


Social media use, mental health, and suicide-related outcomes in Russian women: A cross-sectional comparison between two age groups

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Abstract

Background: Women who belong to the age group “emerging adulthood” (18 to 29 years) are vulnerable to mental health issues and suicide-related outcomes.

Objectives: This study investigated potential predictors of suicide-related outcomes in females emerging adulthood and compared them to older women.

Design and Methods: Data of 2537 women from Russia (group “18 to 29 years”: $n = 1123$; group “> 29 years”: $n = 1414$) on lifetime suicide-related outcomes, (problematic) social media use, daily stress, depression and anxiety symptoms, and positive mental health were assessed via online cross-sectional surveys.

Results: The younger group spent significantly more time on social media use than the older group. It had significantly higher levels of daily stress, problematic social media use, depression and anxiety symptoms, and suicide-related outcomes. The older group showed significantly higher levels of positive mental health. Only in the younger group, problematic social media use significantly mediated the relationship between daily stress and suicide-related outcomes in a moderated mediation analysis. Positive mental health significantly moderated the association between problematic social media use and suicide-related outcomes. Specifically, the higher the positive mental health level, the less close the link between both variables.

Conclusion: The current results reveal that young women in Russia could be at enhanced risk for daily stress, problematic social media use, and low levels of mental health. The interaction between these variables could foster suicide-related outcomes. Public governmental communication in Russia should call attention to potential negative impact of intensive social media use.

Keywords

emerging adulthood, mental health, problematic social media use, Russia, suicide-related outcomes, women

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Introduction

Individuals who belong to the age group “emerging adulthood” (i.e., 18 to 29 years)¹ are at enhanced risk for mental disorders^{2,3} and suicide-related outcomes (i.e., suicide ideation, suicide attempts).^{4–6} Members of this age group often tend to experience high levels of daily stress across different aspects of life (e.g., family, work) and try to escape by intensive use of social media (SM) such as Facebook, Twitter, and Instagram.^{7,8} In the short term, social media use (SMU) can suppress negative experiences and foster positive emotions.⁹

However, available literature from the United States, Europe, and Asia showed that intensive SMU can also contribute to the development of a close emotional bond to the online world that is linked to a strong need to stay permanently online.^{10–12} This phenomenon has been termed as addictive or problematic SMU and is defined by six typical characteristics¹³: salience (permanent thinking of SMU), tolerance (enhanced time must be spent on SMU to experience positive emotions), mood modification (SMU for mood improvement), relapse (reverting to old use pattern despite endeavors to reduce SMU), withdrawal symptoms (feeling nervous without SMU), and conflicts (interpersonal problems because of intensive SMU). Members of the emerging adulthood seem to be at enhanced risk for the addictive tendencies due to their intensive SMU.^{8,14}

Notably, addictive or problematic SMU is not a formal psychiatric disorder (see e.g., 11th Revision of the International Classification of Diseases, ICD-11).¹⁵ Some available literature advised not to overpathologize excessive SMU¹⁶ and pointed to the lack of longitudinal research specifically on its neuronal correlates.¹⁷ Other research provided first evidence from neuroscience¹⁸ and explained potential mechanisms that could contribute to the development and maintenance of addictive tendencies toward SMU.⁷ Against this controversial background, we use the term “problematic” SMU in the present study.¹⁹

Cross-sectional and longitudinal studies from different countries described problematic SMU to be positively related to the level of depressive symptoms and insomnia.^{7,20–24} A cross-sectional study from France reported a positive association between problematic SMU and suicide ideation.²⁵ Moreover, problematic SMU was positively related to suicide-related outcomes assessed 1 year later in two longitudinal studies from Germany.^{26,27} Repetitive negative thinking enhanced this relationship.²⁷ In contrast, positive mental health (PMH)—emotional, social, and psychological well-being²⁸—buffered the negative impact of problematic SMU on suicide-related outcomes.²⁶ Following earlier research, PMH is a significant protective factor that confers resilience and contributes to functional coping strategies in stressful situations. It can reduce depression and anxiety symptoms as well as suicide-related outcomes.^{4,29,30}

Suicide is among the major leading causes of deaths in Russia.³¹ Its rate has increased within the past years especially in people who belong to the emerging adulthood.³² Cross-national research revealed that female members of this age group are at higher risk for suicide ideation and suicide attempts (up to three times), whereas male members are at higher risk for suicide death.^{33–36} In correspondence with this finding, young women in Russia reported higher suicide ideation than men.³⁷ Young women often experience high levels of daily stress due to the dual burden of family and home chores and job performance and are vulnerable to depression and anxiety symptoms.^{38,39} To escape negative experiences of everyday life, they tend to emerge in intensive SMU.⁴⁰ Online discussions on platforms such as VKontakte (VK)—one of the most popular SM platforms in Russia⁴¹—or the uploading and watching of photos and short videos on Instagram and TikTok allow Russian users to forget their offline world obligations and problems at least temporarily.^{13,42} Many young women in Russia spend much time on intensive online self-presentation and social interaction to maintain a positive image and a high rate of popularity within the online community. Some of them consider SMU as an important form of self-expression and self-realization that they miss in the offline world.^{43,44}

Against the presented background,¹³ the question arises whether the online activity might have a negative effect on young women in Russia and at least partly explain the suicidality in this group. Specifically, could daily stress foster problematic SMU, and could this contribute to suicide-related outcomes in this specific group? Moreover, available literature emphasized the protective effect of PMH on suicide risk.⁴⁵ Thus, could PMH also reduce the risk of suicide-related outcomes in young Russian women who have enhanced levels of problematic SMU?

Notably, most available knowledge on potential consequences of SMU in mental health comes from US, European, and Asian samples.^{10–12} A systematic literature search in PubMed, PsycINFO, and Web of Science databases conducted using a combination of search keywords such as “Social Media Use,” “addictive Social Media Use,” “problematic Social Media Use,” “mental health,” “suicide,” “emerging adulthood,” and “Russian women” in the English and Russian language in June 2022 revealed that investigations of potential consequences of SMU for mental health in Russian samples are rare. Most research that investigated SMU in Russia focused on political issues^{46–48} or on the benefits of SMU for marketing and business development.^{49,50} Therefore, the present study aimed to investigate problematic SMU, daily stress, mental health, and suicide-related outcomes as well as their relationships in female emerging adulthood in Russia to close the described research gap. Our research extends the studies on women’s mental health. The findings could contribute to the identification of individuals

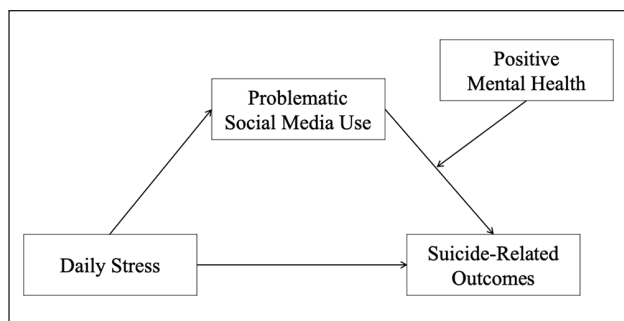


Figure 1. Moderated mediation model with daily stress (predictor), problematic social media use (mediator), positive mental health (moderator), and suicide-related outcomes (outcome).

at risk for suicide-related outcomes in this specific group, explain underlying mechanisms that could foster this risk, and thus sensitize the (Russian) government for the potential negative impact of problematic SMU.

To prevent speculations, we first wanted to ensure that the level of (problematic) SMU, daily stress, mental health, and suicide-related outcomes differs between female members of the emerging adulthood and older women in Russia. Therefore, we formulated the following research questions.

Research Question 1: Does the level of SMU (i.e., daily time spent on SM, use frequency of specific social platforms such as VKontakte, Instagram, Facebook, Twitter, and TikTok, and problematic SMU) differ between female members of the emerging adulthood and older women in Russia?

Research Question 2: Does the level of daily stress differ between female members of the emerging adulthood and older women in Russia?

Research Question 3: Does the level of mental health (i.e. depression symptoms, anxiety symptoms and PMH) differ between female members of the emerging adulthood and older women in Russia?

Research Question 4: Does the level of lifetime suicide-related outcomes differ between female members of the emerging adulthood and older women in Russia?

Next, we formulated the following hypotheses to assess the relationship between problematic SMU, daily stress, mental health, and suicide-related outcomes. Problematic SMU is positively associated with daily stress (Hypothesis 1a), depression symptoms (Hypothesis 1b), anxiety symptoms (Hypothesis 1c), and suicide-related outcomes (Hypothesis 1d). In contrast, problematic SMU is negatively related to PMH (Hypothesis 1e). Moreover, we expected daily stress to be positively related to suicide-related outcomes (Hypothesis 2a). Problematic SMU was

assumed to mediate this association (Hypothesis 2b). Specifically, the higher the daily stress, the higher the problematic SMU; and the higher the problematic SMU, the higher the suicide-related outcomes. Moreover, we assumed that PMH—as a protective factor—could moderate the association between problematic SMU and suicide-related outcomes (Hypothesis 2c). Specifically, the higher PMH, the less close the link between problematic SMU and suicide-related outcomes. Figure 1 illustrates the hypothesized associations as a moderated mediation model.⁵¹ We investigated all hypotheses in female members of the emerging adulthood and in older women. This allowed us to reveal whether the assumed associations are specific for the emerging adulthood or can be applied for female SM users in Russia in general.

Methods and materials

Procedure and participants

The overall sample consisted of 2537 female participants from Russia that was divided into two subsamples by age: (1) Age group “18 to 29 years (emerging adulthood)”: $n = 1123$ (age: $M = 24.84$, $SD = 3.26$, range: 18–29 years; marital status: 20% single, 19.9% with a romantic partner, 60% married); (2) Age group “> 29 years”: $n = 1414$ (age: $M = 36.62$, $SD = 6.21$, range: 30–64 years, of them 78.7% were ≤ 40 years; marital status: 16.2% single, 8.8% with a romantic partner, 75% married). Data were assessed between June and August 2021 via an online cross-sectional survey. Participants were recruited via participation invitations displayed at SM platforms such as Instagram, Facebook, and VKontakte. Participation was voluntary and not compensated. Participants must be female, at least 18 years old, and use any form of SM. Thus, male participants, persons who are younger than 18 years old, and those who do not use SM were excluded from participation. The participation requirements were included in the participation invitations. They were fulfilled by all participants. The responsible Ethics Committee approved the implementation of this study (approval number: 20110512). All procedures performed in this study were in accordance with the ethical standards of the institutional research committees and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. All participants were properly instructed and provided their written informed consent to participate prior to their inclusion in the study via an online form. There were no missing data as there was no option to skip items. Participants were informed about this at the beginning of the survey. All datasets were complete. A priori power analysis (G*Power program, version 3.1) indicated that the multivariate analyses of variance (MANOVAs) required the largest sample size for valid results that was $N = 726$ (per group: $n = 363$; power ≥ 0.80 , $\alpha = 0.05$, effect size: $f^2 = 0.02$). However, considering the limited research on potential consequences

of SMU for mental health in Russian women and the fact that many more people wanted to participate in our study than were provided with the a priori analysis, we decided to include each person that wanted to participate within the data assessment period.

Measures

Social media use. Participants were asked how much time they spend daily on SMU (in minutes). If available, they should refer to the time tracked by specific applications installed on their technical devices used for online activity. If not available, participants estimated the usage time as accurately as possible. Furthermore, they were asked to rate how frequently they use different social platforms (i.e., VKontakte, Instagram, Facebook, Twitter, and TikTok) on a 7-point Likert-type scale (0 = *never*, 6 = *more than one time a day*). The original Russian language version of the used items is shown in Supplemental Material.

Problematic SMU. Problematic SMU was assessed by the brief version of the Bergen Social Media Addiction Scale (BSMAS).⁵² In this study, we used the previously validated Russian language version of the BSMAS.⁵³ Brailovskaia and Margraf⁵³ described good psychometric properties of the scale in a large population representative sample from Russia: its scale reliability was Cronbach's $\alpha=0.873$; its positive relationship with depression symptoms, $r=0.413$, $p<0.001$, revealed a good convergent validity; its negative link to sense of control, $r=-0.331$, $p<0.001$, revealed a good discriminant validity.⁵³ The BSMAS consists of six items (e.g., "Felt an urge to use social media more and more?") that correspond to the six core characteristics of problematic SMU (salience, tolerance, mood modification, relapse, withdrawal, conflict). Items are rated on a 5-point Likert-type scale (1 = *very rarely*, 5 = *very often*). The higher the sum score, the higher the problematic SMU level.

Daily stress. Daily stressful experiences, that is, difficulties or inconveniences in daily life (e.g., related to family, job, or health) were measured by the Brief Daily Stressors Screening Tool (BDSS-Tool).⁵⁴ The Russian language version of the BDSS-Tool has been previously validated.⁵⁵ For example, Schönfeld et al.⁵⁵ reported a scale reliability of $\alpha=0.820$; its positive association with depression symptoms, $r=0.510$, $p<0.001$, revealed a good convergent validity; its negative relationship with PMH, $r=-0.490$, $p<0.001$, revealed a good discriminant validity. The nine items of the BDSS-Tool are rated on a 5-point Likert-type scale (0 = *not at all*, 4 = *very much*). Higher sum scores reveal higher levels of daily stress.

Depression and anxiety symptoms. The depression and anxiety subscales of the Depression Anxiety Stress Scales 21 (DASS-21)⁵⁶ assessed symptoms of depression and anxiety with, respectively, seven items (e.g., depression

subscale: "I felt that life was meaningless"; anxiety subscale: "I felt scared without any good reason"). We used the earlier validated Russian language version of the DASS-21 subscales⁵⁷ in this study. Available research reported its good psychometric properties: scale reliability of $\alpha=0.810$ (depression subscale) and $\alpha=0.820$ (anxiety subscale);⁵⁷ convergent validity: $r=0.790$, $p<0.001$ (depression \times stress symptoms), and $r=0.760$, $p<0.001$ (anxiety \times stress symptoms),⁵⁵ discriminant validity: $r=-0.400$, $p<0.001$ (depression \times self-efficacy), and $r=-0.400$, $p<0.001$ (anxiety \times self-efficacy).⁵⁵ The items of both subscales are rated on a 4-point Likert-type scale (0 = *did not apply to me at all*, 3 = *applies to me very much or most of the time*). The higher the sum score, the higher the symptoms.

Positive mental health. The unidimensional Positive Mental Health Scale (PMH-Scale)²⁸ measured PMH. We included the validated Russian language version of the PMH-Scale⁵⁸ in this study. Velten et al.⁵⁸ reported a scale reliability of $\alpha=0.910$ for this instrument, its convergent validity was $r=0.410$, $p<0.001$ (PMH \times social support), and its discriminant validity was $r=-0.440$, $p<0.001$ (PMH \times stress symptoms). The PMH-Scale includes nine items that are rated on a 4-point Likert-type scale (e.g., "I enjoy my life"; 0 = *do not agree*, 3 = *agree*). Higher sum scores indicate higher levels of PMH.

Lifetime suicide-related outcomes. Lifetime suicide-related outcomes were assessed with Item 1 ("Have you ever thought about or attempted to kill yourself?") of the Suicidal Behaviors Questionnaire-Revised (SBQ-R)⁵⁹ that is rated on a 6-point Likert-type scale (1 = *never*, 6 = *I have attempted to kill myself, and really hoped to die*). This item is typically recommended for brief screening purposes of suicide-related outcomes in clinical and non-clinical samples.^{59,60} A systematic search in PubMed, PsycINFO, and Web of Science databases revealed no previously validated Russian language version of the SBQ-R. Therefore, we translated Item 1 of the SBQ-R from the English version to the Russian language by the customary translation-back-translation-modification procedure.⁶¹ In a pilot data assessment, 20 native Russian language speakers responded via an online survey to the item at two measurement time points (baseline and after 2 months). This sample was gained by invitations displayed at SM platforms. The test-retest reliability was $r_{tm}=0.820$. Our translation of Item 1 of the SBQ-R is shown in Supplemental Material.

Table 1 shows the internal consistency of the used scales in both groups.

Statistical analyses

Statistical analyses were conducted with SPSS 28 and the macro Process version 4.0 (www.processmacro.org/index.html).⁵¹ First, we compared means of the investigated

Table 1. Descriptive statistics, internal scale reliability, and multivariate analyses of variance (MANOVAs) of the investigated variables (age group: “18 to 29 years” versus “> 29 years”).

	Age group “18 to 29 years” (<i>n</i> = 1123)		Age group “> 29 years” (<i>n</i> = 1414)		<i>F</i>	<i>p</i>	η^2p
	M (SD; Min–Max)	α	M (SD; Min–Max)	α			
1. MANOVA							
Vkontakte use frequency	3.87 (2.12; 0–6)		2.86 (2.20; 0–6)		136.593	< 0.001	0.05
Instagram use frequency	5.89 (0.62; 0–6)		5.91 (0.39; 0–6)		1.166	0.280	
Facebook use frequency	1.22 (1.79; 0–6)		1.90 (2.19; 0–6)		71.200	< 0.001	0.03
Twitter use frequency	0.53 (1.40; 0–6)		0.24 (0.96; 0–6)		38.257	< 0.001	0.02
TikTok use frequency	1.08 (1.91; 0–6)		0.61 (1.46; 0–6)		47.821	< 0.001	0.02
2. MANOVA							
Daily SMU (in minutes)	197.41 (130.53; 10–1200)		165.96 (119.01; 1–1220)		40.085	< 0.001	0.02
Problematic SMU	14.46 (5.96; 6–30)	0.82	13.08 (5.59; 6–30)	0.82	36.206	< 0.001	0.01
Daily stress	18.01 (6.91; 2–36)	0.74	16.02 (6.86; 0–36)	0.75	52.446	< 0.001	0.02
Depression symptoms	9.03 (5.93; 0–21)	0.89	7.02 (5.27; 0–21)	0.87	81.706	< 0.001	0.03
Anxiety symptoms	6.78 (5.57; 0–21)	0.87	5.06 (4.89; 0–21)	0.87	68.541	< 0.001	0.03
Positive mental health	15.40 (6.81; 0–27)	0.93	17.58 (5.96; 0–27)	0.91	73.849	< 0.001	0.03
Suicide-related outcomes	2.28 (1.25; 1–6)		1.84 (1.06; 1–6)		92.954	< 0.001	0.03

SMU: social media use; M: mean; SD: standard deviation; Min: minimum; Max: maximum; α : Cronbach's α . Degrees of freedom of all *F*-values = 1,2535; *p*: significance; η^2p : effect size.

variables between both age groups by two MANOVAs. Considering the recommendation not to include more than 10 dependent variables into one MANOVA,⁶² the first analysis focused on the use frequency of the five social platforms and the second MANOVA included the remaining seven variables. Since the Box's test was significant, the Hotelling's trace statistics served as the multivariate test in both analyses. Then, we assessed the associations between the investigated variables by zero-order bivariate correlations in both groups. Next, we calculated a linear regression analysis as a preparing step of the moderated mediation analysis in both groups. It included suicide-related outcomes as outcome. Daily stress, problematic SMU and PMH served as potential predictors in the regression model. In both groups, there was no violation of the multi-collinearity assumption (all values of tolerance > 0.25, all variance inflation factor values < 5).⁶³ Considering the results of the regression analysis, we ran a moderated mediation analysis (Process: model 14) only in the younger group in the next step. The model included a conditional indirect effect (see Figure 1) and examined the multiple effects simultaneously (integration of the hypothesized mediation and moderation effects).^{64,65} The moderated mediation effect was assessed by the bootstrapping procedure (10,000 samples) that provides percentile bootstrap confidence intervals (95% CI). Daily stress served as predictor, problematic SMU as mediator, PMH as moderator, and suicide-related outcomes as outcome. Path *a* denoted the association between daily stress and problematic SMU; the relationship between problematic SMU and suicide-related outcomes was denoted by path *b*; the link

between daily stress and suicide-related outcomes after the inclusion of problematic SMU and PMH in the model was denoted by path *c'* (the direct effect).

Results

Tables 1 and 2 show the descriptive statistics of the investigated variables separately for both groups. Furthermore, Table 1 presents the results of both MANOVAs. In both groups, Instagram was the most frequently used social platform (*at least once a day*: younger group: 98.3%; older group: 98.6%) followed by VKontakte (*at least once a day*: younger group: 52.1%; older group: 31.4%), Facebook (*at least once a day*: younger group: 10.1%; older group: 20.3%), TikTok (*at least once a day*: younger group: 11%; older group: 5.2%), and Twitter (*at least once a day*: younger group: 4.9%; older group: 2.2%; see Table 2). In the first MANOVA that focused on the use of the specific social platforms, the Hotelling's trace was significant, $T=0.101$, $F(5,2531)=50.981$, $p<0.001$, $\eta^2p=0.091$, demonstrating significant differences between both groups. Results revealed that the use frequency of VKontakte, Twitter, and TikTok was significantly higher in the younger group than in the older group. In contrast, the older group used Facebook significantly more frequently. All effects were small (see Table 1). There was no significant difference considering the frequency of Instagram use.

The second MANOVA revealed also significant group differences, the Hotelling's trace was significant, $T=0.067$, $F(7,2529)=24.223$, $p<0.001$, $\eta^2p=0.063$. The daily

Table 2. Use frequency of specific social platforms in % (age group "18 to 29"; age group "> 29").

	Vkontakte	Instagram	Facebook	Twitter	TikTok
Age group "18 to 29 years" (n = 1123)					
"0" = never	10.6	0.7	53.2	81.0	69.5
"1" = less than one time a month	10.1	0.1	20.0	8.6	6.4
"2" = 1–2 times a month	8.9	0.4	8.7	2.1	4.7
"3" = one time a week	6.1	0	2.9	1.1	2.9
"4" = 2–3 times a week	12.2	0.6	5.1	2.2	5.4
"5" = one time a day	20.3	3.6	5.2	1.2	4.9
"6" = more than one time a day	31.8	94.7	4.9	3.7	6.1
Age group "> 29 years" (n = 1414)					
"0" = never	21.8	0.1	41.5	91.5	79.5
"1" = less than one time a month	14.9	0.1	18.6	3.5	6.6
"2" = 1–2 times a month	10.7	0	7.6	1.1	3.5
"3" = one time a week	7.4	0.4	4.2	0.5	1.9
"4" = 2–3 times a week	13.9	0.8	7.8	1.2	3.3
"5" = one time a day	15.8	5.2	9.4	1.1	2.5
"6" = more than one time a day	15.6	93.4	10.9	1.1	2.7

Due to rounding, the sum of the frequencies is not always 100%.

SMU time was significantly longer in the younger group than in the older group (> 30 min difference). Furthermore, the level of problematic SMU, daily stress, depression, and anxiety symptoms, as well as of suicide-related outcomes was significantly higher in the younger group than in the older group (see Table 1). Lifetime suicide ideation/behavior (SBQ-R > 1) was reported by 71.1% of the younger group and by 52.9% of the older group. Lifetime suicide attempts were reported by 6.7% of the younger group and by 4% of the older group. In contrast, the level of PMH was significantly higher in the older group (see Table 1).

Table 3 presents the results of the correlation analyses. Daily time spent on SMU was significantly positively correlated with problematic SMU, daily stress, depression, and anxiety symptoms in both groups (all: $p < 0.001$). However, it was significantly positively correlated with suicide-related outcomes only in the younger group ($p < 0.001$). In both groups, problematic SMU was significantly positively correlated with daily stress, depression, anxiety symptoms, and suicide-related outcomes ($p < 0.001$). Daily stress, depression, anxiety symptoms, and suicide-related outcomes were also significantly positively correlated ($p < 0.001$). PMH was significantly negatively correlated with all the other assessed variables ($p < 0.001$; see Table 3).

The results of the regression analyses are shown in Table 4. In the younger group, the overall model explained 12.8% of the variance. Daily stress and problematic SMU served as significant positive predictors of suicide-related outcomes. PMH served as a significant negative predictor. In the older group, the overall model explained 7.2% of the variance. Daily stress served as a significant positive

predictor of suicide-related outcomes; PMH predicted it significantly negatively. However, there was no significant effect of problematic SMU (see Table 4). Against this background, we calculated the moderated mediation analysis for the younger group only.

Table 5 summarizes the results of the moderated mediation analysis. The overall model was significant, $F(4, 1118) = 40.474$, $p < 0.001$. The explained variance of the overall model was $R^2 = 0.134$. The direct effect (path c') of daily stress on suicide-related outcomes was significant ($p < 0.001$) after controlling for problematic SMU, PMH, and their interaction. The conditional indirect effect of daily stress on suicide-related outcomes through problematic SMU was significant in participants with low and medium levels of PMH (effect: low PMH > medium PMH). In contrast, it was not significant in participants with high levels of PMH. Figure 2 shows the moderation effect of PMH. As indicated by the index of moderated mediation, the test of moderated mediation revealed a significant moderated mediation effect (see Table 5). The found statistical effects were small.

Discussion

As in other countries around the globe,⁶⁶ many people in Russia engage daily in SMU.^{67,68} Especially young women tend to intensive online activity when they are searching for social interaction and distraction, but also for popularity and self-realization.^{43,44} The present findings provide evidence that this specific group could be vulnerable for problematic SMU, low mental health, and increased suicide-related outcomes. Furthermore, they contribute to our

Table 3. Correlations between daily time spent on social media use, problematic social media use, daily stress, depression, anxiety, positive mental health, and suicide-related outcomes (age group “18 to 29 years”; age group “> 29 years”).

	(2)	(3)	(4)	(5)	(6)	(7)
Age group “18 to 29 years” (n = 1123)						
(1) Daily SMU time	0.26**	0.15**	0.21**	0.15**	-0.19**	0.15**
(2) Problematic SMU		0.32**	0.41**	0.36**	-0.34**	0.20**
(3) Daily stress			0.50**	0.47**	-0.50**	0.31**
(4) Depression symptoms				0.71**	-0.68**	0.35**
(5) Anxiety symptoms					-0.49**	0.27**
(6) Positive mental health						-0.30**
(7) Suicide-related outcomes						
Age group “> 29 years” (n = 1414)						
(1) Daily SMU time	0.26**	0.11**	0.11**	0.11**	-0.12**	0.04
(2) Problematic SMU		0.36**	0.38**	0.28**	-0.31**	0.11**
(3) Daily stress			0.54**	0.46**	-0.54**	0.24**
(4) Depression symptoms				0.69**	-0.64**	0.23**
(5) Anxiety symptoms					-0.43**	0.17**
(6) Positive mental health						-0.24**
(7) Suicide-related outcomes						

SMU: social media use.

** $p < 0.001$.**Table 4.** Linear regression analyses with suicide-related outcomes as outcome, daily stress, problematic social media use, and positive mental health as predictors (age group “18 to 29 years”; age group “> 29 years”).

	β	95% CI	t	Adjusted R^2	Changes in R^2
Age Group “18 to 29 years” (n = 1123)					
$F(3, 1119) = 55.910, p < 0.001$				0.128	0.130
Daily stress	0.198**	[0.024, 0.047]	6.058		
Problematic social media use	0.070*	[0.002, 0.027]	2.319		
Positive mental health	-0.181**	[-0.045, -0.021]	-5.487		
Age group “> 29 years” (n = 1414)					
$F(3, 1410) = 37.669, p < 0.001$				0.072	0.074
Daily stress	0.151**	[0.014, 0.033]	4.827		
Problematic social media use	0.005	[-0.009, 0.011]	0.164		
Positive mental health	-0.158**	[-0.039, -0.017]	-5.140		

 β : standardized coefficient beta; CI: confidence interval.** $p < 0.001$; * $p < 0.05$.

understanding of potential mechanisms that could underlie the development of suicide-related outcomes and of how they might be reduced.

First, we focused on the use frequency of SM. In this study, Instagram was by far the most frequently used social platform. Instagram is a mainly photo- and video-based form of SM, while the other investigated platforms—except TikTok—rather base on text messages (Twitter) or a combination of both (VKontakte, Facebook).^{69,70} The visual self-presentation is especially important for the self-expression of women.⁷¹ This could at least partly explain the dominance of Instagram use in our study.

To prevent speculations about age differences, we compared women who belong to emerging adulthood and older

individuals. Our results reveal significant group differences considering SMU (see Research Question 1). Overall, members of emerging adulthood spent daily more time on SMU (about 3 h 17 min) than older individuals (about 2 h 45 min). The older group was close to the worldwide average daily SMU time of about 2 h 30 min,⁶⁶ whereas the younger group was remarkably more involved in SMU. Considering the specific platforms, Instagram was used equally intensively by both groups. But younger women used VKontakte, Twitter, and TikTok more frequently, while older women engaged more frequently in Facebook use. Considering Facebook, TikTok, and Twitter, this result pattern corresponds to recent findings from the United States.⁷²

Table 5. Moderated mediation model (outcome: suicide-related outcomes; age group "18 to 29 years").

	β	SE	t	p	95% CI
Path a: Daily stress \rightarrow Problematic SMU	0.274	0.025	11.094	< 0.001	[0.226, 0.323]
Path b: Problematic SMU \rightarrow Suicide-related outcomes	0.013	0.006	2.001	0.046	[0.001, 0.025]
Interaction: Problematic SMU \times PMH \rightarrow Suicide-Related Outcomes	-0.002	0.001	-2.232	0.026	[-0.004, -0.001]
Path c' (direct effect): Daily stress \rightarrow Suicide-related outcomes	0.037	0.006	5.794	< 0.001	[0.024, 0.049]
Conditional indirect effects: Daily stress \rightarrow Suicide-related outcomes					
Daily stress \rightarrow Problematic SMU \rightarrow Suicide-related outcomes					
PMH					
Low (one SD below mean = -6.814)	0.007	0.003			[0.002, 0.012]
Medium (mean = 0)	0.004	0.002			[0.000, 0.007]
High (one SD above mean = 6.814)	0.000	0.002			[-0.005, 0.005]
Index of moderated mediation	-0.0005	0.0002			[-0.0010, -0.0001]

SMU: social media use; PMH: positive mental health; β : standardized beta; SE: standard error; t: t-test; p: significance; CI: confidence interval. N = 1123; explained variance of the overall model: $R^2 = 0.134$.

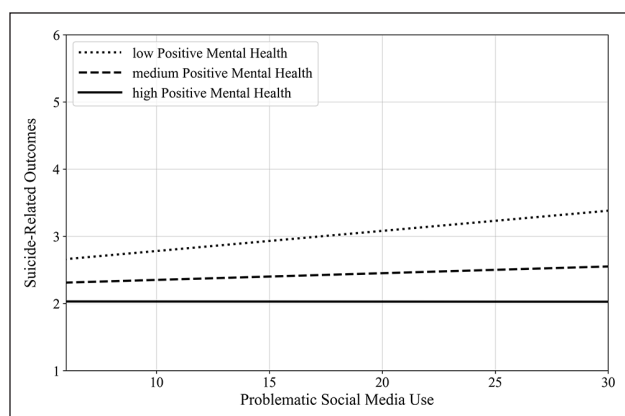


Figure 2. Positive mental health moderates the association between problematic social media use and suicide-related outcomes (age group "18 to 29 years," $n = 1123$).

Previous research from Russia showed that especially younger women worry about their online popularity and often suffer under the pressure to maintain a positive online image. Due to the strong preoccupation with their online popularity, they tend to have intensive self-presentation on SM aiming to increase and to maintain its level.^{43,44} This, however, could foster the risk of younger women in Russia to develop a close emotional bond to SM and a strong need to stay permanently online especially when they receive a lot of positive feedback from other users.⁷³ Both are characteristics of problematic SMU.⁷⁴ In line with these considerations, we found a higher level of problematic SMU in members of emerging adulthood than in older individuals (see Research Question 1). Emerging adulthood is vulnerable to problematic behavior in various life areas.² As shown by our results, this is also applicable to online activity.

Our further findings might also at least partly explain the higher level of problematic SMU in members of emerging adulthood. The experience of daily stress can trigger

intensive SMU to escape negative emotions especially in individuals who lack adequate functional coping strategies.⁷ The experience of relief in the online world could foster the emotional bond to SM and thus the development of problematic tendencies.⁷⁵ Consistent with these considerations, daily stress was positively linked to time spent on SMU and to problematic use tendencies (confirmation of Hypothesis 1a) in both investigated groups. However, the level of daily stress (see Research Question 2), time spent on SMU, and the level of problematic tendencies (see Research Question 1) was higher in emerging adulthood than in older individuals. Thus, based on earlier findings,¹¹ it could be hypothesized that the higher levels of daily stress in the younger women might contribute to higher levels of problematic SMU.

In this study, younger women in Russia had higher levels of depression and anxiety symptoms than older ones. The level of PMH was higher in older women (see Research Question 3). Note that mental health is not only the absence of psychopathology.⁷⁶ To achieve a high level of mental health, its negative dimension (e.g., operationalized by depression and anxiety symptoms) must be at a low level and its positive dimension (e.g., operationalized by PMH) must be at a high level.^{77,78} In our study, female members of emerging adulthood in Russia had a lower level of mental health than older women considering both dimensions. Following earlier findings, low levels of mental health might reduce psychological resilience and increase vulnerability for problematic SMU.²⁰ Notably, as expected, problematic SMU was positively associated with depression (confirmation of Hypothesis 1b) and anxiety symptoms (confirmation of Hypothesis 1c). PMH was negatively linked to the problematic tendencies (confirmation of Hypothesis 1e).

The present results also confirm earlier findings that members of emerging adulthood are at enhanced risk for suicide-related outcomes.³² Our group comparison revealed a higher level of lifetime suicide-related

outcomes in younger women in Russia than in older ones. Compared to older women, a higher number of younger women reported lifetime suicide ideation/behavior and lifetime suicide attempts (see Research Question 4).

Following available literature, enhanced experience of daily stress and problematic SMU could serve as predisposing factors of suicide-related outcomes.^{27,79,80} A recent study from the United States that investigated only emerging adulthood, showed that female members of this group are especially vulnerable to the negative effects of these factors.⁸¹ Our current findings from Russia confirm and extend this knowledge. Suicide-related outcomes were positively linked to problematic SMU (confirmation of Hypothesis 1d) and daily stress (confirmation of Hypothesis 2a) in both age groups. However, the results of the regression analyses revealed group differences. While daily stress served as a statistical predictor of suicide-related outcomes in both groups, problematic SMU predicted suicide-related outcomes only in emerging adulthood. Moreover, problematic SMU mediated the association between daily stress and suicide-related outcomes in that group positively (confirmation of Hypothesis 2b). Thus, the potential negative impact of problematic SMU could be rather specific for younger individuals. Young women in Russia who experience high levels of stress in their everyday life and who engage in problematic SMU to escape the negative experiences could be at enhanced risk for suicide-related outcomes.

Against this background, it is of great importance to identify factors that can reduce the risk in this specific group. Our findings show that PMH could be such a protective factor. It buffered the association between problematic SMU and suicide-related outcomes (confirmation of Hypothesis 2c). The higher the level of PMH, the less close was the link between both variables. Typically, individuals with high PMH feel less overwhelmed by unexpected stressful situations and find functional solutions for daily problems.^{29,82} Also, they are less prone to mental disorders.⁴ Our results allow the hypothesis that young women in Russia with high levels of PMH could also be less prone to potential negative effects of problematic SMU and thus could be at reduced risk for suicide-related outcomes. Notably, PMH was lower in emerging adulthood than in older individuals. Therefore, fostering PMH is urgent in this specific group. Following available literature, the engagement in moderate physical activity (e.g. jogging, cycling, yoga) that contributes to the experience of positive emotions could increase PMH.⁸³

Our present data suggest that a specific focus of governmental programs in Russia should be on the reduction of daily stress of women and on the improvement of their mental health. For example, free low-threshold weekly trainings implemented by psychologists could be offered to the female population. Such trainings could include

psychoeducational modules that provide information on the relationship between SMU, daily stress and mental health, as well as practical modules to train potential functional strategies to cope with stressful experiences—for example, engagement in physical activity. During that time, mothers could be offered free childcare. In addition, public governmental communication should call attention to the potential negative impact of intensive SMU in female members of emerging adulthood on public TV and radio channels. Also, a stronger research focus on problematic SMU and on its potential consequences in Russia is desirable and should be supported by the government.

Clinically, our results reveal that it could be promising to incorporate problematic SMU into the psychosocial risk assessment of persons contemplating suicide and into their psychotherapeutic treatment, especially when they belong to emerging adulthood. Earlier research from Spain emphasized that mindfulness (enhanced attention to and nonjudgmental awareness of the present moment)⁸⁴ is negatively linked to problematic tendencies of SMU.⁸⁵ Against this background, mindfulness-based cognitive therapy (MBCT)⁸⁶ that trains the individual ability to maintain the focus of attention on the present moment and not to escape into the online world in stressful situations could be a promising way to reduce problematic SMU and thus suicide-related outcomes in young women in Russia.

This study provides first evidence on potential negative effects of SMU in female members of emerging adulthood in Russia. In contrast to most earlier studies from other countries that investigated only emerging adulthood (e.g., Brailovskaia and Margraf⁷⁴), we compared large groups of younger and older individuals to prevent speculations. But the present work has some limitations that should be considered. First, due to its specific research focus, the sample included only female participants. Future studies should investigate the generalizability of the current findings for male and diverse gender. Moreover, as our main focus was on the emerging adulthood, we used an “artificial” dichotomy of age groups for our investigation. For further conclusions of potential changes of (problematic) SMU and the other investigated variables, future research could work with the whole age range and control for the variable age in the statistical analyses. Second, our data collection took place during the global outbreak of the coronavirus disease (COVID-19; severe acute respiratory syndrome coronavirus 2, SARS-CoV-2).⁸⁷ To reduce the pandemic spread, many governments—including the Russian one⁸⁸—introduced restrictions such as the need to keep distance from other people and to limit offline meetings (“social distancing”).⁸⁹ As a consequence, time spent on SMU and problematic use tendencies increased.^{90–92} As we have no pre-pandemic data on problematic SMU in Russia, we could not assess whether this is also true for Russian users. However, it is interesting to mention that the present level

of problematic SMU of the emerging adulthood in Russia was higher than the level described by research from Germany,⁷⁴ equally high as the level described by research from Lithuania,⁹³ and lower than the level described by research from China.¹⁰ All mentioned studies assessed problematic SMU with the BSMAS⁵² in gender-mixed samples of emerging adulthood during the COVID-19 outbreak. Against this background, future studies should assess potential (cultural-specific) factors that might explain these differences. Furthermore, they should investigate whether the associations of problematic SMU—specifically those displayed by the moderated mediation model—can also be replicated in (female) emerging adulthood of other countries or whether they are specific for Russian users. Third, due to the cross-sectional study design, we can draw only hypothetical conclusions on causality. Moreover, we cannot exclude other combinations of the assessed variables. For example, it could be that excessive online activity is used as a distraction from suicide-related outcomes. To tackle this limitation at least partly, we calculated a check-test for the moderated mediation model. Specifically, we included suicide-related outcomes as mediator and problematic SMU as outcome in the analysis. Of note, in both groups, this model did not show significant results, which contributes to our hypothetical assumption of the association between the investigated variables. Nevertheless, our findings should be interpreted with caution and replicated by future experimental and longitudinal studies that allow true causal conclusions. For example, to investigate the potential protective effect of PMH, the participants' PMH level might be experimentally enhanced by conscious engagement in regular physical activity over several weeks. Then, the impact of potential changes of PMH on the link between problematic SMU and suicide-related outcomes could be assessed. Fourth, we used an online self-report survey that was the safest way for data collection during the COVID-19 situation that required social distancing. However, self-report measures are prone to social desirability, same-source bias, and distortions of perception.^{94,95} Considering the time spent on SMU, we asked our participants to refer to the SMU time tracked by specific application to tackle this limitation at least partly. But we did not control how many participants used such applications. Thus, the present findings that are associated with SMU time should be interpreted with caution. Future studies should overcome this limitation by asking all participants to install a time-tracking application on their technical devices. Furthermore, they should assess social desirability to control for it in the statistical analyses (e.g., Balanced Inventory of Desirable Responding, BIDR).⁹⁴ Fifth, we measured suicide-related outcomes with only one item. This approach is recommended for screening purposes.⁵⁹ Furthermore, the SBQ-R item has been already used in two recent studies that focused on the link between problematic SMU and

suicide-related outcomes.^{26,27} The inclusion of this item in this study contributed to the comparability of our results and the available findings. Nevertheless, we suggest to replicate our findings using multidimensional measures such as the Suicide Ideation and Behavior Scale (SSEV)⁹⁶ that assess suicide ideation and suicidal behavior separately. Sixth, the replication of the present results is also desirable considering the only small statistical effects revealed by our analyses—especially the moderated mediation analysis. As long as they are not replicated by experimental and longitudinal research, our finding should be interpreted as hypothetical. They provide just the first step to the investigation of mechanisms that could explain suicide-related outcomes in Russian women. Further research in this area is urgently required.

Conclusion

To conclude, this study sheds light on the SMU of women in Russia. The current findings point to the fact that female members of emerging adulthood could tend to a higher level of problematic SMU, have a lower level of mental health and a higher level of suicide-related outcomes than older women. Also, they highlight the potential role of problematic SMU and PMH in understanding and preventing suicide-related outcomes, especially in female members of emerging adulthood in Russia. This knowledge might be of specific importance during the COVID-19 outbreak that fostered the time spent online. It could support governmental authorities in preparing programs for suicide prevention.

Declarations

Ethics approval and consent to participate

The Ethics Committee of the Faculty of Psychology of the Ruhr-Universität Bochum approved this study (approval number: 20110512). All procedures performed in this study were in accordance with the ethical standards of the institutional research committees and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. All participants were properly instructed and provided their written informed consent to participate prior to their inclusion in the study via an online form.

Consent for publication

All participants were properly instructed that data gained in the present will be used for publication in an anonymous form and gave online their informed consent for publication.

Author contribution(s)

Julia Brailovskaia: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Resources; Software; Supervision; Validation; Visualization; Writing—original draft; Writing—review & editing.

Yulia Krasavtseva: Conceptualization; Data curation; Investigation; Methodology; Project administration; Software; Supervision; Validation; Writing—review & editing.

Yakov Kochetkov: Conceptualization; Methodology; Writing—review & editing.

Polina Tour: Data curation; Writing—review & editing.

Jürgen Margraf: Conceptualization; Writing—review & editing.

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Competing interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Availability of data and materials

The dataset and further materials analyzed during this study will be available from the corresponding author on reasonable request.

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Supplemental material

Supplemental material for this article is available online.

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