

Research article

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The Relationship Between Social Media Use and Life Satisfaction and Loneliness in Adolescents

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Abstract: Introduction. Active social media use has both positive and negative effects on psychological well-being. Recently, research in this field has explored the links between psychological well-being and social media use by considering various factors such as personality traits and motives for use. A question of particular relevance is how indicators of social media use, characteristics of psychological well-being and the extent to which social media is incorporated into the daily lives of adolescents are related. The novelty of the current work is the study of the mediating role of loneliness in the relationship between life satisfaction and social network use, which is particularly important for adolescents as active users. The purpose of this study is to examine the relationships between life satisfaction, loneliness and the incorporation of social media into daily activity, as well as the formal parameters of social media use. Methods. The study sample consisted of 391 adolescents between the ages of 13 and 18. Formal indicators of social media use were identified as follows: time spent using social media, the number of social networks used and the number of friends in social networks. The Social Media Integration Scale (M. A. Jenkins-Guarnieri et al.), the Life Satisfaction Scale (E. Diener; adapted by D. A. Leontiev, E. N. Osin) and the Three-Point Loneliness Scale (A. Sirola et al.) were also used. Results. Life satisfaction was found to decrease and the experience of loneliness increase with increased incorporation of social media into the daily activities of adolescents. Formal indicators contributed little to overall life satisfaction and loneliness. Loneliness and life satisfaction were found to mediate reciprocal relationships regarding the incorporation of social networks into daily activities. Discussion. Overall, the avoidance of loneliness through active social media use reinforced life dissatisfaction, especially for girls.

Keywords: social networks, adolescents, psychological well-being, loneliness, life satisfaction, social media, internet, number of friends, regression analysis, mediation

Highlights:

- The use of social media and preference for interaction with others through social networking is more characteristic of adolescent girls.
- The integration of social media into daily activities decreases adolescents' life satisfaction and loneliness – this effect is more pronounced for girls.
- Life satisfaction and loneliness are reciprocal mediators, reinforcing the negative effects of integrating social media into daily activities.

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Introduction

The development and use of social media has led to it becoming an integral part of everyday life for adults and children. Active use of social networks has caused the emergence of new research problems, one of which is the nature of the relationship between psychological well-being and the degree of social media engagement (Jenkins-Guarnieri et al., 2013; Sobkin & Fedotova, 2021; Rostovtseva et al., 2022; Gorlova et al., 2021). To date, there are several concepts describing social media activity, such as intensity of use (Ellison et al., 2007), behavior-oriented or compulsive use, which, based on the criteria of addictive behavior, considers social media activity as normative, but having a tendency to form behavior associated with constant online presence (Elphinston & Noller, 2011), and problematic internet use (Gerasimova & Holmogorova, 2018).

One way of describing the psychological component of social media use that combines behavioural and emotional characteristics is by understanding the integration of social media into daily activity (Jenkins-Guarnieri et al., 2013). Social media is investigated as a broad concept due to the existence of various forms of presenting information (content) on social media i.e., text messages, videos, audio files, pictures, or a combination. In general, the integration of social media is seen as a behavioural characteristic associated with various online actions, and as an emotional component of communication via social networks, where the lack of availability of social media leads to the experience of negative emotions. In contrast to formal parameters of social network use, such as time spent online or number of friends, the notion of integration draws attention to the role that social networks play in daily activities and the importance of maintaining communication and experiencing positive emotions when online.

Psychological well-being and the use of social media

The role of various aspects of social media use and activity related to social media engagement to promote psychological well-being has been extensively investigated in recent

decades. To date, it can be said that there is evidence to the contrary. Positive effects of social media use on psychological well-being have been demonstrated for students with low self-esteem or life satisfaction (Ellison et al., 2007). Negative effects on psychological well-being depend on time spent on social media, number of friends, and propensity to engage in addictive behaviour (Suntsova & Burdyko, 2018). One of the most studied components of psychological well-being is loneliness; a feeling or emotional experience characterized by a sense of abandonment and loss of connections with other people (Sirola et al., 2019). It has been shown that the formal indicators of social media use are negatively correlated to the experience of loneliness (Gorelova & Inozemtsev, 2020). However, research also demonstrates the inverse, where a decrease in loneliness occurs upon increased social network use, both in the form of status updates and an increase in the frequency of contact with online friends (Ryan & Xenos, 2011; Lou et al., 2012).

The involvement of communication skills and personality traits in psychological well-being remains a separate matter of debate. For example, there is evidence that when communication skills are highly developed, there is no negative impact on psychological well-being when using social media; when offline communication skills and introversion are low, online interactions can lead to improved psychological well-being (Bruggeman et al., 2019; Kim et al., 2009). However, using social media as a means to escape loneliness has a negative effect (Teppers et al., 2014). A 'balanced approach', which considers the positive impact of moderate use of digital devices on psychological well-being, is promising (Przybylski & Weinstein, 2017).

Due to ambiguity in the results of empirical research regarding the links between psychological well-being and social media use, an approach (Bochaver et al., 2019) that would consider different factors and non-linear relationships between psychological characteristics and features of the digital environment seems promising. In particular, a study that considered the effect of motivational and communicative factors on the relationship between loneliness and the number of online friends found that social networking and compensatory motives increase the desire for openness and online communication, leading to more friends (Hood et al., 2018).

The current study investigates the links between life satisfaction, loneliness, and the integration of social media in daily activities, as well as the formal parameters of social media use. The basis for this study was the work of Phu & Gow (2019), which made similar assumptions, but the results were obtained on a sample of 18–29-year-olds. This study involved a sample of adolescents. Based on the existing research, it can be assumed that life satisfaction and loneliness will decrease with increased activity in the use of social media. However, the question arises regarding the relationship between life satisfaction and loneliness in the context of active use of social media. The following research questions have therefore been posed:

1. How does the integration of social media into daily activity and the formal indicators of social media use contribute to life satisfaction and loneliness?

2. What formal quantitative indicators of social media use contribute to life satisfaction and loneliness?

3. (a) Is it possible to talk about a mediating influence of loneliness and life satisfaction in the relationship between the integration of social networks in daily activities and indicators of psychological well-being? (b) Does life satisfaction mediate the relationship between integration of social networks in daily activities and loneliness? (c) Does loneliness mediate the relationship between life satisfaction and number of friends, as shown in Phu & Gow (2019)?

4. What role does gender play in the relationship between the indicators of social network integration in daily activity and formal indicators of social media use with measures of psychological well-being? The gender factor appears to be significant when examining the intensity of social networking activity, as many studies have shown that women tend to use social networks more often (Frison & Eggermont, 2016; Kornienko & Rudnova, 2018).

Methods

Participants

The study involved 439 adolescents, but the final sample consisted of 391 adolescents aged 13 to 18 years ($M = 15.6$; $SD = 1.18$; 54 % were girls) living in the Russian Federation. The exclusion of some respondents was due to a subsequent normality test, which revealed a significant asymmetry in the variables "number of hours per week spent on social media" and "number of friends on social media". As a result, the sample was restricted to respondents spending 24 hours or less on social media and having 500 or fewer friends on their social media profile.

Methodology

The formal characteristics of social networking use i.e., time spent on social networks, number of social networks and number of friends on social networks, were established using the following questions: "what social networks do you use?" (multiple choice), "time (in hours) spent in social networks", and "number of friends in the main social network".

The Social Media Use Integration Scale (Jenkins-Guarnieri et al., 2013) was used to assess the degree of behavioural and emotional involvement of an adolescent in a social network: how much social network-related activity is represented in daily practice. The original version of the scale was designed for the social network Facebook (hereinafter: Facebook is the social network of the company Meta, recognized as extremist in 2022; banned in Russia). The name of the social network was replaced with the phrase *sozial'naya set'* (or social network) to make the scale more universal. Prior to the start of the survey, participants were instructed to focus on the social network they use most often or consider to be their primary social network. The scale contains 10 questions, with response options ranging from 1 (strongly disagree) to 5 (strongly agree).

E. Diener's Satisfaction with Life Scale (SWLS) was used to diagnose subjective psychological well-being (Osin & Leontiev, 2020). The scale contains five questions, with response options ranging from 1 (strongly disagree) to 5 (strongly agree).

The Three-Item Loneliness Scale was used to determine the overall experience of loneliness (Sirola et al., 2019). The scale includes three questions with response options 1 (almost never), 2 (sometimes), and 3 (often).

Statistical analysis

Testing for normality of the distribution showed a significant deviation from normality, as a result the data were transformed (based on a logarithmic function). Initially, a comparative analysis was done to establish the differences by gender, followed by a correlation analysis of all the studied indicators. Next, in accordance with the research questions put forward, regression analysis was carried out, followed by mediation analysis. Mediation was based on

the bootstrapping technique of Preacher & Hayes (2004). 10.000 bootstrapped samples were used to obtain a 95 % confidence interval to establish the significance of the indirect effect. Mediation analysis was done using the PROCESS script (Hayes, 2012).

Results

Differences in the use of social media, life satisfaction and loneliness in relation to gender

The following can be seen from descriptive statistics and the comparative criterion. Despite the closeness of values, the boys appear to be significantly older than the girls, but in subsequent analyses the age factor was found to be insignificant. Girls show significantly higher rates of loneliness, integration of social networks in daily activities, as well as having a higher number of friends on social networks at the average effect size.

Table 1

Arithmetic mean, standard deviations (SD) and results of comparative analysis (t-test) of the indicators under study

Indicators	Male N = 179		Female N = 212		t-test	p	Cohen's d
	Mean	SD	Mean	SD			
Age	15.749	1.203	15.434	1.140	2.651	0.008	0.269
Life satisfaction	3.480	0.845	3.395	0.706	0.492	0.623	0.05
Loneliness	1.994	0.886	2.489	1.096	-4.883	0.001	-0.496
Integration of social networks	2.857	0.711	3.071	0.659	-3.156	0.002	-0.32
Number of social networks	4.184	1.688	4.307	1.423	-1.304	0.193	-0.132
Number of online friends	77.525	100.879	97.500	106.246	-2.251	0.025	-0.229
Time spent on social media	4.291	3.830	4.816	3.853	-1.862	0.063	-0.189

The number of friends that participants had was consistent with previous data obtained for adolescents (Soldatova & Teslavskaya, 2018). The average time spent by adolescents on social media did not differ significantly between boys and girls, ranging from 3 hours 50 minutes to 4 hours 20 minutes, with 50 % of respondents being on social media for up to 3 hours and only 6 % for more than 10 hours. The results of the time spent on social networks was consistent with the data obtained on a wider age range (from 14 to 25 years old) (Vorobyeva & Kruzhkova, 2017).

There were no differences in the number of social networks used: 50 % of adolescents were found to use four to five social networks. 41.2 % of respondents used VKontakte as their main social network, 29.7 % used Instagram (Instagram is a social network of the company Meta, recognized as extremist in 2022; banned in Russia), 10 % used YouTube (site that violates Russian legislation).

It can be stated that girls experience loneliness to a greater degree, integrate social networks into daily activity to a greater extent and establish more connections with other people. Overall, adolescents, regardless of gender, experience similar levels of life satisfaction, tending to use two social networks on average, on which they spend about four hours per day.

Correlations of social network use, life satisfaction and loneliness indicators

A correlation analysis (Pearson's correlation coefficient) was then performed to determine the relationships between the indicators.

Table 2

Correlation coefficients of the studied indicators

Indicators	1	2	3	4	5
Life satisfaction					
Loneliness	-0.36**				
Integration of social networks	-0.26**	0.27**			
Number of social networks	-0.11*	0.15**	0.38**		
Number of online friends	0.10*	-0.02	0.19**	0.20**	
Time spent on social media	-0.07	0.08	0.28**	0.15**	0.09

* – $p < 0.05$; ** – $p < 0.01$.

Life satisfaction was found to be negatively correlated to 'loneliness', 'integration of social networks', and 'number of social networks' and positively correlated to 'number of online friends'. The loneliness indicator reveals positive associations with 'integration of social networks' and 'number of social networks' that a person uses. 'Integration of social networks' is positively related to all formal indicators of social networking activity, while the 'number of social networks' is positively related to 'number of friends' and 'time spent on social media'.

The results of the correlation analysis indicate that greater use and integration of social networks is associated with lower life satisfaction, but less experience of loneliness. The 'number of friends in social networks' contributes positively towards 'life satisfaction'. High social media integration is associated with higher quantitative formal indicators of social media activity.

Contribution of social networking indicators to life satisfaction and loneliness

Testing the model for multicollinearity (Farrar–Glauber Test) revealed high correlations between the indicator 'integration of social networks' and 'number of social networks', and a subsequent comparison (t-test) of partial correlations confirmed this effect. As a result, it was decided not to include the indicator 'number of social networks' in the models.

The regression model for 'life satisfaction' ($R^2 = 0.178$; $F = 13.83$, (6.384), $p < 0.001$) showed 'social network integration' and 'loneliness' with a negative sign and 'number of social network friends' with a positive sign as significant predictors.

Table 3

Regression analysis results for the life satisfaction indicator

Predictors	b	beta
(Constant)	1,49**	
Age	-0,01	-0,02
Gender	0,03	0,07
Integration of social networks	-0,20**	-0,20
Loneliness	-0,18**	-0,32

Predictors	b	beta
Time spent on social media	-0,00	-0,01
Number of online friends	0,02**	0,13

* – $p < 0,05$; ** – $p < 0,01$.

Based on the results, it can be stated that indicators such as greater use of social networks and constant social networking activity, as well as the experience of loneliness contribute negatively to life satisfaction, while the number of friends on social networks increases life satisfaction. It can be assumed that those more satisfied with life spend less of their day on social networks, have more online friends and are less likely to be lonely.

The regression model for 'loneliness' ($R^2 = 0.212$; $F = 17.25$, (6.384), $p < 0.001$) finds gender and integration of social networks used by adolescents as significant positive predictors and life satisfaction as negative predictors.

Table 4

Results of regression analysis for the indicator 'loneliness'

Predictors	b	beta
(Constant)	1.20**	
Age	-0.02	-0.06
Gender	0.18**	0.20
Integration of social networks	0.30**	0.17
Life satisfaction	-0.53**	-0.31
Time spent on social media	-0.01	-0.01
Number of online friends	-0.01	-0.04

* – $p < 0.05$; ** – $p < 0.01$.

Higher levels of loneliness were found among young people who use social media extensively and experience dissatisfaction with their lives, with girls who use social media extensively being more likely to experience loneliness than boys.

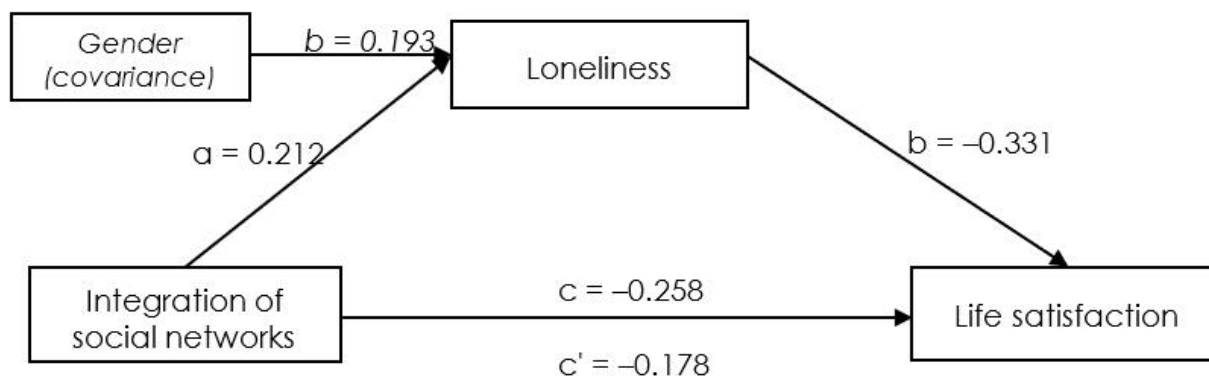
Life satisfaction and loneliness as mediators of the relationship between social networking indicators (mediation analysis)

Further analyses were done to test the research questions that: (3a) 'loneliness' could mediate the relationship between the 'integration of social networks' and 'life satisfaction'; (3b) 'life satisfaction' could mediate the relationship between the 'integration of social networks' and 'loneliness'; and (3c) 'loneliness' could mediate the relationship between 'life satisfaction' and 'number of online friends'. Respondents' gender and age were included in the analysis as covariates.

A. The results of the mediation analysis for the 'life satisfaction' indicator showed the following. In the first step, results on the significance of the contribution of the 'integration of social networks' ($\beta = -0.258$, $SE = 0.049$, $p < 0.001$) to the 'life satisfaction' indicator were obtained. In the second step, the contribution of the 'integration of social networks' ($\beta = 0.212$, $SE = 0.084$, $p < 0.001$) and the role of gender ($\beta = 0.193$, $SE = 0.044$, $p < 0.001$) for the 'loneliness' indicator was determined. The third step determined the contribution of 'loneliness' ($\beta = -0.331$, $SE = 0.028$, $p < 0.001$) to the 'life satisfaction' indicator, while accounting for the contribution of the 'integration of social networks' indicator ($\beta = -0.178$, $SE = 0.049$, $p < 0.001$). The explainability of the model accounting for the contribution of the 'integration of social networks' and 'loneliness' was 16.2 % ($F = 18.66$ (4,386), $p < 0.001$). The indirect effect of 'loneliness' on 'life satisfaction' was small but significant ($b = -0.08$, $SE = 0.02$, $CI = -0.123, -0.042$).

Figure 1

Loneliness mediation model of the relationship between social network integration and life satisfaction (standardised regression coefficients)

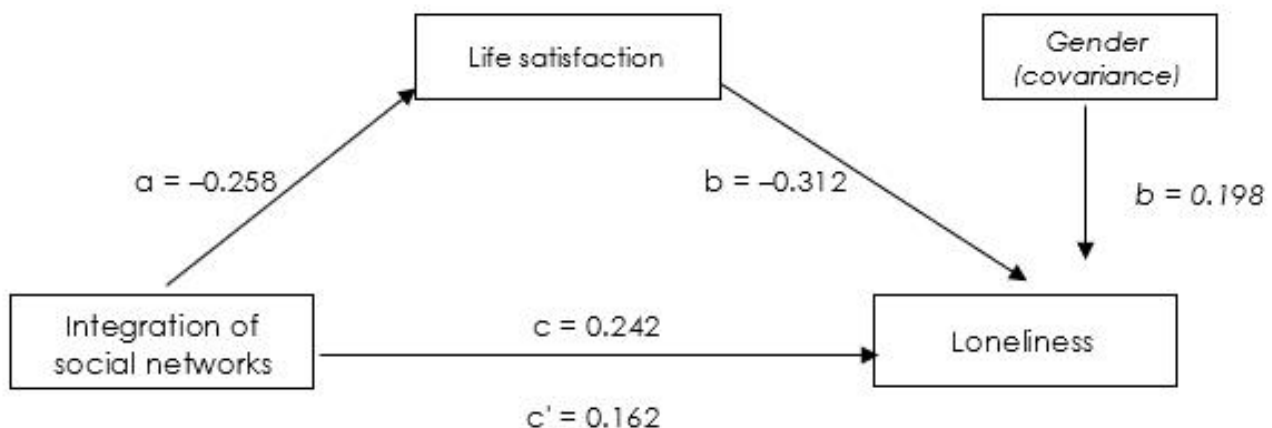


Thus, it is possible to say that loneliness contributes further to the relationship between social network integration and life satisfaction, reducing the latter.

B. Mediation analysis for the indicator 'loneliness' revealed the following. The contribution of the 'integration of social networks' ($\beta = 0.242$, $SE = 0.084$, $p < 0.001$) to the 'loneliness' indicator is significant when considering gender ($\beta = 0.193$, $SE = 0.044$, $p < 0.001$). As already indicated, the contribution of the 'integration of social networks' ($\beta = -0.258$, $SE = 0.049$, $p < 0.001$) to 'life satisfaction' is significant. In the third step, the contribution of 'life satisfaction' ($\beta = -0.312$, $SE = 0.081$, $p < 0.001$) to 'loneliness' is considered alongside the contribution of the 'integration of social networks' indicator ($\beta = 0.162$, $SE = 0.082$, $p < 0.001$) and gender ($\beta = 0.198$, $SE = 0.042$, $p < 0.001$). Model explainability was 21 % ($F = 25.71$ (4,386), $p < 0.001$). The indirect effect of 'life satisfaction' on 'loneliness' was small but significant ($b = 0.08$, $SE = 0.02$, $CI = 0.123, 0.042$).

Figure 2

Life satisfaction mediation model of the links between social network integration and loneliness (standardised regression coefficients)



As in the previous analysis (item A), it is possible to discuss the role of life satisfaction in the relationship between social network integration and loneliness.

Considering the results of the two analyses, it seems reasonable to say that integration of social networks plays an opposing role for life satisfaction and loneliness, with increasing use of social networks reducing life satisfaction but increasing loneliness, which in turn further reduces life satisfaction.

C. Results of the analysis of the mediating role of 'loneliness' in the relationship of 'life satisfaction' and 'number of friends' showed the following. The contribution of 'number of friends' to 'life satisfaction' is significant ($\beta = 0.107$, $SE = 0.009$, $p < 0.05$), but not significant for 'loneliness'. In turn, the contribution of 'loneliness' to 'life satisfaction' when controlling

for 'number of friends' is significant ($\beta = -0.371$, $SE = 0.028$, $p < 0.001$), but in this case the regression coefficient for 'number of friends' was not significant. The direct effect of the 'number of friends' and the indirect effect of 'loneliness' on 'life satisfaction' were not significant, suggesting that the number of friends in social networks does not contribute to life satisfaction.

Discussion

Considering the results in the context of gender differences, no differences were found in the time spent by girls and boys on social media. The difference found between genders in terms of the 'integration of social networks' in daily activities was consistent with the evidence of more intensive and compulsive use of social media by women (Kornienko & Rudnova, 2018), including as a way of procrastination (Przepiorka et al., 2016). Distinguishing the results of the current study from those of Phu & Gow (2019) is the presence of a difference in the higher expression of loneliness among girls. Regarding the higher numbers of online friends for girls, this fact is consistent with existing research (Dunbar, 2016).

'Life satisfaction' and 'number of online friends' show a positive relationship; similar findings were found by Lönnqvist & Deters (2016), but the 'loneliness' indicator found no relationship with the 'number of online friends'. This was also shown when investigating different aspects of loneliness and the number of online friends (Hood et al., 2018). The found positive association of loneliness with social network integration is consistent with the correlation found by Phu & Gow (2019) between loneliness and persistence in using Facebook, which characterises the desire to gain access to social media. The correlations of the 'integration of social networks' with formal indicators of social network activity (time, number of friends, and total number of social networks) are also consistent with findings regarding the relationship of similar measures with intensity of Facebook use (Phu & Gow, 2019).

Upon comparison of our results with those of Phu & Gow (2019), a larger set of predictors was found for life satisfaction, including both substantive and formal indicators of social networking activity, rather than just the experience of loneliness. Spending time on social networks was not a significant predictor of life satisfaction, which may be due to the fact that social networking activity involves playing games or surfing other users' pages rather than interacting with them (Tosun, 2012).

For loneliness, the predictor model was also similar to Phu & Gow (2019) in that social networking activity and life satisfaction are significant predictors, but with gender taken into account. Supporting evidence that social media use increases with increased loneliness was also found in another study by Lai et al. in 2012. Given that the integration of social media into daily activities summarises behavioural, emotional and social characteristics, the existence of a link between loneliness and increased integration is further evidence that emotional connection or behavioural activity in relation to social media may occur when the experience of loneliness is high.

The results show that the 'integration of social networks' has a negative effect on 'life satisfaction' and 'loneliness', with 'life satisfaction' and 'loneliness' mediating the relationship between 'integration of social networks' and each other. Greater social network integration reduces life satisfaction but increases the experience of loneliness, while mediating properties reduce this effect. The negative contribution of 'life satisfaction' to 'loneliness' appears to be greater than the reverse effect. Furthermore, gender emerges as a significant factor for loneliness, regardless of whether loneliness is treated as a predictor or as a dependent variable.

Overall, it can be assumed that greater use of social media has a positive effect on the experience of loneliness, but also reduces feelings of life satisfaction. However, life satisfaction appears to be the factor that significantly reduces loneliness, but not vice versa. The negative effect of experiencing loneliness is amplified in girls.

Thus, an adolescent exposed to social networks becomes both more lonely and less satisfied with life, with greater dissatisfaction leading to loneliness. It is also possible to speculate that an adolescent experiencing loneliness begins to use social media to a greater extent, but this leads to both greater dissatisfaction with life and an increased experience of loneliness.

This study did not find evidence that the contribution of the number of social media friends to life satisfaction is mediated by the experience of loneliness. However, there was evidence that more friends, along with low social networking activity and low experience of loneliness, increased adolescents' life satisfaction. This finding is consistent with the findings of Kim & Lee (2011) and with Chou & Edge (2012) that more social networking friends, when contact frequency outside the social network is high, gives the impression that one's life is happier and easier. At the same time, researchers emphasize the importance of considering personality traits as factors that simultaneously influence the number of social networking friends and subjective well-being: extroversion is seen as such a trait, which reduces or negates the effect of the number of friends on well-being (Lönnqvist & große Deters, 2016).

Conclusions

Summarizing the findings of the study, the following can be stated.

Adolescents, regardless of gender, spend approximately the same amount of time on social networks, but activity on social media (viewing news feeds, commenting on posts) and a preference for social interactions through social networks (as manifested by a greater number of friends) is more characteristic of girls. Gender, meanwhile, is a factor that increases the experience of loneliness and thus indirectly decreases life satisfaction.

Factors that decrease life satisfaction were found to be increased integration of social networks into daily activity, increased experience of loneliness and the number of friends in the social network. The experience of loneliness was found to increase with increased integration of social networks in adolescents' daily activities, as did low life satisfaction. Formal characteristics, with the exception of the role of the number of social network friends for life

satisfaction, do not contribute to life satisfaction and the experience of loneliness.

Experiencing loneliness was found to mediate the link between integrating social networks into daily activities and life satisfaction, leading to a decrease in the latter. Life satisfaction played a similar role in the relationship between the integration of social networks in daily activity and loneliness. However, formal indicators of social networking activity (number of friends, time spent online) appeared to be the least significant for both life satisfaction and the experience of loneliness. This suggests that increased use of social media, both for content browsing and social interaction, increases the feeling of loneliness and, in general, leads to lower life satisfaction. In seeking more social contact, the adolescent turns to social networking, but because social networking is not only a means of communication but also contains a mass of information that can provoke different reactions and, for instance, lead to the perception of missing out, overall life satisfaction will decrease.

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A. V. Chursina analyzed the scientific literature, prepared the literature review, prepared and finalized the research part of the text, conceptualized the conclusions.

A. M. Kalimullin conducted the research, developed the methodological component of the research.

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Conflict of Interest Information

The authors have no conflicts of interest to declare.