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Martinac Dorčić, Tamara; Smojver-Ažić, Sanja; Bradić, Sanja

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Social Media Use: Association with Digital Stress and Anxiety and Depression Symptoms in Youth

Tamara Martinac Dorčić, Sanja Smojver-Ažić, and Sanja Bradić

University of Rijeka, Faculty of Humanities and Social Sciences, Rijeka, Croatia

Abstract

The aim of the present study was to examine the relationship between social media use and digital stress (availability stress, approval anxiety, fear of missing out, connection overload and online vigilance), and whether social media use and digital stress predict anxiety and depression symptoms. In addition, we aimed to examine the moderating role of digital stress in the relationship between social media use and anxiety and depression symptoms. The study was conducted with 267 university students (M = 21.06, SD = 2.01; 81.3% female). To achieve the objectives of the study, a new measure of social media use was developed, and the Multidimensional Digital Stress Scale was applied. The results showed that the association between social media use and anxiety and depression symptoms is weak. Higher digital stress is associated with more anxiety and depression symptoms. Availability stress, approval anxiety, and connection overload were significant positive predictors of anxiety, and connection overload was significant positive predictor of depression. Availability stress and connection overload were significant moderators of association between Instagram use and anxiety symptoms while availability stress was significant moderator of association between Instagram use and depression symptoms. Results showed that among individuals with higher availability stress, less time on Instagram was associated with more severe psychological symptoms of depression and anxiety. Similarly, among individuals with lower connection overload, more time on Instagram was associated with lower levels of anxiety symptoms.

Keywords: social media, digital stress, anxiety, depression

Tamara Martinac Dorčić https://orcid.org/0000-0002-3844-8500
Sanja Smojver Ažić https://orcid.org/0000-0002-4389-6463
Sanja Bradić https://orcid.org/0009-0008-4916-6112

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✉ Tamara Martinac Dorčić, University of Rijeka, Faculty of Humanities and Social Sciences, Sveučilišna avenija 4, 51000 Rijeka, Croatia. E-mail: *tamaramd@ffri.uniri.hr*

Introduction

Social media has become an integral part of young people's lives, offering numerous opportunities for communication and interaction with peers, information sharing, self-expression, and social comparison. Social media refers to various Internet-based applications that enable the creation and sharing of user-generated content (Van Dijk, 2012).

In 2022, global Internet usage was higher among people aged 15 to 24 in all regions, with young people in Europe having the highest usage rate at 98 percent (Statista, 2023). Adolescents tend to have accounts on a variety of social media platforms. WhatsApp, Instagram, Facebook and WeChat are some of the favorite social media platforms among internet users aged 16 to 64 (DataReportal, 2022). Social media applications all have their own strengths and weaknesses in terms of the different experiences offered to the user. While Facebook and Instagram allow users to communicate, create and share images with textual content, and allow other users to interact with them and staying up to date (Alhabash & Ma, 2017; Faelens et al. 2021), YouTube is not primarily used for social interaction and its content is accessible to a broader, mainly unfamiliar audience (Franchina et al., 2018). TikTok, Instagram and Snapchat are considered as highly visual social media platforms focused on sharing user-generated images and short videos (Marengo et al., 2018).

Because access to a smartphone allows young people to be online almost constantly (Hall et al., 2021), much attention has been paid to the potential effects of social media on youth mental health. Research on the relationship between digital media use and psychological outcomes does not provide unequivocal answers, although it does suggest that social media use may be associated with decreased psychological functioning in adolescents and young adults. Several meta-analyses (e.g., Appel et al., 2020; Ivie et al., 2020) of hundreds of studies suggest that social media use has small negative effect on mental health. At the same time, certain studies suggest some positive outcomes of social media use such as the acquisition of online social capital (e.g., Ellison et al., 2014; Wolfers & Utz, 2022) or the satisfaction of intrinsic needs (Reinecke et al., 2014). The results of correlational and, rarely, experimental research suggest that effect sizes are not large and imply the importance of analyzing possible mediator or moderator effects (e.g., Nesi & Prinstein, 2015; Steele et al., 2020).

The effects of social media use on well-being may depend on many possible factors related to social media use per se (e.g., frequency, quality, type of social media, specific reasons for social media use, active or passive nature of social media use), but also on some user characteristics (e.g., population cohort, geographic region, gender, general psychological functioning, personality traits, temperament, loneliness) (e.g., Nesi & Prinstein, 2015; Steele et al, 2020; Twenge et al., 2018).

Regarding frequency of social media use, analysis of social network effects has shown that subjective experience of positive or negative social network interactions

is a better predictor of outcomes than frequency of social media use (Davila et al., 2012). Although different researchers often use the same term "social media" for different platforms (e.g., Instagram, Facebook or Twitter), platforms can share many characteristics but differ in their structure and norms of use (Kross et al., 2021) or motivation for use (Kircaburun et al., 2020), which can have implications for findings on the relationship between social media use and well-being. For example, as Instagram is a more visually driven social media platform in comparison with Facebook, those who used Instagram engaged in more appearance comparisons and showed increased negative affect, decreased body satisfaction and positive affect (e.g., Engeln et al., 2020).

One of the factors determining the relationship between network use and psychological well-being may be the nature of social network use. For example, just viewing content, which implies a passive use, is associated with psychological symptoms, while active use, such as posting or sending private messages, has no effect on personal well-being (Verduyn et al., 2017). As noted earlier, some intra-individual characteristics may alter the impact of social media use on psychological well-being (Nesi & Prinstein, 2015; Twenge et al. 2018). Loneliness may be one of these characteristics and one that is particularly important in adolescence and emerging adulthood when it reaches a peak (e.g., Barreto et al., 2020; Twenge et al., 2021). During this developmental period, forming and managing close relationships are important goals (Barry et al., 2009). Consequently, adolescents and emerging adults who fail in these goals may experience loneliness (Buecker et al., 2020; Teppers et al., 2014). The role of loneliness has also been recognized in the context of social media use, with the relationship between social media and loneliness explained by several theoretical frameworks: the social displacement model, the rich-get-richer model, and the social compensation model (Smith et al., 2021). Song et al. (2014), for example, found that loneliness predicted greater Facebook use and that this model fits the data better than the reverse model, in which social media use predicted feelings of loneliness.

Recently, digital stress has been proposed as a potential variable explaining different associations between social media use and psychological well-being (Steele et al., 2020). Research on this phenomenon is still young and different definitions, theoretical models, and operationalizations of this construct can be discussed.

Hefner and Vorderer (2016) emphasize that digital stress is stress that results from frequent information and communication technology (ICT) use and constant access to a large amount and diversity of content. The conceptualization of digital stress proposed by Steele et al. (2020), based on Lazarus and Folkman model (1984), refers to individual's subjective reaction to stressor emanating from digital media use (e.g., exposure to a large amount and frequency of information on social media). Furthermore, Reinecke et al. (2017) point out that digital stress depends on factors that challenge personal coping resources: communication load (i.e., the number of messages sent and received) and multitasking (i.e., the simultaneous use of ICT and

other activities). Steele et al. (2020) distinguish between digital stress as a subjective response to individual stimuli (e.g., notifications) and objectively measured social media use (e.g., time spent using mobile device).

Hall et al.'s (2021) empirical model considers digital stress as a higher-order construct consisting of at least five distinct but interrelated subconstructs, including connection overload, approval anxiety, availability stress, fear of missing out (FoMO), and online vigilance. Connection overload refers to the discomfort resulting from the subjective experience of an excessive input of information from digital sources, including notifications, text messages, posts, etc. (Steele et al., 2020). On a sample of students, Reinecke et al. (2017) analyzed the effects of objective measures of communication load and the subjective experience of receiving excessive input and confirmed the role of subjective feelings of load on symptoms of depression and anxiety. Approval anxiety refers to insecurity and anxiety about others' responses and reactions to one's posts (Steele et al., 2020). Availability stress can be described as discomfort, including feelings of guilt and anxiety, which may result from the belief that others expect a person to be available through digital media. For young people, a particular source of stress is the feeling of social pressure to be constantly available (Fox & Moreland, 2015; Reinecke et al., 2017). Fear of missing out, FoMO (Reinecke et al., 2017), refers to the feeling of discomfort that results from real, perceived, or anticipated consequences of not participating in rewarding experiences in which others participate and the individual being absent from that experience. Online vigilance was a dimension that was not originally hypothesized but emerged as a distinct factor from FoMO (Hall et al., 2021). It refers to obsessive checking of social media and the intense need to have access to one`s mobile device.

Empirical studies on different samples suggest that the components of digital stress are differentially related to psychosocial functioning. The way in which a particular aspect of stress may be associated with an outcome depends on the reasons for using the networks. For example, the fear of approval may be more pronounced when creating a profile or sharing new material (Steers et al., 2014). Hall et al. (2021) found strongest associations between FoMO and negative outcomes and generally weaker associations between availability stress and online vigilance and negative outcomes. Generally, the research provides a complex picture of digital stress, which can be either a mediator or a moderator or take on both roles in explaining the nature of the relationship between digital media and potential outcomes (Steele et al., 2020). As a mediator, digital stress can be a consequence of digital media use and subsequently lead to changes in psychosocial functioning. On the other hand, as a moderator, digital stress as an individual characteristic (when high or low) could change the extent or direction of the relationship between digital media use and psychosocial functioning (Steele et al., 2020). This is in accordance with differential susceptibility to media effect model (Valkenburg & Peter, 2013) that has pointed out various possible moderators that explain the different susceptibility to media effects.

Goals and Hypotheses

Given the ambiguous findings on the association between social media use and negative mental health outcomes and the various proposed possible mediating and moderating variables in this relationship, in this paper we focused on the association between the use of different social media platforms, digital stress and anxiety and depression symptoms in Croatian youth. Moreover, along with controlling the effects of loneliness, we put an emphasis on the less explored moderating role of digital stress. To achieve the goals of the study, we tried to develop a new measure of social media use that would take into account both the different social media platforms or applications and the different activities one might engage in on social media. In addition, a new measure based on multidimensional conceptual model of digital stress (Multidimensional Digital Stress Scale, Hall et al., 2021) which comprises five components (Availability Stress, Approval Anxiety, Fear of Missing Out, Connection Overload and Online Vigilance) was used. The present study starts from the following hypothesis:

H1: More time spent on social media will be related to more digital stress.

In line with the conclusions of some previous research that it is important to distinguish the mode of media use and the variety of platforms and applications used when conceptualizing digital stress (e.g., Hall, 2020; Reinecke et al., 2017), we examined the relationship between time spent on different social media platforms and digital stress. Consistent with *social-media-use-causes-stress hypothesis* and related findings (Nick et al., 2022; Reinecke et al., 2017; Wolfers & Utz, 2022), we expected to find that more time spent on social media will be related with more digital stress.

H2: Time spent on social media and digital stress will be positively associated with anxiety and depression symptoms, after controlling for loneliness, age, and gender differences.

Consistent with available evidence (e.g., Appel et al., 2020; Ivie et al., 2020; Schemer et al., 2021), we expected that time spent on social media will be positively but weakly associated with anxiety and depression symptoms. In addition, based on previous reports of the relationship between digital stress and well-being (e.g., Hall et al., 2021), we expected components of digital stress to be related to anxiety and depression symptoms. Because gender differences in anxiety and depression symptoms, as well as some age differences have been documented (Copeland et al., 2014; Racine et al., 2021), we controlled for gender and age. As a significant portion of adolescents and young adults regularly report feelings of loneliness (Smith et al., 2021; Twenge et al., 2021) and loneliness can modify the effects of social media use on psychological well-being (e.g., Song et al., 2014), we also controlled for loneliness.

H3: Digital stress will moderate the relationship between social media use and anxiety and depression symptoms.

We hypothesized that social media use would have a more negative effect on anxiety and depression symptoms when digital stress is high than when digital stress is low (Steele et al., 2020).

Method

Participants and Procedure

The study was conducted with 267 Croatian university students aged 18 to 28 (M = 21.06, SD = 2.01) studying at the University of Rijeka (81.3% female). Most students, 68.6% of them attend undergraduate studies and 31.4% of them graduate studies. More than a third of students, 38.1% live with their parents, 11.9% live alone, 42.4% live in a shared flat and 7.6% live with a partner. Students gave their informed consent to participate in the study after they were notified that participation is voluntary and anonymous. It took about 10 minutes to complete the online questionnaire which was created in Google Forms.

Measures

The Demographic Data Questionnaire

The Demographic Data Questionnaire included information on age, gender (male, female, other), year (1^{st}- 6^{th}) and level of study (undergraduate, graduate, or integrated study), and living arrangement (with parents, alone, with roommate, with romantic partner).

Depression, Anxiety, and Stress Scale

The Depression, Anxiety, and Stress Scale (DASS-21; Henry & Crawford, 2005) was used to examine emotional symptoms in three categories: depression, anxiety, and stress. It consists of 21 items (seven for each category). Respondents indicate how much each statement applied to them in the past week on a 4-point scale ranging from 0 (*not at all true of me*) to 3 (*almost completely or mostly true of me*). Only the anxiety ("I felt scared without any good reason") and depression subscales ("I felt that I had nothing to look forward to") were used. Higher total score indicates a higher level of anxiety and depression symptoms. The scales showed good internal reliability (anxiety α = .84, depression α = .87).

Digital Stress

The Multidimensional Digital Stress Scale (Hall et. al., 2021) consists of 24 items measuring five dimensions: Availability Stress (4 items, e.g., "My friends

expect me to be constantly available online"), Approval Anxiety (6 items, e.g., "I feel anxious about how others will respond when I share a new photo on social media"), Fear of Missing Out (4 items, e.g., "I get worried when I found out my friends are having fun without me"), Connection Overload (6 items, e.g., "I feel overwhelmed with the flow of messages/notifications on my phone"), and Online Vigilance (4 items, e.g., "I feel lost or *naked* without my phone"). Items describe how people feel about their use of social networks. Answers vary on a 5-point scale from 1 (*never*) to 5 (*always*). The scale was translated to Croatian and factor analysis using Principal Components with Oblimin rotation was performed (KMO = 0.89, $df = 276$, $p < .01$). The analysis revealed, in accordance with the original structure, that there are five components with eigenvalues of 8.40 for approval anxiety as the first factor, 3.41 for connection overload as the second factor, 1.65 for online vigilance as the third factor, 1.42 for availability stress as the fourth factor, and 1.12 for fear of missing out as the fifth factor. These factors together explained 66.7% of the variance. The correlations between the factors range from .14 to .64. The factor loadings for each of the component of the Digital Stress Scale in the Croatian sample ranged from .50 to .89. Higher score on each dimension indicates a higher level of digital stress. The alpha coefficients of the scales were satisfactory (Approval Anxiety .93, Connection Overload .83, Online Vigilance .80, Availability Stress .75, Fear of Missing Out .86).

Social Media Use Questionnaire

For this study, a social media use questionnaire was developed. The items related to the types of activities on the networks were formulated based on a review of the available literature (e.g., Steele et al., 2020) and the selection of the most frequently used platforms based on discussions with our students during course on Developmental psychology. In addition, to ensure that we did not omit any platform that was important to the participants, the participants could indicate a different platform for each individual activity. The initial version consists of 23 items measuring time spent per day on browsing, content creation, response to content, and communication on different social media. The time spent on activities such as browsing, content creation and response to content are measured for applications: TikTok, Instagram, Facebook, Youtube, and BeReal. Time spent on communication is measured for all above-mentioned social media except YouTube but for three additional: WhatsApp, Snapchat, and Viber. Participants' answers could vary from 1 (*not at all*), 2 (*up to 1*), 3 (*1 to 2*), 4 (*2 to 3*), 5 (*3 to 4*) and 6 (*more than 4 hours a day*).

Factor analysis by Principal Components was conducted (KMO = 0.73, $df = 253$, $p < .01$) with Oblimin rotation. The analysis revealed that there were seven factors with eigenvalues greater than one, which together explained approximately 61.20% of the variance. Since the last two factors did not have sufficient explanatory power, it was decided to use the first five. The first factor relates to the use of BeReal (4 items: browsing, content creation, response to content, communication) with

loadings from .65 to .96. The second factor relates to Facebook use (3 items: browsing, response to content, communication) with loadings from .77 to .83. The third factor represents the use of TikTok application (3 items: browsing, response to content, communication) with loadings from .73 to .90. The fourth factor (3 items) represents the use of YouTube (browsing, response to content) and Discord (communication) with loadings from .67 to .79, and the fifth factor represents the use of Instagram (3 items: browsing, response to content, communication) with loadings from .75 to .89. WhatsApp, Snapchat and Viber as well as remaining content creation items did not load on specific factor, so they are not considered in further analysis. The final version consists of 16 items. Higher score on each subscale indicates a higher time spent on each social media. The alpha coefficients were satisfactory (BeReal .89, Facebook .76, TikTok .77, YouTube/Discord .62, Instagram .83).

Loneliness Scale

In this study, loneliness was measured with *Three-Item Loneliness Scale* (Hughes et al. 2004) as indirect measure of loneliness. Although the original version of the scale consists of three items (e.g., "How often do You feel left out?"), in this study one item was added that directly measures loneliness ("How often do You feel lonely?"). Each question is rated on a five-point scale from 1 (*hardly ever*) to 5 (*very often/almost always*). Factor analysis by Principal Component and Oblimin rotation confirmed one factor solution (KMO = .79, $df = 6$, $p < .01$) which is a reason for creating one composite. Higher score indicates a higher level of reported loneliness. The reliability of the loneliness scale in this study is .88, which is satisfactory.

Results

The descriptives for all variables used in the study and their correlation are shown in Table 1.

Social Media Use and Digital Stress

As shown in Table 1, students in our sample used Instagram (for browsing, response to content, and communication) the most, and BeReal (for browsing, content creation, response to content, and communication) the least.

To analyze the relationship between the time spent on different social media platforms and digital stress, a correlation analysis was performed (Table 1). No significant association was found between the use of Facebook and YouTube/ Discord and different components of digital stress. Instagram use has a positive low correlation with availability stress, connection overload and online vigilance. TikTok and BeReal use have a positive low correlation with all components of stress except TikTok for connection overload, and BeReal for approval anxiety.

Table 1

Descriptive Statistics and Correlations of the Study Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) Gender[a]	-														
(2) Age	.31**	-													
(3) Loneliness	-.17**	-.22**	-												
(4) BeReal	-.14*	-.27**	.03	-											
(5) Facebook	.08	.22**	-.01	-.12	-										
(6) TikTok	-.24**	-.22**	.14*	.29**	.01	-									
(7) YouTube/Discord	.17**	-.02	.10	.01	.09	-.04	-								
(8) Instagram	-.18**	-.13*	.05	.30**	.15*	.17**	.19**	-							
(9) Availability stress	-.04	-.17**	.14*	.22**	.10	.14*	-.01	.25**	-						
(10) Approval anxiety	-.15*	-.23**	.40**	.10	-.04	.20**	.01	.08	.26**	-					
(11) Fear of missing out	-.11	-.27**	.53**	.16**	.01	.22**	.10	.08	.31**	.67**	-				
(12) Connection overload	-.05	-.17**	.27**	.12*	.01	.05	.00	.22**	.54**	.33**	.37**	-			
(13) Online vigilance	-.10	-.16*	.14*	.20**	.01	.25**	-.04	.19**	.46**	.37**	.38**	.53**	-		
(14) Anxiety	-.17**	-.13*	.43**	.03	-.03	.08	.09	.00	.28**	.34**	.35**	.37**	.24**	-	
(15) Depression	-.07	-.13*	.60**	.09	-.02	.04	.14*	.00	.19**	.33**	.37**	.31**	.14*	.64**	-
M	-	21.06	2.54	0.15	0.60	0.63	0.80	1.36	2.60	2.17	2.37	2.46	3.11	0.78	0.90
SD	-	2.01	1.01	0.34	0.65	0.80	0.77	0.90	0.82	1.10	1.04	0.89	0.95	0.70	0.72
Skewness	-	0.91	0.24	2.31	1.25	1.25	1.91	0.88	0.20	0.75	0.46	0.53	-0.08	0.75	0.77
Kurtosis	-	0.82	-0.81	4.79	1.63	1.17	5.20	1.47	-0.27	-0.48	-0.70	-0.37	-0.59	-0.36	-0.21

[a] 0 = females; 1 = males.
*$p < .05$. **$p < .01$. ***$p < .001$.

Predictors of Anxiety and Depression Symptoms

To determine whether social media use and different components of digital stress predict anxiety and depression symptoms after controlling for age, gender, and loneliness, two hierarchical multiple regression analyses were conducted. Gender and age were entered in Step 1, loneliness in Step 2, different social media use in Step 3 and different components of digital stress in Step 4 (Table 2).

Table 2

Standardized Coefficients of Predictors of Anxiety and Depression Symptoms

	Anxiety	Depression
Step 1		
Age	-.09	-.13
Gender[a]	-.14*	-.03
R^2	.04*	.02
Step 2		
Age	-.01	-.01
Gender[a]	-.09	.04
Loneliness	.41***	.60***
R^2	.20***	.36***
ΔR^2	.16***	.34***
Step 3		
Age	-.01	.00
Gender[a]	-.11	.01
Loneliness	.40***	.60***
BeReal	.00	.09
Facebook	-.01	.00
TikTok	.01	-.03
YouTube/Discord	.06	.09
Instagram	-.04	-.06
R^2	.20***	.38***
ΔR^2	.00	.02
Step 4		
Age	.04	.03
Gender[a]	-.13*	.00
Loneliness	.30***	.54***
BeReal	-.03	.08
Facebook	-.02	.00
TikTok	-.00	-.02
YouTube/Discord	.10	.12*
Instagram	-.12*	-.11*
Availability stress	.14*	.07
Approval anxiety	.16*	.13†
Fear of missing out	-.05	-.08
Connection overload	.20**	.16*
Online vigilance	.02	-.04
R^2	.31***	.42***
ΔR^2	.11***	.04**

[a] 0 = females; 1 = males.
*$p < .05$. **$p < .01$. ***$p < .001$. †$p = .051$.

The results showed that the observed predictor variables explained 31% of the variance in anxiety symptoms and 42% of the variance in depression symptoms. In the final step, gender was a significant predictor of anxiety only and loneliness was a significant predictor of anxiety and depression symptoms. Use of various social media did not significantly contribute to explaining variance in anxiety or depression symptoms in step when entered but use of Instagram and YouTube/Discord gained significance in the final step when components of digital stress were entered. Components of digital stress were significant predictors of anxiety (availability stress, approval anxiety, and connection overload) and depression symptoms (connection overload). Specifically, female students, students who reported to be lonelier, who used Instagram less, who had more pronounced availability stress, approval anxiety, and connection overload, exhibited more anxiety symptoms. On the other hand, students who were lonelier, who used Instagram less and YouTube/Discord more, and who had more pronounced connection overload had more depression symptoms.

Moderating Effect of Digital Stress

Because Instagram and YouTube/Discord use did not significantly contribute to explaining variance in anxiety or depression symptoms until the final step, when components of digital stress were entered, interaction effects of Instagram use and all components of digital stress for anxiety and depression symptoms and YouTube/Discord use and all components of digital stress for depression symptoms were tested. For anxiety, two significant interaction effects were found (between Instagram use and availability stress, and between Instagram use and connection overload), and for depression, a significant interaction effects was found only between Instagram use and availability stress (Table 3).

Higher levels of availability stress are associated with higher levels of anxiety symptoms, and those who use Instagram less have more anxiety symptoms. When stress levels are low, regardless of how much Instagram is used, anxiety levels are low (Figure 1).

For individuals experiencing higher levels of stress due to connection overload, the level of anxiety symptoms does not depend on the Instagram use. However, at low levels of stress, those who use Instagram less have slightly higher levels of anxiety symptoms, while those who use Instagram more have the lowest levels of anxiety symptoms (Figure 2).

With more time spent on Instagram, the level of depression symptoms is similar regardless of the level of availability stress. However, with less Instagram use, the high availability stress contributes to the expression of depression symptoms (Figure 3).

Table 3

Standardized Coefficients of Predictors of Anxiety and Depression – Interaction Effects of Instagram Use and Digital Stress

	Anxiety	Depression
Step 1		
Age	-.09	-.13
Gender[a]	-.14*	-.03
R^2	.04*	.02
Step 2		
Age	-.01	-.01
Gender[a]	-.09	.04
Loneliness	.41***	.60***
R^2	.20***	.36***
ΔR^2	.16***	.34***
Step 3		
Age	-.01	-.01
Gender[a]	-.10	.04
Loneliness	.41***	.60***
Instagram	-.03	-.02
R^2	.20***	.36***
ΔR^2	.00	.00
Step 4[b]	Step 4[c]	
Age	.02/.02	.00
Gender[a]	-.11/-.11	.03
Loneliness	.38***/.34***	.60***
Instagram	-.09/-.09	-.05
Digital stress	.25***/.30***	.13*
R^2	.25***/.27***	.38***
ΔR^2	.05***/.07***	.01*
Step 5[b]	Step 5[c]	
Age	.02/.02	.00
Gender[a]	-.13*/-.11*	.02
Loneliness	.39***/.35***	.60***
Instagram	-.11/-.11*	-.07
Digital stress	.25***/.29***	.13*
Instagram x Digital stress	.12*/.14**	.10*
R^2	.27***/.29***	.39***
ΔR^2	.02*/.02*	.01*

[a] 0 = females; 1 = males. [b] values are presented when Availability stress/Connection overload as components of Digital stress are included. [c] values are presented when Availability stress as component of Digital stress is included.
*$p < .05$. **$p < .01$. ***$p < .001$.

Figure 1

Interaction Effect of Instagram Use and Availability Stress on Anxiety

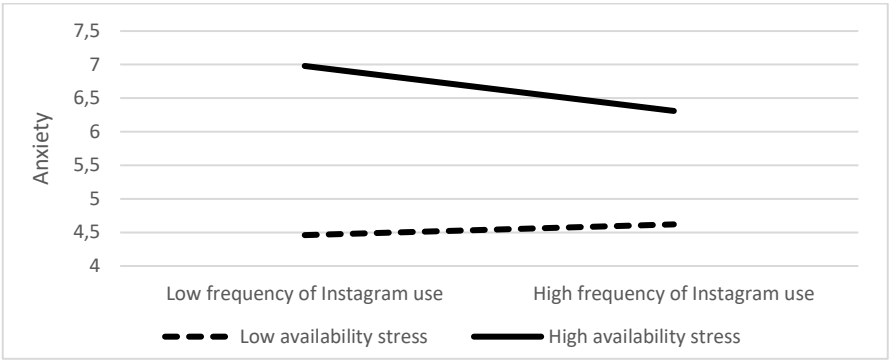


Figure 2

Interaction Effect of Instagram Use and Connection Overload on Anxiety

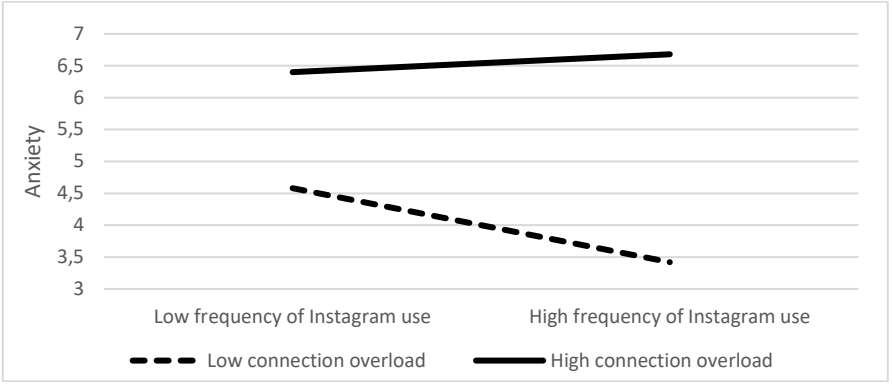
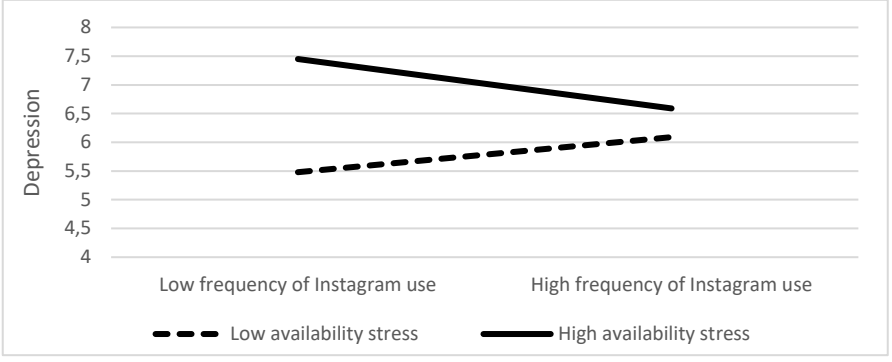


Figure 3

Interaction Effect of Instagram Use and Availability Stress on Depression



Discussion

The aim of the present study was to investigate the relationship between the use of different social media platforms, digital stress, and anxiety and depression symptoms in youth. More specifically, we wanted to investigate the relationship between social media use and digital stress as well as to examine whether social media use and various components of digital stress predicted anxiety and depression symptoms after controlling for age, gender, and loneliness. In addition, we aimed to examine the moderating role of digital stress in the relationship between social media use and anxiety and depression symptoms.

To achieve the objectives of the study, a new measure of social media use was developed that takes into account both the different social media platforms and the different social media activities. The results of the factor analysis showed that the items were grouped according to the type of platform, so the factors included different types of activities on a particular social media: BeReal, Facebook, TikTok, YouTube/Discord, and Instagram.

A translated Multidimensional Digital Stress Scale (Hall et al., 2021) confirmed the original structure with five components: Approval Anxiety, Connection Overload, Online Vigilance, Availability Stress, and Fear of Missing Out. The items loaded identically to the original structure. The expression of the different components of digital stress was moderate (from rarely to sometimes), with online vigilance being the most pronounced stress in students.

We found certain associations between gender and use of various social media platforms and digital stress. Female students used Instagram, TikTok, and BeReal more than male students. The opposite was true for YouTube/Discord. There was no significant association between Facebook use and gender. Previous research has already documented gender differences in technology use. For example, Twenge and Martin (2020) concluded that girls spend more time with smartphones, social media, text messaging, general computer use, and online, while boys spend more time with games and electronic devices in general. The greater use of YouTube/Discord by male students in this study is likely related to the gamified nature of these platforms, where users can simultaneously view content, and connect and share with others. As for the correlation between gender and digital stress, only one significant correlation emerged - approval anxiety was greater among female students. The lack of a significant relationship between other components of digital stress and female gender is surprising given the higher levels of stress among girls in general (e.g., Graves et al., 2021; Rose & Rudolph, 2006) and the more time spent on social networks by girls in this and other studies. The observed association between approval anxiety and female gender can be explained by generally greater concerns about peer evaluation in girls (Rose & Rudolph, 2006).

Our results showed that, in terms of age, younger students were more likely to use almost all social media platforms, except for Facebook, which was more likely

to be used by older students. YouTube/Discord use was not related to age in our sample. According to some surveys (Statista, 2023), Instagram is a more important social media platform for 18- to 24-year-olds, while Facebook is more important for 25- to 34-year-olds.

In addition, younger students in our study experienced more digital stress across all components. There is not much data on the relationship between age and digital stress, but it could be that younger students, due to their greater focus on peer relationships and identity insecurity (Yang et al., 2019), are more vulnerable to digital stress related to interactions on social media. Moreover, it could be assumed that older students may be more digitally resilient (Lee & Hancock, 2023) due their maturity and longer online experience.

The social-media-use-causes-stress hypothesis (Nick et al., 2022; Reinecke et al., 2017; Wolfers & Utz, 2022) was confirmed only for some social media sites and for some components of digital stress. We found that TikTok and BeReal use were positively and weakly correlated with all components of digital stress, except TikTok for connection overload and BeReal for approval anxiety. Instagram use had a positive but low correlation with availability stress, connection overload and online vigilance. Contrary to our expectations, no significant association was found between Facebook and YouTube/Discord use and various components of digital stress. The different patterns of association between the use of different social media and digital stress could be due to the different activities and motives of young people on social media sites. Although it is one of the applications with the most users (Statista, 2023), Facebook today serves younger users more as a source of information and less as a cyberspace for social interaction than it did when it was first created. YouTube is often a source of entertaining content without potentially stressful settings.

While gender was a significant predictor only of anxiety, loneliness was a significant predictor both of anxiety and depression symptoms. Students who reported feeling lonelier also reported more anxiety and depression symptoms. Numerous previous studies have confirmed the link between loneliness and negative emotional states such as depression and anxiety (e.g., Moeller et al., 2019; Smith et al., 2021). The role of loneliness has also already been recognized in the context of social media use, and explained through several theoretical frameworks (Smith et al., 2021).

Contrary to our expectations, of all the social media studied, only YouTube/Discord use was associated with depression symptoms. The association between YouTube/Discord and depression symptom can be explained by previously mentioned gamified nature of these platforms and findings of the positive correlation between online gaming hours and depression symptoms (e.g., Wei et al., 2012). It is possible that individuals with more symptoms of depression may engage more in gaming activities or seek additional self-help information (Naslund et al., 2014). Furthermore, the results of hierarchical regression analysis have shown that time spent on most social media is not associated with anxiety or depression symptoms,

except for Instagram and YouTube/Discord use, and only in combination with digital stress. Previous studies on the relationship between time spent on social media and mental health problems found conflicting results. While meta-analyses suggest small negative effects of social media on well-being (e.g., Appel et al., 2020; Ivie et al., 2020), other studies suggest some positive outcomes of social media use (e.g., Steele et al., 2020). To differentiate effects at the between-person and within-person levels, Coyne et al. (2020) conducted longitudinal study and found that time spent on social media was not associated with an increase in mental health problems when examined at the individual level. It seems that the experience of digital stress is more relevant to mental health than time spent on social media.

Our results showed that the determinants of anxiety and depression symptoms in the context of digital stress are somewhat different. Students who felt obligation to be always available, and who felt anxious about others' comments about their posts, experience more anxiety symptoms. Students who felt overwhelmed with information, experience more anxiety and depression symptoms. FoMO did not prove to be a significant predictor, likely due to its high correlation with loneliness that is significant predictor of depression and anxiety. The results of previous research, which also create framework for the conceptualization of digital stress in the context of mediator or moderator models, point to the association between digital stress and psychosocial functioning (Hall et al., 2021; Nick et al., 2022; Steele et al., 2020). According to Hall et al. (2021), components of digital stress showed some distinct relationships with depressive symptoms and anxiety: The strongest associations appeared to be between FoMO and negative outcomes, and weaker associations between availability stress and online vigilance and negative outcomes. In their study (Hall et al., 2021), some age differences also emerged: availability stress was more weakly associated with anxiety in young adults than in adolescents. In addition, availability stress was not as important for depressive symptoms in adults as in adolescents (Hall et al., 2021). The results of our study do not allow us to draw clear conclusions about differential and specific associations between subcomponents of digital stress and anxiety and depression symptoms.

Because there are more studies supporting the mediated model of digital stress (Steele et al., 2020), we focused on digital stress as a possible moderator in this study. Our hypothesis is only partially confirmed. Availability stress and connection overload were significant moderators of association between Instagram use and anxiety symptoms while availability stress was significant moderator of association between Instagram use and depression symptoms. Results showed that among individuals with higher availability stress, less time on Instagram was associated with more severe psychological symptoms of depression and anxiety. In other words, it could be that participants who experience high levels of availability stress may benefit from more time spent on Instagram and avoid higher levels of anxiety and depression. Similarly, among individuals with lower connection overload, more time on Instagram was associated with lower levels of anxiety symptoms. The effect of

Instagram use on anxiety and depression depends on the type of stress and its severity, and more time spent on Instagram is not necessarily associated with more pronounced symptoms.

Implications

The applied *Multidimensional Digital Stress Scale* (Hall et al., 2021) proved to be a valid measure of five components of digital stress in Croatian sample of university students. The multidimensional nature of digital stress confirmed its role in explaining complex relationships between social media and mental health outcomes. Practical implications refer to importance of informing young people about different components of digital stress, their role in mental health and effective ways of coping.

Limitations and Suggestions for Future Research

Several limitations should be considered when interpreting the results of this study. Only self-assessments were used. This study is correlational, and it is not known, for example, whether digital stress causes anxiety or depression symptoms or vice versa. In addition, small sample size and the use of convenience sampling limited the representativeness of and generalizability to a larger adolescent and youth population. The sample of this study consisted of a group of predominantly females in late adolescence and emerging adulthood. It is possible that the relationship between social media use and psychological functioning is stronger in younger age groups due to their developmental vulnerability. Another limitation concerns measure of social media use. Despite the intention to capture active and passive social media use, responses were grouped by media rather than activity (e.g., the same result for time spent on Instagram may be related to browsing for one person and posting for another), which is one of possible reasons for the lack of a direct relationship between social media use and the outcome variables.

Future studies should continue working on a measure of social media use that distinguishes between different motives for using networks, as well as between active and passive use (e.g., different activities) regardless of social media platform. It is also possible to analyze only the effects of the most used social media. Some recent research has already taken an important step in this direction (e.g., Reimann et al., 2023). In addition, the possible effects of other variables such as experiences with social media (e.g., cyberbullying), and various personality traits, as well as peer or adult support, should be controlled. Future studies could examine the relationships between the studied variables in other age subgroups of adolescents and adults.

Conclusion

This research has shown that the association between social media use and mental health is weak, at least in this age group. When examining the relationship between social media use and mental health outcomes, it seems important to consider digital stress, which could have a direct effect on mental health, but also a moderating effect on the relationship between social media use and mental health symptoms. Higher digital stress is associated with more anxiety and depression symptoms. Availability stress, approval anxiety, and connection overload were significant predictors of anxiety, and connection overload was significant for depression.

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