed to participate in the second wave but dropped. Analysis revealed that most differences between these two groups were not statistically significant when considering factors such as gender, age, and social anxiety. However, we observed a noteworthy social media use (SMU) distinction. Participants who dropped out displayed slightly higher average scores in this area, with a mean of 2.44 compared to 2.21 for those who completed the study ($t(218) = 2.322$, $p = 0.021$). These findings suggest that higher levels of compulsive SMU among dropouts could indicate a specific area of concern. Nevertheless, given that our dropout analysis revealed only a minimal risk of systemic attrition bias, we retained the full longitudinal sample of 220 participants to ensure the robustness of our findings. This approach allows for a comprehensive examination of the research question, despite the potential dropout issues. We have also accounted for the missing data by using the FIML estimator (Lee & Shi, 2021).

The longitudinal sample consisted of 220 participants (47 men, 171 women and 4 other). The age of the research participants ranged from 18 to 67 years ($M = 30.2$; $SD = 12.2$). Most of the participants were employed (36.4%), studying (23.2%) or combining work and studies (25.9%) and were living in one of the major cities (85%). Only 5% of the subjects indicated that their work was related to the use of social networks, and 29.5% indicated that it was partially related.

Measures

The subjects were asked to fill out a questionnaire in which they provided basic demographic information (age, gender, occupation) and completed scales assessing their social media use and perceived social anxiety.

Compulsive social media use was measured by the Compulsive Internet Use Scale (Meerkerk et al., 2009). The short version of the scale consists of 9 items, rated on a five-point Likert-type scale, ranging from '1' – 'never' to '5' – 'very often'. All the items were reworded to inquire specifically about social media use (instead of general Internet usage). Sample item is "How often do you find it difficult to stop using social media?". Confirmatory factor analysis has confirmed the scale structure ($\chi^2 = 69.359$, $df = 27$, $p < 0.001$; $CFI = 0.937$, $RMSEA = 0.085$; all loadings ≥ 0.474), and the scale was determined to have good internal consistency ($\alpha = 0.861$).

Social anxiety was measured by the Social Anxiety Scale of Social Media Users (Alkis et al., 2017). The scale consists of 21 items, rated on a five-point Likert-type scale, ranging from '1' – 'never' to '5' – 'very often'. The items form 4 subscales assessing different manifestations of social anxiety: shared content anxiety (7 items, sample item: "I

am concerned about the fact that the content I share will not be liked by others"), privacy concerns anxiety (5 items, sample item: "the possibility of having my private information acquired by others makes me feel anxious"), interaction anxiety (6 items, sample item: "I feel anxious when talking with people I have just met") and self-evaluation anxiety (3 items, sample item: "I feel anxious about making a negative impression on people"). Confirmatory factor analysis has confirmed the scale structure ($\chi^2 = 634.004$, df = 183, $p < 0.001$; CFI = 0.928; RMSEA = 0.080, all items' loadings ≥ 0.531), and all the subscales had good internal consistency (all αs ≥ 0.812)

Data analysis

Before addressing our research question, we tested all the measures for the strict longitudinal measurement invariance. Specifically, we tested for the configural, metric, scalar, and residual invariance to establish the equivalence of model structure, factor loadings, intercepts, and residual variances at both time points (Putnick & Bornstein, 2016). In all steps, invariance was observed if the Root Mean Square Error of Approximation (RMSEA) increased by less than .015, and the Comparative Fit Index (CFI) decreased by less than .01 after imposing additional constraints (Chen, 2007). For all measures, longitudinal invariance was confirmed, and further SEM models were tested with longitudinally constrained item loadings, intercepts, and residual variances.

We used structural equation modeling (ML estimator) with IMB AMOS 20.0 to answer our research question. We estimated the autoregressive and cross-lagged effects between different types of social anxiety and compulsive social media use. Due to the limited sample size, we included all four types of social anxiety separately. In all cases, we estimated a full model that included all possible autoregressive and cross-lagged paths first, followed by two partial models with only one cross-lagged path (T1 social anxiety to T2 compulsive social media use or vice versa), and, finally, an autoregressive model with no cross-lagged paths. When comparing two models, one model is considered to fit the data better than the other if their chi-square difference is significant, considering the difference in degrees of freedom. If multiple structural equation models fit the data equally well, based on the principle of parsimony, the most parsimonious model (i.e., the one with the most degrees of freedom) is considered more appropriate (Preacher, 2006).

Results

The correlations between the main variables are presented in Supplementary Table S1. As expected, compulsive SMU was strongly correlated between both data points, thereby suggesting a relatively stable nature of this form of behavior. Compulsive SMU was also related to all forms of experienced social anxiety, with the strongest correlations obtained with sharing content and social evaluation anxiety.

To answer the main research question about the directions of predictive relationships between different forms of social anxiety and compulsive SMU, autoregressive cross-lagged models were tested with each form of social anxiety. The results are presented in

Tables 1–4. In all cases, autoregressive models included only autoregressive effects, direct causality models included a predictive relationship between social anxiety (measured in T1) and compulsive SMU (measured in T2), whereas reverse causality models described the opposite cross-lagged path. The full autoregressive cross-lagged model (i.e., including all possible predictive relationships) was used for comparison.

For content sharing anxiety (see Table 1), the direct causality ($\Delta\chi^2 = 4.458$, $\Delta df = 1$, $p = 0.035$) and autoregressive ($\Delta\chi^2 = 8.625$, $\Delta df = 2$, $p = 0.013$) models fit the data worse than the full autoregressive cross-lagged model. In addition, the reverse causality model (in which compulsive SMU is treated as a predictor of content sharing anxiety) fit the data similarly to the full model ($\Delta\chi^2 = 2.851$, $\Delta df = 1$, $p = 0.091$), but was more parsimonious (i.e., had more degrees of freedom) and should therefore be considered superior (Preacher, 2006). Moreover, the cross-lagged effect between T1 compulsive SMU and T2 content-sharing anxiety was significant in both the full and reverse causality models.

Table 1.

Results of models examining relationships between shared content anxiety and compulsive SMU

	Models			
	Full cross-lagged model	Direct causality model	Reversed causality model	Autoregressive model
Paths (standardized regression weights)				
$CSMU_1 \rightarrow CSMU_2$	0.713***	0.664***	0.785***	0.752***
$SCA_1 \rightarrow SCA_2$	0.567***	0.663***	0.517***	0.622***
$CSMU_1 \rightarrow SCA_2$	0.220*		0.254*	
$SCA_1 \rightarrow CSMU_2$	0.151	0.189*		
Explanatory power (R^2)				
$CSMU_2$	0.639	0.599	0.616	0.565
SCA_2	0.491	0.439	0.462	0.387
Model fit measures				
χ^2	798.253***	802.711***	801.104***	806.878***
df	488	489	489	490
$\Delta\chi^2$		4.458*	2.851	8.625*
RMSEA	0.054	0.054	0.054	0.054
CFI	0.897	0.896	0.896	0.894

Note. CSMU – compulsive social media use, SCA – shared content anxiety, $\Delta\chi^2$ – chi-square difference from the full model. Subscript indices refer to the study wave (1st or 2nd), *$p < .05$; **$p < .01$; ***$p < .001$.

Regarding privacy concerns anxiety (see Table 2), all four models did not differ in their data fit, and both cross-lagged relationships were insignificant in all models, so the simplest, i.e., autoregressive model, should be considered the most appropriate.

For interaction anxiety (see Table 3), the reverse causality ($\Delta\chi^2$ = 12.532, Δdf = 1, p < 0.001) and autoregressive ($\Delta\chi^2$ = 14.779, Δdf = 2, p < 0.001) models fit the data worse than the full autoregressive cross-lagged model and the direct causality model fitted data equally good as the full model ($\Delta\chi^2$ = 1.763, Δdf = 1, p = 0.184). Moreover, the cross-lagged path between T1 interaction anxiety and T2 compulsive SMU was significant in all models. Thus, interaction anxiety should be considered as a predictor of compulsive behavior.

Table 2.

Results of models examining relationships between privacy concern anxiety and compulsive SMU

	Models			
	Full cross-lagged model	Direct causality model	Reversed causality model	Autoregressive model
Paths (standardized regression weights)				
$CSMU_1 \rightarrow CSMU_2$	0.752***	0.751***	0.778***	0.775***
$PCA_1 \rightarrow PCA_2$	0.560***	0.562***	0.520***	0.525***
$CSMU_1 \rightarrow PCA_2$	0.005		0.020	
$PCA_1 \rightarrow CSMU_2$	0.101	0.101		
Explanatory power (R^2)				
$CSMU_2$	0.613	0.612	0.605	0.601
PCA_2	0.316	0.316	0.276	0.276
Model fit measures				
χ^2	550.901***	550.903***	552.093***	552.126
df	370	371	371	372
$\Delta\chi^2$		0.002	1.192	1.225
RMSEA	0.047	0.047	0.047	0.047
CFI	0,912	0,913	0,912	0,913

Note. CSMU – compulsive social media use, PCA – privacy concern anxiety, $\Delta\chi^2$ – chi-square difference from the full model. Subscript indices refer to the study wave (1st or 2nd), *p < .05; **p < .01; ***p < .001.

Similar results were obtained with self-evaluation anxiety (see Table 4). More specifically, the reversed causality ($\Delta\chi^2$ = 9.495, Δdf = 1, p = 0.002) and autoregressive ($\Delta\chi^2$ = 10.189, Δdf = 2, p = 0.006) models had worse fit with our data than the full autoregressive cross-lagged model, and the differences in data fit from the full model were nonsignificant ($\Delta\chi^2$ = 0.400, Δdf = 1, p = 0.527). Thus, self-evaluation anxiety should also be considered as a predictor of compulsive SMU.

Table 3.

Results of models examining relationships between interaction anxiety and compulsive SMU

	Models			
	Full cross-lagged model	Direct causality model	Reversed causality model	Autoregressive model
Paths (standardized regression weights)				
$CSMU_1 \rightarrow CSMU_2$	0.719***	0.706***	0.785***	0.772***
$IA_1 \rightarrow IA_2$	0.751***	0.779***	0.717***	0.752***
$CSMU_1 \rightarrow IA_2$	0.113		0.133	
$IA_1 \rightarrow CSMU_2$	0.263***	0.271***		
Explanatory power (R^2)				
$CSMU_2$	0.695	0.684	0.616	0.597
IA_2	0.626	0.607	0.589	0.566
Model fit measures				
χ^2	696.722***	698.485***	709.254***	711.501***
df	427	428	428	429
$\Delta\chi^2$		1.763	12.532***	14.779***
RMSEA	0.054	0.054	0.055	0.055
CFI	0.903	0.903	0.899	0.899

Note. CSMU – compulsive social media use, IA – interaction anxiety, $\Delta\chi^2$ – chi-square difference from the full model. Subscript indices refer to the study wave (1st or 2nd), *$p < .05$; **$p < .01$; ***$p < .001$.

Table 4.

Results of models examining relationships between self evaluation anxiety and compulsive SMU

	Models			
	Full cross-lagged model	Direct causality model	Reversed causality model	Autoregressive model
Paths (standardized regression weights)				
$CSMU_1 \rightarrow CSMU_2$	0.780***	0.697***	0.788***	0.782***
$SEA_1 \rightarrow SEA_2$	0.704***	0.799***	0.747***	0.774***
$CSMU_1 \rightarrow SEA_2$	0.055		0.075	
$SEA_1 \rightarrow CSMU_2$	0.247**	0.251**		
Explanatory power (R^2)				
$CSMU_2$	0.693	0.687	0.622	0.611
SEA_2	0.645	0.638	0.608	0.599

	Models			
	Full cross-lagged model	Direct causality model	Reversed causality model	Autoregressive model
Model fit measures				
χ^2	380.861***	381.261***	390.356***	391.050***
df	268	269	269	270
$\Delta\chi^2$	-	0.400	9.495**	10.189**
RMSEA	0.044	0.044	0.045	0.045
CFI	0.945	0.945	0.941	0.941

Note. CSMU – compulsive social media use, SEA – self-evaluation anxiety, $\Delta\chi^2$ – chi-square difference from the full model. Subscript indices refer to the study wave (1st or 2nd), *$p < .05$; **$p < .01$; ***$p < .001$.

Discussion

As the use of social networks grows (Kemp, 2024), questions about the relationships of this form of behavior with various features of human functioning and well-being become more and more relevant. Due to the characteristics of the habit-forming virtual architecture, social media is attractive to its users, which may lead to compulsive SMUs in some of the most vulnerable individuals (Anderson & Wood, 2020; Bayer et al., 2022). Previous studies reveal clear links between compulsive SMU and social anxiety (O'Day & Heimberg, 2021). However, different theoretical models explain the mechanisms of this relationship differently, and therefore it is not unequivocally clear whether social anxiety should be considered a risk factor or a consequence of compulsive behavior. Moreover, social anxiety can take many forms, the causes and effects of which are not equivalent. In this study, we aimed to explore the cross-lagged prognostic relationships between compulsive SMU and different forms of anxiety experienced by social media users.

In this study, we followed Alkis et al. (2017), who proposed a taxonomy of anxiety experienced by social network users. According to it, there are four distinct forms of social anxiety related to content sharing, privacy, interactions, and self-evaluation. The results revealed that this distinction between different forms of social anxiety makes sense, as their association with compulsive SMU is not the same. Although the dominant cross-sectional studies in the research field show that all forms of anxiety are more or less associated with compulsive SMU, the longitudinal study design allowed us to examine in more detail the cross-lagged predictive relationships between two data points separated by an 8-month interval. More specifically, our results revealed that content-sharing anxiety should be treated as a consequence of compulsive SMU, and it was nonsignificant in predicting subsequent compulsive SMU. The opposite results were obtained when analyzing interaction and self-evaluation anxiety. These forms of social anxiety emerged as significant risk factors for later compulsive SMU but were themselves unrelated to earlier compulsive behavior. Finally, cross-lagged relationships between privacy concerns and compulsive SMU were nonsignificant, implying that one cannot be predicted longitudinally from the other.

The obtained results have significant theoretical and practical implications. As for the former, our results contribute to the chicken-and-egg debate on the relationship between social anxiety and compulsive SMU, showing that different forms of social anxiety can be both risk factors for and outcomes of online behavior. More specifically, our results indicate that at least two forms of social anxiety – interaction and self-evaluation anxiety – should be considered as risk (i.e., predictive) factors for compulsive SMU. These results are consistent with the cognitive-behavioral model proposed by Davis (2001) and Caplan (2005) as well as the social compensation theory (Poley & Luo, 2012), according to which, the virtual environment becomes an attractive alternative for anxious individuals seeking to satisfy social needs in a relatively safer environment. On the other hand, our results also suggest that compulsive SMU may be a risk factor for at least one specific form of social anxiety, i.e., content-sharing on social media anxiety. These results resonate with previous studies revealing an anxiety-inducing effect of SMU (Carruthers et al., 2021; Lambert et al., 2022; Rauch et al., 2014). Collectively, our results suggest that when examining the question of longitudinal relationships between compulsive SMU and anxiety, the latter should be assessed and analyzed by differentiating between different forms of social anxiety, as their consequences do not appear to be equivalent.

These findings offer valuable insights for individuals with compulsive social media use (SMU). While it is common for these individuals to encounter various forms of social anxiety, it is helpful to understand that not all types of anxiety are equally relevant when it comes to reducing SMU. Our research highlights that interactional anxiety and self-evaluation anxiety can pose significant challenges in efforts to limit social media usage. Therefore, it may be beneficial to address these issues in individual counseling or group sessions by focusing on enhancing social skills, improving self-presentation, and building self-efficacy in social interactions.

Conversely, our findings suggest that social anxiety related to fears of sharing content online or privacy concerns may be less critical. Although these kinds of anxiety may coexist with compulsive SMU, they are not necessarily directly linked to it and could be side effects of the compulsive behavior that dissipate as one learns to manage their social media use effectively. As such, while social anxiety represents a relevant consideration in supporting individuals with compulsive social media use, it is crucial to identify which specific forms of anxiety are most deserving of focus to provide the most effective assistance.

Several limitations in our study may have influenced the results and warrant thorough discussion. First, we relied on a convenience sample that was limited in size, restricting our findings' generalizability. This study should be considered a preliminary, exploratory investigation. Future research involving a larger and more diverse sample is needed to validate our results and ensure they can be applied to the broader population. The small sample size also limited our ability to analyze the data separately for different age groups. Understanding how younger and older adults navigate specific developmental tasks is crucial, as social anxiety may affect their compulsive SMU in unique ways. For example, younger adults may face pressure from social media in the form of social comparison. In comparison, older adults might struggle with feelings of isolation, leading to different

compulsive behaviors. Second, we conducted a dropout analysis and compared participants who engaged in the second wave of the study and those who initially agreed but later dropped out. Interestingly, while the two groups did not show significant differences in most respects, we found that those who dropped out exhibited slightly higher scores for compulsive SMU. This observation raises concerns that our results may not accurately represent individuals with more severe compulsive behavioral tendencies. Third, the scope of our research was limited to a small number of anxiety forms, primarily focusing on social anxiety. Future studies should explore a broader spectrum of anxiety types. This expansion could reveal more comprehensive trends in the interplay between various forms of anxiety and compulsive SMU. Finally, it's important to note that our study relied solely on self-report data, which can be subject to biases such as social desirability and inaccurate self-assessment. These biases may limit the reliability of our results. To strengthen future research findings, it would be beneficial to integrate self-report measures with objective physiological indicators of social anxiety, such as heart rate variability or skin conductance. This combination could provide a more nuanced understanding of how social anxiety manifests in relation to compulsive SMU across different populations.

Although this study has certain limitations, the results still offer some insight into the complex relationship between social anxiety and compulsive social media use. It seems possible that some forms of social anxiety may contribute to compulsive behavior, while such behavior in turn may reinforce other aspects of social anxiety. Future research could benefit from paying closer attention to the different sources of social anxiety, as this might provide a more detailed picture and help in better understanding the challenges arising from the rapid spread of social networks.

Compliance with Ethical Standards

All procedures performed in this study were in accordance with the *1964 Helsinki Declaration* and its later amendments or comparable ethical standards. Permission to conduct the study was obtained from the Psychological Research Ethics Committee of Vilnius University (permission No. 9 / (1.13 E) 250000-KT-60). Informed consent was obtained from all individual participants included in this study. On behalf of all authors, the corresponding author states that there is no conflict of interest to declare.

Data availability

The dataset supporting the findings of this study is available from the corresponding author upon reasonable request.

Author contributions

Arūnas Žiedelis: conceptualization, data curation, methodology, formal analysis, writing – original draft.

Laima Bulotaitė: conceptualization, methodology, writing – review and editing.

Justina Kymantienė: conceptualization, methodology, writing – review and editing.

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Supplementary Table S1

Table S1.

Descriptive statistics and correlations between the main variables

	M	SD	1	2	3	4
1. $CSMU_1$	2.35	0.72	(0.861)			
2. $CSMU_2$	2.36	0.71	0.719***	(0.877)		
3. SCA_1	2.35	0.99	0.459***	0.394***	(0.924)	
4. SCA_2	2.29	0.93	0.348**	0.541***	0.628***	(0.915)
5. PCA_1	2.89	0.98	0.254***	0.234*	0.345***	0.222*

	M	SD	1	2	3	4
6. PCA_2	2.92	0.99	0.132	0.371***	0.232*	0.402***
7. IA1	2.55	1.02	0.283***	0.363**	0.468***	0.266*
8. IA2	2.54	1.08	0.217*	0.432***	0.321**	0.390***
9. SEA1	2.78	1.24	0.369***	0.362**	0.654***	0.484***
10. SEA2	2.79	1.22	0.221*	0.445***	0.551***	0.639***

Note. CSMU – compulsive social media use, SCA – shared content anxiety, PCA – privacy concern anxiety, IA – interaction anxiety, SEA – self-evaluation anxiety. Subscript indices refer to the study wave (T1 or T2). Cronbach's alpha coefficients are presented on the diagonal. ***$p < .001$.

Table S1.

(Continued)

	5	6	7	8	9	10
5. PCA_1	(0.818)					
6. PCA_2	0.541***	(0.845)				
7. IA1	0.299***	0.132	(0.916)			
8. IA2	0.167	0.176	0.762***	(0.927)		
9. SEA1	0.384***	0.179	0.683***	0.523***	(0.916)	
10. SEA2	0.215*	0.336**	0.566***	0.721***	0.721***	(0.920)

Note. CSMU – compulsive social media use, SCA – shared content anxiety, PCA – privacy concern anxiety, IA – interaction anxiety, SEA – self-evaluation anxiety. Subscript indices refer to the study wave (T1 or T2). Cronbach's alpha coefficients are presented on the diagonal. ***$p < .001$.