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Research Article

The effect of new media literacy on problematic mobile phone usage among Russian university students

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ABSTRACT

The aim of this study is to find the relationship between problematic mobile phone use (PMPU) and new media literacy (NML) among Sechenov University, Pyatigorsk State University, and Kuban State University in Russia students where the study is under progress. The study was conducted using a quantitative approach and included 425 undergraduate students. The data was evaluated using partial least squares structural equation modeling (PLS-SEM); the findings revealed a complex relationship between NML and PMPU. The results revealed that whilst functional production-consumption had a negative effect, functional consumption and critical production-consumption had a beneficial effect on social dissonance. It was noted that cognitive effects were affected differently by the NML aspects. Multiple group analysis based on gender showed that NML affects PMPU differently depending on gender. These findings imply that in some situations good media literacy may encourage problematic behavior rather than always resulting in low problematic use. The report underlines that media literacy initiatives should go beyond mere technical knowledge to increase awareness about sensible and balanced technology use. Furthermore covered are recommendations for next studies and constraints of the study.

Keywords: new media literacy, problematic mobile phone use, PLS-SEM, gender, Russia

INTRODUCTION

With the rapid spread of digital technologies and their becoming an integral part of daily life (Kabha, 2019), concepts such as new media literacy (NML) and problematic mobile phone use (PMPU) have become the focus

of attention of researchers and educators. Understanding the relationship between these two phenomena, especially among university students, is of great importance for promoting healthy technology use in the digital age. The importance of this NML is heightened by the fact that young people are turning to digital media tools rather than written media tools (Zheltukhina et al., 2017). NML refers to the ability of individuals to effectively acquire, evaluate, analyze and produce information in digital environments (Koc & Barut, 2016). This concept goes beyond traditional literacy skills and includes skills such as critical thinking, creativity and digital content production. Chen et al. (2018) defined four dimensions of NML: functional consumption (FC), critical consumption (CC), functional production-consumption and critical production-consumption (CP).

On the other hand, PMPU refers to negative situations that arise as a result of individuals' excessive and uncontrolled use of mobile phones (Billieux, 2012). Particularly among young people, this has become a widespread issue that can have several bad effects including low academic performance, damage in social connections, and psychological stress (Sohn et al., 2019).

There are few studies in the literature looking at how NML relates to PMPU. Media literacy has been investigated in certain studies on problematic internet use. For their analysis of Chinese university students, Long et al. (2023) for instance showed a positive correlation between NML and problematic internet use. This surprising outcome implied that highly media literate people could be more active online.

Still, how this relation develops in the particular context of cell phone use and how it shows up in the Russian setting has not yet been enough investigated. Regarding the degree of NML and PMPU practices among Russian university students, little is known. Filling this research gap is critical for the development of educational policies and intervention programs. This study aims to examine the relationship between NML and PMPU among students in Sechenov University, Pyatigorsk State University, and Kuban State University in Russia. Data was collected from these three universities, with ethical approval granted by Sechenov University. By analyzing the effects of different dimensions of NML on PMPU, the research aims to illuminate the complex relationship between these two phenomena. Considering that virtual space is especially attractive for teenagers today (Tolokonnikova et al., 2020), the findings will provide valuable insights to educators, policy makers and researchers in developing digital competencies and promoting healthy technology use.

LITERATURE REVIEW

New Media Literacy

NML refers to a set of skills and competences required to effectively navigate the intricacies of digital environments and various types of media. The concept incorporates components of digital literacy, including the capacity to retrieve, manipulate, and generate information within a digital environment, as well as media literacy, which particularly emphasizes the examination and production of media messages in many formats (Fedorov, 2014; Stein & Prewett, 2009; Tyner, 2009). With the advent of new media, literacy has expanded beyond reading and writing to encompass comprehension of the logics and methods of literacy that have developed alongside technical progress (Kress, 2003). The acquisition of critical thinking skills and the capacity to assess information sources proficiently are essential elements of information literacy (Afrilyasanti et al., 2023; O'connor, 2009). In light of the ongoing influence of new media on communication and information distribution, the significance of various literacies becomes more apparent. They enable individuals to actively and critically interact with intellectual material, therefore promoting well-informed citizenry and facilitating involvement in public discussions (Collins et al., 2011). Therefore, acquiring knowledge and understanding of new media technologies is crucial for adjusting to the ever-changing environment of information and communication in the 21st century.

Higher education students' NML levels differ; this has been evidenced by various studies examining different dimensions of media literacy within this demographic. These studies highlight the importance of critical thinking, media literacy, and the ability to discern reliable information in the digital age. The results indicate that university students possess essential media literacy abilities that are requisite for effectively navigating intricate media landscapes. Among the Turkish university students, the degree of NML was found

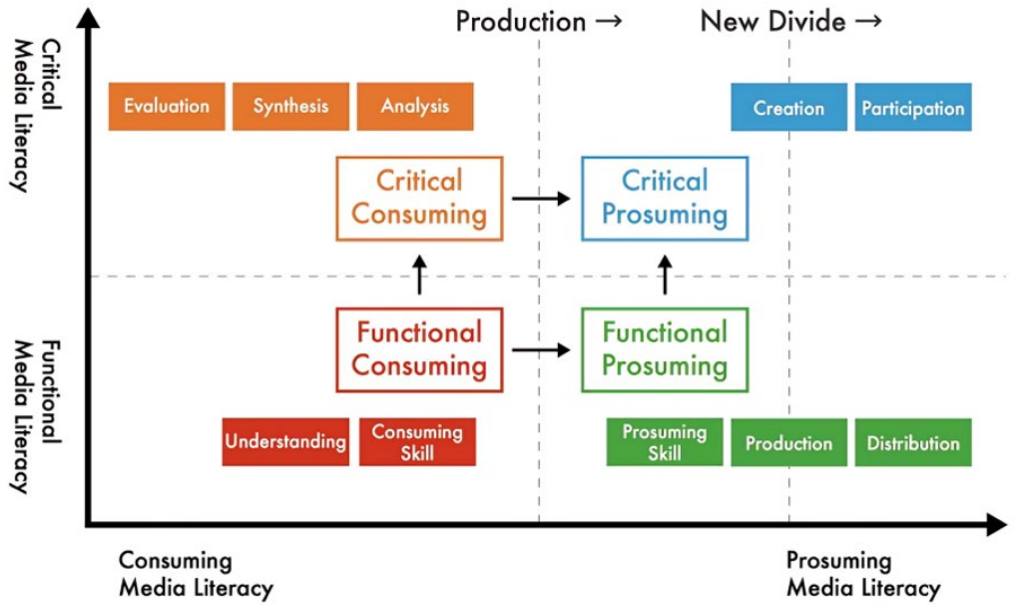

Figure 1. NML component (Chen et al., 2018)

medium (Balaban-Sali, 2012). Students from Singapore have developed quite advanced degrees of new media technical proficiency (Chen et al., 2018).

The research undertaken by Orhan (2023) reveals that university students exhibit a considerable degree of NML, which strongly forecasts their capacity to identify false information on social media platforms, as well as their inclination towards critical analysis. The results of the studies show a notable and moderate association between these elements, implying that students' critical thinking capacity is somewhat strongly correlated with their media literacy (Orhan, 2023). Offering undergraduate students' opportunities to consider how news items could promote (probably erroneous) understanding of science among the general public, improved their scientific media literacy, according to additional study primarily focused on scientific media literacy. This methodology, which entails contentious class exchanges, enables students to critically assess scientific information presented in the media (Archila et al., 2021).

The study indicates that university students exhibit different degrees of NML. Above half of the participants (61.7%) had a moderate degree of media literacy, with a further 32% demonstrating a high level. Merely 6.3% of the participants belong to the low-level category (Shin & Zanuddin, 2019). Although these studies indicate a considerable degree of media literacy among university students, they also emphasize the need for further development in critical thinking abilities and the implementation of organized educational interventions. These results emphasize the need for continuous endeavors to create extensive media literacy programs that tackle the changing media environment.

Key component of new media literacy

A preliminary framework of NML was proposed by Jing and Wang (2011). A thorough framework necessary for properly negotiating the complex terrain of digital information is NML. Digital literacy is a particular set of skills and knowledge that enable individuals to effectively consume, create, and evaluate digital content. The fundamental elements of NML include FC, CC, and CP, socio-cultural awareness, and the capacity to identify accurate information. These elements are essential for producing knowledgeable digital citizens able to handle the complexities of the digital media environment.

According to Chen et al. (2018), NML is organized around two main axes. The vertical axis distinguishes between "critical media literacy" and "functional media literacy", while the horizontal axis distinguishes between "consumer media literacy" and "prosumer media literacy". The writers underline the change from traditional media consumption to the "prosumer" concept developed by the digital age. Students have to not only understand and absorb media content but also develop in their capacity for critical thinking, evaluation, and original creation. According to **Figure 1**, media literacy is a process from the functional to the critical level,

hence educational policies and pedagogical strategies should be created to assist this evolution. Moreover, the "new divide" speaks of a significant change in the way media users are turned from simple consumers to active participants.

Functional and critical consumption

FC includes the basic ability to access and use digital media, while CC requires evaluating the reliability and credibility of information. This dual approach is vital for understanding and reducing the spread of unverified information (Lee et al., 2022). Jing and Wang (2011), who expand functional and critical literacy, argued that functional media literacy is essential. Koc and Barut (2016) emphasizes the need for both functional and critical skills in media consumption by identifying these as fundamental components.

Functional and critical pro-consumption

Pro-consumption relates to the capacity to create and distribute as much as to the consumption of digital material. While CP includes knowledge of the effect of content production and ethical issues, functional pro-consumption entails the technical abilities needed to generate content (Koc & Barut, 2016). This aspect of NML is very important for interacting with digital media in a participatory society where individuals are both consumers and creators of information (Koc & Barut, 2016; Lee et al., 2022).

It is not enough to remain a functional consumer and prosumer; criticality is vital in consuming new media and in prosumerization. Based on two continuities from consumer to prosumer and from functional to critical media literacy, four types of NML can be defined: FC (individuals can access and understand media content) and functional pro-consumption (FP, individuals can produce media content using new media), CC (individuals not only understand the message but also interpret and evaluate it critically), and CP (individuals are aware of their positions in media participation, construction, and dissemination) (Luo et al., 2022).

News trustworthiness and fact-checking

NML emphasizes cognitive thinking ability, which is considered a critical factor for individuals in distinguishing the truth in news content (Paor & Heravi, 2020). Studies show a slight correlation between the ability to assess news reliability and NML, emphasizing the need for better education in this area (Luo et al., 2022). NML emphasizes its importance in dispelling false information, which shapes both the fact-checking motive and the view of fake news (Lee et al., 2022).

Although these elements define NML, the digital world also offers difficulties that require ongoing adaptation and education. The fast development of digital media calls for constant evaluation of what it means to be literate in this environment as new technologies and modes of communication change established ideas of literacy (Kress, 2003).

Mobile Phone Problematic Use

According to Billieux (2012), PMPU is understood as "the inability to regulate one's use of a mobile phone, which ultimately leads to negative consequences in daily life". Systematic reviews on this topic suggest that excessive and maladaptive use and psychological dysfunction resulting from use are the two main elements of such studies (Harris et al., 2020; Sohn et al., 2019).

Due to the lack of a precise definition of this PMPU, prevalence estimates of adolescents suffering from PMPU in Hong Kong vary from a low of approximately 3% to a high of 30% (Leung, 2017). Other studies PMPU by outcome have reported wide variations in prevalence, ranging from 10% (British adolescents, [Lopez-Fernandez et al., 2014]) to 24.8% (Korean adolescents, [Kwon et al., 2013]). In the final study, De-Sola et al. (2017) conducted a psychometric analysis of the problematic mobile phone use scale (PMPUS) with a sample of 1,126 Spanish adults aged 16 to 65 years. Up to 20.5% of participants were classified as "problem users." Although both studies adapted the PMPUs as a measure of mobile phone addiction, differences in participant characteristics may partially explain this discrepancy. An examination of the reported details of these studies suggests that this discrepancy may be due to the lack of commonly accepted definitions of PMPU (Yu & Sussman, 2020), the use of different measurement instruments (Harris et al., 2020), or the study of samples from different populations. As with other forms of technology addiction or problematic use, the measure of PMPU is the inability to maintain other social and personal activities.

Problematic mobile phone usage of university students

Growing concerns about PMPU among college students center especially on how it affects social interactions and academic achievement. Many studies have found a detrimental correlation between too much cell phone use and academic performance. For instance, a Valencia, Spain, study revealed a statistically significant negative correlation between average grades of pupils and cell phone usage. Regular phone calls to students usually produced average scores below (Roig-Merino et al., 2024). A study combining Chinese and Czech teenagers found that higher degrees of cell phone addiction were connected to lower academic performance scores (Liu et al., 2024).

Many times, smartphones disrupt study sessions and lower concentration. Even if some students have great GPAs, the general usage of cellphones for social media can cut study time and calls for careful supervision of smartphone practices to lower these distractions (Mushtaq, 2024). PMPU is linked to mental health problems such as depression and anxiety, which can strain social relationships. A study in Singapore found significant correlations between PMPU and symptoms of depression and anxiety, suggesting that excessive phone use can exacerbate these conditions and thus affect social interactions (Teo et al., 2023).

While cell phones facilitate connectivity and interaction, they can also lead to addiction by negatively affecting social relationships. PMPU is rather common among university students ranging from 36.5% to 67% and has strong correlation with social anxiety and mental health issues (Candussi et al., 2023). Still, traits like self-esteem and social anxiety have little bearing on mobile phone addiction; this suggests that other factors might be more vital in social dynamics (Munusamy & Ahmad Ghazali, 2023).

It has been demonstrated that too much use of smartphones alters social interaction patterns. Although it can increase social circles and keep pupils current with knowledge, it usually results in a decline in the quality of face-to-face contact and attention during contacts (Ikhwan & Karlina, 2023). Addiction to cell phones is linked to more social anxiety, which might impede good social connections even more. Particularly in the COVID-19 epidemic, depending on cell phones for communication and entertainment aggravates this worry (Lakshika & Bulathwatta, 2023).

Students' sentiments of loneliness and smartphone addiction have a clear relationship. This relationship suggests that excessive mobile phone use may affect emotional well-being by intensifying feelings of isolation (Chaudhry et al., 2023). Studies have found significant positive correlations between smartphone use and loneliness, suggesting that as cell phone use increases, so does the feeling of loneliness. This is particularly evident among younger students and students in certain academic majors (Sarici & Sayan, 2023).

A multi-pronged approach including behavioral interventions, awareness campaigns and self-management strategies is essential to reduce these negative impacts. One study demonstrated the effectiveness of contingency management combined with a deposit contract intervention. Participants deposited money and were able to earn it back by meeting daily smartphone usage goals. For most participants, this method resulted in a notable drop in PMPU; hence, it has been suggested as a practical, low-cost method to cut too high smartphone usage (Williams-Buttari et al., 2023). Reducing the frequency of PMPU can be accomplished by increasing knowledge of its detrimental consequences and supporting in-person contacts. Campaigns should concentrate on teaching students about the dangers of too high smartphone use, including its connection to poorer life satisfaction and insomnia (Jiang et al., 2022). Teaching stress management and good smartphone use would enable students to make wise choices regarding their usage of their devices. This might include seminars on digital detox and mindfulness techniques meant to boost self-control and lower reliance on cellphones (Marín et al., 2022).

Corrective exercises help reduce physical symptoms connected with PMPU, including text neck syndrome. The need for physical health interventions is shown by one study on self-management activities greatly lowering neck discomfort and improving posture among students (Sarraf et al., 2023). By raising students' resilience, stress–which is intimately related to PSU–may be lessened in effect. By means of resilience training, students can create coping strategies to manage stress without turning into too heavy smartphone use (Abd Elsalam Abd Elazeem et al., 2023). Since "fear of missing out" motivates students to remain always connected, it is a major factor influencing PMPU. Cognitive-behavioral therapy and other interventions aiming at "fear of missing out" can help students control their worries and lower PMPU (Zheng et al., 2023). Many times, bad emotions are coped with by PMPU. Teaching better emotional control techniques should be the main

emphasis of interventions to stop students from turning to cellphones as a means of escape from bad moods (Wei et al., 2023). Although these techniques show good means to reduce PMPU, it is important to take individual student variations into account. Intervention effectiveness can be raised by customizing them to particular requirements and psychological profiles. Moreover, the creation of a friendly campus environment supporting good digital practices can help to lower PMPU even more.

Studies looking at the relationship between NML and problematic internet use abound in the body of current work. For Chinese university students, Long et al. (2023) observed, for instance, a positive correlation between NML and problematic internet use. Particularly, NML's essential production-consumption dimension revealed a clear correlation with PIU. These findings imply that media literacy courses should involve growing awareness of healthy internet use as gaining digital competencies does not always ensure good internet use. Conversely, the link between NML and mobile phone use has been discussed independently; yet the direct link between these two crucial ideas has not been enough investigated. Particularly in the Russian setting, research on how NML skills of university students affect PMPU is few. Seeking to close this knowledge vacuum, our study will help to create a more complete knowledge of young people's digital age media intake and technological use. By examining the effects of multiple degrees of NML on PMPU, this study will offer teachers, legislators, and scholars interesting insights. These results can be very significant for the formulation of plans to raise the digital competency of college students and simultaneously support responsible technology usage practices. Moreover, by directing the design and execution of upcoming media literacy initiatives, this study will help to enhance the well-being of young people in the digital era.

METHODOLOGY

This study adopted a quantitative approach to examine the relationship between NML and PMPU. Correlational survey models were used in the study. This model is a research method that aims to determine the relationships and connections between two or more variables (Fraenkel et al., 2012). In social sciences and education, the correlational survey model is extensively applied since it offers a thorough knowledge of the interactions among variables (Creswell & Creswell, 2017). Design of the research was cross-sectional. Different from longitudinal research, cross-sectional investigations entail data collecting at a designated moment in time and set themselves apart (Cohen et al., 2017). This approach offers the advantage of quickly assessing the current situation and identifying instantaneous relationships between variables (Levin, 2006). In this study, the use of a cross-sectional design allowed us to simultaneously assess current levels of NML and PMPU among students at Sechenov University, Pyatigorsk State University, and Kuban State University in Russia. Ethical approval was granted by Sechenov University.

Participants

A total of 425 undergraduate students participated in the study. When the gender distribution is analyzed, it is seen that the majority of the participants were female. There is a significant difference between 317 female participants (74.6%) and 108 male participants (25.4%). This suggests that there may be more female students in the relevant departments or at Sechenov University, Pyatigorsk State University, and Kuban State University in general. In terms of age distribution, it is observed that the majority of the participants are at the young age group. Students between the ages of 18–19 constitute the largest group (225 people, 52.9%). This is followed by the group younger than 18 (120 people, 28.2%). There were 66 participants in the 20–21 age group (15.5%), while the fewest participants were in the 22–23 age group (14 people, 3.3%). Overall, this demographic profile reflects a young and female-dominated student population at Sechenov University, Pyatigorsk State University, and Kuban State University's undergraduate programs. This is an important factor to consider in the interpretation and generalization of the research results.

Data Collection Tools

New media literacy scale

New media literacy scale (NMLS) was developed by Koc and Barut (2016). The scale aims to measure the NML levels of university students. The NMLS consists of four dimensions based on Lin et al.'s (2013) theoretical framework:

1. FC
2. CC
3. Functional prosumption (FP)
4. CP

The scale consists of a total of 35 items and uses a 5-point Likert-type rating. For validity and reliability studies, 1,226 students from a state university in Turkey were studied. Exploratory and confirmatory factor analyses were conducted for construct validity. Confirmatory factor analysis results confirmed the four-factor structure of the scale (χ^2/df = 2.35, SRMR = 0.050, RMSEA = 0.049, GFI = 0.89, CFI = 0.98, and NFI = 0.97). In the reliability analysis, Cronbach's alpha internal consistency coefficients were 0.85 for FC, 0.87 for CC, 0.89 for FP and 0.93 for CP. Cronbach's alpha value for the whole scale is 0.95. The item-total correlations of the scale were above 0.30. In addition, the t-test results between the lower and upper 27% groups showed that the discrimination power of the scale items was sufficient.

Since the original scale is in English, a translation study was conducted into Russian. It was first translated from English into Russian. A second expert translated the Russian translation back into English. An additional expert, who was competent in both Russian and English, finalized the Russian version by comparing both translations. Since the Partial least squares structural equation modeling (PLS-SEM) approach will be used in the data analysis, no additional validity and reliability studies were conducted.

Problematic mobile phone usage scale

PMPUS was originally developed by Bianchi and Phillips (2005). The original scale is a 27-item self-report scale designed to assess problematic cell phone use in adults. The first version showed a single-factor structure and high internal consistency (Cronbach's alpha = 0.93). Over the years, the PMPUS has been translated into several languages such as Spanish, Turkish, Japanese, Farsi, German, Polish, and Russian and validity and reliability studies have been conducted. The dimensions of the scale include tolerance, avoidance, withdrawal, craving and negative consequences. However, multidimensional constructs have emerged in adaptations to different cultures. For example:

1. 3 factors in the Spanish version: addiction, withdrawal, and negative consequences.
2. 3 factors in the Iranian version: overuse, withdrawal symptoms, and mental preoccupation.
3. 5 factors in the German short form: loss of control, withdrawal, negative life consequences, cravings, and peer dependence.
4. In the adaptation study (Martynenko et al., 2024) in the Russian context, the scale showed a 5-dimensional structure: social dissonance, emotional effect, cognitive effect, psychosomatic effect, and loss of control.

According to the validity and reliability results of the Russian adaptation; confirmatory factor analysis supported this structure and acceptable fit indices were obtained (CFI = 0.926, TLI = 0.909, RMSEA = 0.079). On every subscale, Cronbach's alpha coefficients ranged from 0.83 to 0.92. McDonald's omega coefficients computed lie between 0.82 and 0.87.

These findings show that in the Russian environment the PMPUS is a legitimate and accurate measuring tool. The scale is flexible across cultures and reflects the complex character of PMPU.

Data Analysis

PLS-SEM was applied to the gathered data in order to investigate intricate interactions between latent variables (Hair Jr et al., 2017). This approach is quite appropriate. This method was selected for its efficacy in predictive modeling and for handling non-normal data distributions (Sarstedt et al., 2014). The measurement model was first assessed for reliability and validity. Factor loadings were examined and items with loadings below 0.7 were removed. Cronbach's alpha, Dillon-Goldstein's rho and average variance explained (AVE) values were analyzed. Then, Heterotrait-Monotrait (HTMT) ratio, Fornell-Larcker (1981) criterion and VIF values were analyzed. The results of the structural model, path values between NML dimensions and PMPU factors were examined. R-square values were also examined to evaluate the results. A gender-based multiple group analysis was performed. RStudio and plspm package were used in the analysis.

Table 1. Loading factor and reliability coefficients

Factors	Items	Loading	Cronbach's alpha	Dillon-Goldstein's rho	AVE
FC	NM_1	0.799	0.848	0.892	0.616
	NM_2	0.812			
	NM_3	0.824			
	NM_4	0.738			
	NM_7	0.746			
CC	NM_8	0.820	0.91	0.929	0.649
	NM_9	0.789			
	NM_11	0.820			
	NM_12	0.780			
	NM_15	0.862			
	NM_16	0.787			
	NM_17	0.777			
FP	NM_19	0.742	0.912	0.93	0.65
	NM_20	0.780			
	NM_21	0.767			
	NM_22	0.849			
	NM_23	0.864			
	NM_24	0.791			
	NM_25	0.843			
CP	NM_26	0.815	0.889	0.914	0.598
	NM_27	0.785			
	NM_28	0.741			
	NM_29	0.707			
	NM_30	0.772			
	NM_31	0.803			
	NM_32	0.784			
Social dissonance	MP_4	0.812	0.888	0.915	0.635
	MP_15	0.878			
	MP_16	0.799			
	MP_22	0.770			
	MP_23	0.811			
	MP_25	0.702			
Emotional effect	MP_1	0.949	0.89	0.932	0.812
	MP_2	0.901			
	MP_3	0.851			
Cognitive effect	MP_7	0.961	0.866	0.919	0.791
	MP_8	0.849			
	MP_9	0.853			
Psychosomatic effect	MP_5	0.740	0.86	0.916	0.725
	MP_6	0.940			
	MP_19	0.862			
Loss of control	MP_12	0.886	0.827	0.897	0.724
	MP_20	0.811			
	MP_21	0.855			

RESULTS

The studies revealed rather strong psychometric qualities of the NMLS and problematic PMPU measures (**Table 1**). All factor loadings were over 0.7, meaning every item fairly reflected the relevant construct. For all measurements, Cronbach's alpha scores above 0.8 indicate great internal consistency and dependability of the scales. The composite dependability of the constructions is rather good according to Dillon-Goldstein's rho values above 0.9. For all constructions, AVE values above 0.5 show that convergent validity is attained and the items of every construct explain a significant amount of the variation. The fact that the FP dimension has the highest Cronbach's alpha value among the NMLS dimensions indicates that the internal consistency of this dimension is very high. Among the PMPU dimensions, emotional effect dimension has the highest AVE value, indicating that the items of this dimension explain a large portion of the variance. In addition, the fact that an item in the cognitive effect dimension has a very high factor loading indicates that this item represents

Table 2. HTMT ratio matrix

Dimension	FC	CC	FP	CP	SD	EE	CE	PE
FC								
CC	0.796							
FP	0.826	0.876						
CP	0.480	0.560	0.629					
Social dissonance (SD)	0.011	–0.043	–0.039	0.064				
Emotional effect (EE)	0.138	0.108	0.103	0.080	0.477			
Cognitive effect (CE)	0.055	0.008	0.043	0.205	0.664	0.472		
Psychosomatic effect (PE)	0.044	0.076	0.072	0.176	0.874	0.540	0.732	
Loss of control (LOC)	0.113	0.114	0.093	0.082	0.865	0.716	0.537	0.705

Table 3. Fornell-Larcker criterion

Dimension	FC	CC	FP	CP	SD	EE	CE	PE	LOC
FC	**0.785**								
CC	0.762	**0.806**							
FP	0.698	0.750	**0.806**						
CP	0.466	0.553	0.626	**0.773**					
Social dissonance (SD)	0.036	–0.031	–0.038	0.093	**0.797**				
Emotional effect (EE)	0.063	0.092	0.107	0.080	0.381	**0.901**			
Cognitive effect (CE)	0.107	0.025	0.074	0.172	0.562	0.425	**0.889**		
Psychosomatic effect (PE)	0.103	0.105	0.105	0.111	0.635	0.472	0.577	**0.852**	
Loss of control (LOC)	0.096	0.106	0.117	0.094	0.631	0.574	0.544	0.659	**0.851**

the relevant dimension very strongly. Overall, these results show that the psychometric properties of the scales are very good and the results of the study are reliable and valid. However, structural model results are also needed to fully assess the impact of NMLS on PMPU.

When the relationships between the dimensions of the NMLS are examined, high correlations are observed between FC and CC (0.796) and FP (0.826) (**Table 2**). This shows that these dimensions are closely related to each other. However, CP has lower correlations with the other NMLS dimensions (between 0.480 and 0.629), indicating that this dimension is slightly different from the others.

When the relationships between the dimensions of PMPU are examined, it is noteworthy that especially social dissonance shows high correlations with the other PMPU dimensions (between 0.664 and 0.874). This suggests that social dissonance is strongly linked to other indicators of problematic phone use. In addition, psychosomatic effect also has very high correlations with other PMPU dimensions.

An examination of the Fornell-Larcker criterion analysis reveals that both the NMLS and PMPUS exhibit commendable psychometric properties (**Table 3**). The subscales of both instruments were assessed with a high degree of reliability, as evidenced by elevated AVE values. Strong discriminant validity and the minimal correlations found between the NMLS dimensions (FC, CC, FP, and CP) and PMPU dimensions (social dissonance, emotional effect, cognitive effect, psychosomatic effect, and loss of control) show that these two scales evaluate different constructs. The substantial correlation that has been revealed between the NMLS dimensions, particularly between FP and CC, does indicate that there is a definite relationship between them, despite the fact that the NMLS dimensions can still be considered as different creations. Social dissonance has shown significant connections with other dimensions, most notably the psychosomatic effect and loss of control, which suggests that there is a substantial interaction between the PMPU. Given that it falls below the square root of AVE, one can assert that dissociation is indeed a matter of consideration. In summary, the analysis based on the Fornell-Larcker criterion indicates that the scales exhibit a high degree of reliability and validity.

Table 4 displays your model's independent variables' degree of multicollinearity. VIF values gauges the correlation between one independent variable and other independent variables. Generally speaking, all VIF readings less than five indicate positive direction. Under this model, the cognitive effect row for CP has the lowest value of 1.754 while emotional effect row for CC has the highest VIF value of 3.270. For every dependent variable, the CC variable has the highest VIF values–between 3.198 and 3.270. This suggests that the fluctuation most linked with the other independent variables is CC. Still, these numbers fall within reasonable limits. Additionally with moderate VIF values (between roughly 2.7 and 3.0) are FC and FP. These variables are

Table 4. Variance inflation factor

Dependent variables	FC	CC	FP	CP
Social dissonance (SD)	2.684	3.247	2.938	1.763
Emotional effect (EE)	2.705	3.270	3.020	1.798
Cognitive effect (CE)	2.673	3.198	3.024	1.754
Psychosomatic effect (PE)	2.708	3.252	3.020	1.793
Loss of control (LOC)	2.705	3.261	3.000	1.783

Table 5. Path analysis result

Path	Estimate	Standard error	t-value	Pr (>|t|)
FC → Social dissonance	0.175	0.078	2.260	0.024
CC → Social dissonance	–0.140	0.085	–1.640	0.101
FP → Social dissonance	–0.182	0.082	–2.220	0.027
CP → Social dissonance	0.202	0.062	3.240	0.001
FC → Emotional effect	–0.047	0.078	–0.596	0.552
CC → Emotional effect	0.049	0.086	0.568	0.570
FP → Emotional effect	0.093	0.083	1.120	0.263
CP → Emotional effect	0.017	0.063	0.263	0.793
FC → Cognitive effect	0.198	0.077	2.570	0.010
CC → Cognitive effect	–0.220	0.084	–2.610	0.009
FP → Cognitive effect	–0.041	0.081	–0.509	0.611
CP → Cognitive effect	0.227	0.062	3.670	0.000
FC → Psychosomatic effect	0.044	0.078	0.559	0.576
CC → Psychosomatic effect	0.024	0.086	0.279	0.781
FP → Psychosomatic effect	0.013	0.083	0.161	0.872
CP → Psychosomatic effect	0.069	0.063	1.090	0.276
FC → Loss of control	0.012	0.078	0.152	0.879
CC → Loss of control	0.029	0.086	0.333	0.739
FP → Loss of control	0.069	0.083	0.838	0.402
CP → Loss of control	0.029	0.063	0.462	0.644

so rather connected with the others. With values between 1.654 and 1.798, CP boasts the lowest VIF values. CP is thus the variable least connected with the other independent variables. These VIF values thus show that the multicollinearity in the model is at reasonable levels. One can argue that there is no major multicollinearity issue as all values are less than five. This allows one to assess the separate impact of every independent variable in the model on the dependent variables.

The analysis of the path analysis shows the effects of NMLS dimensions on PMPU dimensions (**Table 5**). The effects on social dissonance are striking. In contrast to the beneficial impact of FC ($\beta = 0.175$, $p < 0.05$) and CP ($\beta = 0.202$, $p < 0.01$) on social dissonance, the detrimental effect of FP ($\beta = –0.182$, $p < 0.05$) reveals a distinct pattern. This suggests that engaging with media and fostering critical content might result in heightened social dissonance, whereas the creation of functional content could contribute to its reduction.

It was also noticed that there were significant effects on the cognitive effect. Both FC ($\beta = 0.198$, $p < 0.05$) and CC ($\beta = 0.227$, $p < 0.001$) exert a positive influence on cognitive effects. In contrast, CC ($\beta = –0.220$, $p < 0.01$) exerts a detrimental influence on cognitive effects. According to the data presented, it seems that the development of critical content and the act of media consumption could both play a role in enhancing cognitive effects, while CC might lead to a reduction in these effects.

It was found that the NMLS dimensions did not have any significant effects on the emotional effect, the psychosomatic effect, or the loss of control dimensions. Given this information, it appears that media literacy does not have a direct impact on the emotional, psychosomatic, or loss of control impacts that are experienced. Taking everything into consideration, the CP component was the one that had the most constant and powerfully favorable effect on social dissonance and cognitive effects. The fact that this is the case shows that the production of critical content may be connected to certain characteristics of problematic phone use.

According to **Table 6**, the effect of the independent variables on the dependent variables is quite limited. The R-square and adjusted R-square values for all dependent variables are quite low. The highest explanation rate is seen in the cognitive effect variable, where the independent variables explain about 5.15% of the variance (adjusted R-square: 4.25%). This is followed by social dissonance with an R-square value of 3.62%

Table 6. R-square and adjusted R-square values

Variables	R-square	Adjusted R-square
Social dissonance (SD)	0.0362	**0.0260**
Emotional effect (EE)	0.0128	**0.0035**
Cognitive effect (CE)	0.0515	**0.0425**
Psychosomatic effect (PE)	0.0160	**0.0067**
Loss of control (LOC)	0.0150	**0.0057**

Table 7. Comparation path analysis based on gender

Path	Global	Female	Male	Absolute difference	p-value	Significance
FC → Social dissonance	0.1752	0.1673	0.0167	0.1507	0.4671	No
CC → Social dissonance	–0.0467	0.0088	–0.4784	0.4872	0.0200	Yes
FP → Social dissonance	0.1977	0.2170	0.0089	0.2081	0.3333	No
CP → Social dissonance	0.0438	0.0682	–0.2527	0.3209	0.1058	No
FC → Emotional effect	0.0119	0.0438	–0.3557	0.3995	0.0499	Yes
CC → Emotional effect	–0.1396	–0.1232	–0.0499	0.0733	0.7106	No
FP → Emotional effect	0.0489	0.0248	0.5472	0.5224	0.0160	Yes
CP → Emotional effect	–0.2202	–0.2277	0.0397	0.2674	0.2116	No
FC → Cognitive effect	0.0239	0.0084	0.3925	0.3841	0.0519	No
CC → Cognitive effect	0.0286	0.0413	0.3548	0.3135	0.1138	No
FP → Cognitive effect	–0.1818	–0.2002	–0.0257	0.1745	0.4331	No
CP → Cognitive effect	0.0929	0.1078	–0.0881	0.1959	0.3693	No
FC → Psychosomatic effect	–0.0413	–0.0557	0.1313	0.1871	0.3792	No
CC → Psychosomatic effect	0.0133	0.0050	0.0477	0.0427	0.8723	No
FP → Psychosomatic effect	0.0693	0.0424	0.1741	0.1318	0.5030	No
CP → Psychosomatic effect	0.2022	0.2494	–0.0593	0.3087	0.0659	No
FC → Loss of control	0.0166	0.0066	–0.0298	0.0365	0.8343	No
CC → Loss of control	0.2271	0.2432	0.0063	0.2368	0.0998	No
FP → Loss of control	0.0687	0.0653	0.0182	0.0471	0.7844	No
CP → Loss of control	0.0291	0.0487	–0.2213	0.2700	0.1158	No

(adjusted R-square: 2.60%). Explanation rates for the other variables are even lower: 1.60% (adjusted: 0.67%) for psychosomatic effect, 1.50% (adjusted: 0.57%) for loss of control and 1.28% (adjusted: 0.35%) for emotional effects. These results suggest that our model is insufficient to explain the variation in these dependent variables and that there are probably other important factors that are not included in the model. In future research, it is recommended that other potential factors affecting these variables be examined and included in the model.

Multi-Group Analysis Based on Gender

Multigroup analysis results examine whether the effects of NML dimensions on PMPU dimensions differ according to gender (**Table 7**). In the path from FC to emotional effect, a negative effect was observed for female (–0.0467) and a positive effect for male (0.0088). This difference is statistically significant ($p = 0.02$). This shows that the effect of functional media consumption on emotional effects differs according to gender. As FC increases, emotional effects decrease for female, while a slight increase is observed for male.

In the path from FC to loss of control, a positive effect was observed for both female (0.0119) and male (0.0438), but the effect was stronger for men. With a $p = 0.0499$ this difference is statistically significant. This result implies that male exhibit more clearly the influence of functional media use on loss of control. Female (0.0489) have a more significant favorable effect than males (0.0248); this is in the path from CC to emotional effect. The difference is statistically significant–$p = 0.016$. This outcome reveals that female experience more pronounced positive benefits of critical media intake on emotional aspects.

DISCUSSION

The association between NML and PMPU among students at Sechenov University, Pyatigorsk State University, and Kuban State University was investigated in this paper. The results showed notable correlations between various NML and PMPU dimensions.

Our study reveals among other somewhat remarkable results that social dissonance is positively correlated with FC and CP. This result complements the results of Long et al. (2023) research on Chinese university students. Higher NML levels among students revealed a higher prevalence of problematic internet use in their academic environment. This surprising outcome implies that highly media literate people could spend more time in digital surroundings. Usually stemming from variations in social connections made possible by mobile devices, social dissonance can lead to anxiety or conflict regarding social relationships. Part of this issue can be attributed to FC–that is, the ability to efficiently consume media–as well as to CP–that is, the capacity to create media content with critical eye. Particularly those who actively consume and create media are more likely to interact closely with their mobile devices, therefore aggravating disruptive habits like social dissonance. Studies looking at smartphone addiction have underlined this link: media literacy is proven to influence how people process and interact with content, which in turn influences their mobile phone use habits (Elhai et al., 2017; Marino et al., 2021).

On the other hand, it was observed that FP had a negative effect on social dissonance. This finding is consistent with study (Park & Burford, 2013). According to Sujon and Dyer (2020) , NML helps people to negotiate and critically interact with the complexity of online interactions, therefore influencing socializing in the digital age. The ability to produce digital content leads young people to behave more consciously and be in control in online environments. This suggests that the content creation process may have a positive impact on individuals' behavior in digital environments. Furthermore, young women in treatment for eating disorders found that the critical media literacy curriculum helped combat isolation by nurturing reciprocity, friendship, self-expression and empathy. This suggests that curriculum can foster community and connection in today's networked culture (Yousman, 2019).

As Mezentsev (2021) stated, the importance of media education for many countries cannot be denied. The aspect of media education that looks at the individuals is media literacy. NML is not only about understanding content, but also includes critical thinking, content production and technical skills (Koc & Barut, 2016). These skills can enable individuals to interact with media more effectively, promoting a more nuanced understanding of media messages and reducing the likelihood of dissonance (Bilić & Vuković, 2023). Media literacy and dissonance do not always have a straightforward relationship. Media literacy can help to propagate false information if users do not completely grasp the risks connected with fake news, even while it can lower dissonance by motivating critical participation (Lee et al., 2022).

Notables are also the several effects of NML dimensions on cognitive emotion. Cognitive effects improved with FC and CP; CC had a negative effect. In the dimension of FC, consumer skills and understanding become rather important (Chen et al., 2018). In this case, the individual's excessive consumption of new media content may have caused them to experience problems in the cognitive domain as it would naturally reduce their focus on academic studies. On the other hand, since production and participation are at the forefront in the dimension of CP (Lee et al., 2022), if the individual is active in this area, he/she may experience problems because he/she cannot allocate enough time to academic studies because he/she will devote time to content production. Since evaluation, analysis and synthesis skills are at the forefront in the dimension of CC (Koc & Barut, 2016), students may act more consciously and focus on their academic studies or use mobile phones to obtain content suitable for their academic studies. According to Xie et al. (2019), CC literacy acts as a defensive shield that protects young individuals from the influence of misinformation and also equips them with the necessary skill set to navigate the complex new media environment. It can raise awareness about students' use of digital tools.

In our study, NML dimensions did not have a significant effect on emotional impact, psychosomatic impact and loss of control. This result contradicts Taibi et al. (2023) who found a relationship between media literacy and psychological well-being. This difference may be due to cultural factors or differences in measurement instruments.

Our gender-based multiple group analysis showed that the effect of NML on PMPU differed according to gender. This finding is in line with Kircaburun and Griffiths (2018) study revealing gender differences in social media use. Studies on media usage and how it affects problematic behaviors like mobile phone addiction reveal that male and female students show different trends. In one study on Turkish middle school students, it was discovered that although both sexes with low media literacy were more likely to have PMPU, females

exhibited a stronger link between poor media literacy and problematic usage than did male (Yildiz Durak & Saritepeci, 2019). In particular, the differentiation of the effect of FC on emotional impact by gender suggests that male and female students process media content in different ways. Furthermore included are gender variations in social media activity. While girls commonly participate in online sociability and self-presentation, which can be connected to many psychological effects, like internalizing symptoms like worry or tension, boys are more oriented towards gaming and pleasure (Svensson et al., 2022).

This study reveals that the link between NML and PMPU is multifarious and multimodal. High NML has been found not always to translate into low PMPU and in some situations may even encourage problematic use. Thus, it may be argued that media literacy programs should not only concentrate on technical abilities but also increase knowledge of sensible and balanced technology use. NML training could be crucial to lower the PMPU among academic and social study subjects. Students should personally see the value of NML and develop in this sector, as Liu (2020) emphasizes.

CONCLUSIONS

The present study examined the relationship between NML and PMPU among students at Sechenov University, Pyatigorsk State University, and Kuban State University in Russia. The findings indicate that the relationship between these constructs is complex and multifaceted, challenging some preconceived notions about the impact of media literacy on technology use. The results indicate a positive correlation between FC and CP with social dissonance. This suggests that higher media literacy may not necessarily result in reduced problematic usage. The results indicate a negative effect of FP on social dissonance, suggesting that content creation skills may foster more conscious online behavior. Furthermore, the NML dimensions have shown different effects on cognitive results. Whereas CC had a detrimental effect, FC and CP have shown favorable effects. With a special eye toward the effect of FC on emotional responses, the current study also aimed to find any gender variations in the relationship between NML and PMPU. These findings emphasize the necessity for a multifaceted approach to media literacy instruction that extends beyond the mere acquisition of technical abilities, encompassing the development of responsible and well-balanced technology usage habits.

Recommendations

1. Develop comprehensive NML programs that not only focus on technical skills but also emphasize responsible and balanced technology use.
2. Tailor media literacy initiatives to target media consumption and production patterns specific to female students.
3. Combine discussions on the probable negative effects of excessive media consumption–even among highly media literate people.
4. Encourage content creation as part of media literacy education since it could drive more intentional online behavior.
5. Regular assessment and course updating of NML helps to keep them current with growing technology and fast changing digital surroundings.

Limitations of the Study

1. The study was conducted at only 3 universities in Russia, which may limit the generalizability of the findings to other cultural contexts or educational settings.
2. The cross-sectional nature of the study stops NML and PMPU from developing causal links.
3. The quite low R-square values imply that this investigation lacked other significant variables affecting PMPU.
4. The self-reported character of the data could bring bias since participants might not fairly document their media literacy skills or mobile phone usage.
5. The study excluded probable confounding variables including socioeconomic level, academic performance, or psychological components affecting both NML and PMPU.

Future studies should overcome these restrictions by means of longitudinal studies, inclusion of a wider spectrum of variables, and investigation of these links across several cultural environments. Moreover, qualitative research could provide a better knowledge of the mechanisms by which NML influences PMPU.

At last, this research explains our knowledge of the intricate link among university students between NML and PMPU. It emphasizes the need for a more sophisticated approach to media literacy education that not only offers technical abilities but also supports ethical and fair usage of technology. Constant research in this field will be vital because digital technologies grow to create successful plans to motivate young people to participate actively in media.

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