# Examining the Relationship Between Students' Social Media Usage, Smartphone Checking During Lessons/Studying, and Academic Achievement (GPA)

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*Abstract* - **The interaction of young people with modern technology, specifically social media, is being studied in various contexts. This study aimed to examine the relationship between the students' social media usage (SMU), smartphone checking during lessons or while studying, and their academic achievement (GPA). In total, 225 participants took part in the study, with a mean age of 17.22 years (SD=1.57). To examine the role of time spent on Facebook (FB) and Instagram (IG), frequency of checking FB and IG, and smartphone checking during lessons/while studying, a hierarchical regression analysis was made. In the first step of the analysis, the participants' age and gender were controlled for, and both were significant predictors of the students' GPA. According to the findings, younger age, and female gender both predict a higher GPA. The amount of time spent on IG was a negative predictor of the student's GPA. Furthermore, the frequency of FB checking was also a predictor of the GPA, students who checked FB more frequently had higher GPAs. The two different measures of SMU (time spent and frequency of checking) were moderately congruent. The limitations and contributions of this study were discussed.**

*Keywords – academic achievement; GPA; screen time; smartphone use; social media usage*

## I. INTRODUCTION

### A. Social Media Usage (SMU)

Social media are internet-based, disentranced channels enabling mass personal communication through user-generated content [1], primarily in the form of text, audio, and video [2]. The way individuals spend their time, present themselves, and socialize has been fundamentally changed because of it. Questions have been raised about the potentially harmful effects of increased SMU. The amount of time that young people spend online has doubled over the past ten years and there is a growing debate about whether this change has a harmful effect on children and adolescents [3].

Social media is commonly used for social interactions in groups with similar interests, photo sharing, news reading, and business purposes. [3]. Whiting and Williams [4] emphasize that motivations vary depending on the platform in question. Cross-cultural research [5] showed a plethora of social media platforms used by adolescents – the most-popular were Instagram (IG), Snapchat, Facebook (FB), and Twitter. Social media platforms' popularity is continually changing throughout time. The change in popularity of various social media platforms is influenced by different factors, such as age, culture, or point in time. For example, FB's popularity is declining among younger generations, but it remains one of the world's most-used social media sites with over a billion active daily users. Users primarily access Facebook through mobile devices for personal information sharing and social connections [6].

Another example is Instagram (IG), a mobile application mostly used for photo and video-sharing, predominantly by young adults, with over 1.3 billion active users [5]. Research indicates that IG usage can be motivated by the need for self-presentation, social documentation (e.g., travel), and may be associated with certain aspects of narcissism [7], [8].

There is a growing body of studies exploring the effects of SMU in various contexts, but the studies are still mostly cross-sectional and use self-assessment measures of SMU [9]. Social media is widespread in both personal and professional settings, which has increased the significance of these technologies for education. College students reported that they use FB for social networking, work related activities and daily activities. Students primarily use FB for communication in academic groups, exchanging learning materials, and information regarding lessons, according to the study that aimed to identify the academic purposes for which students use the social media platform [10]. Research indicates that students

have positive attitudes towards using FB for communication and online interaction with peers, reporting that it aids in a better understanding of course content [11].

## B. Smartphone Usage

Evolving research focused on the potential influence of modern technology on various psychological functions is not limited to specific social media sites. Some researchers focus on specific devices like television, tablet [9], or smartphone – the most used digital device for many individuals, with over 90% of the population owning one [12]. For example, a study found that college students reported that smartphones can have a positive impact on students' educational and psychological well-being [13]. On the other hand, a systematic report has linked problematic smartphone use to decreased health-related and overall quality of life as well as life satisfaction, and subjective well-being in adolescents [14]. The research connecting smartphone usage and academic achievement typically reports a negative relationship between the variables, although not necessarily causal. Such reports usually indicate that spending time on social media affects academic performance, not vice versa [15], [16]. Regarding the measurement of smartphone usage, research was first largely dominated by self-assessment measures. They were proven to be imprecise in most cases, so researchers are advocating for different ways of measuring smartphone usage and screen time [9]. However, self-assessment measures are still often present in this field because they are an effective and quick way of gathering wanted information. Possible alternatives include direct measures of smartphone usage. This information is available for most smartphones on both commonly operating systems (Android and iOS). Depending on the device and OS, information about the amount of time spent interacting with smartphone last week or on a specific app is also given [17]. The frequency of smartphone checking refers to checking the device for possible new notifications, even when no incoming notification is signaled. This measure can fall in the category of self-assessment, although information about the number of times a phone was unlocked is given for some mobile devices. Interestingly, this type of measurement is not necessarily highly correlated to smartphone screen time [9]. Three types of self-assessment measures are included in this study. The self-assessment of time spent daily on FB and IG, the frequency of smartphone checking while studying and during lessons, and the frequency of checking FB and IG.

## C. Academic Achievement

Academic achievement refers to the performance outcomes that indicate how far a student has progressed toward specific goals that were the focus of activities in instructional settings. School systems typically define cognitive goals that apply across multiple subject areas or include knowledge and understanding in a specific intellectual domain (e.g., literacy) [18]. As a result, academic achievement should be viewed as a multifaceted construct encompassing various domains of learning. Because the field of academic achievement is so broad and encompasses such a wide range of educational outcomes, the definition of academic achievement is dependent on the indicators used to measure it. Academic achievement measures usually include standardized tests, course exam scores, course grades, and a cumulative or current grade point average (GPA). Test scores and GPA are the most used measures of educational or academic achievement, mostly because of their objectivity, simplicity, and possibility of comparison between different samples [19], [20]. Some researchers found empirical evidence implicating a link between academic achievement and SMU, while others reported the absence of such a link. For example, Alaslani and Alandejani [21] found that undergraduate and graduate students who use social networks more often have significantly better interactions with colleagues and instructors, higher engagement, and better, cooperative learning and student achievement. Sharing knowledge among colleagues improves the learning process and has an impact on improving students' achievement.
However, there is a growing body of evidence that unmonitored, excessive social media use which is not related to school/academic activities leads to lower academic achievement. One explanation is the fact that social media often presents a distraction from academic activities and therefore leads to lower educational success [22]. It was found that university students who spend more time on social media have lower GPAs than students who spend less time on social media or do not use social media. Although, their SMU for academic purposes was positively related to their academic achievement [23],[24]. Similar evidence was found by Junco [25], who reported that senior students spent significantly less time on FB compared to freshmen. His research explored the negative correlation between the time that freshman students spend on FB and their GPA. Multitasking with FB was negatively correlated with GPA for younger students, but there was no negative correlation for seniors.

## II. METHOD

### A. Research Problem

The overall objective of this study is to explore the role of students' SMU (FB and IG) and smartphone checking in explaining their academic achievement (GPA).

The hypothesis is that students' FB/IG usage, frequency of checking FB/IG, smartphone checking while studying and during lessons will explain a significant amount of variance of the GPA in the last academic year. It is expected that all predictors regarding the amount of usage will be negative, meaning that higher usage is related to lower GPA. Frequency of checking FB/IG will be positively related to GPA, because higher values in checking frequency mean that more time passes between two checking occasions.

The second objective is to check the congruence between the two different measures of SMU (time spent and frequency of checking) for both FB and IG. It is expected that the two measures of SMU will be moderately correlated.

### B. Participants

There were 225 participants in total, with a mean age of 17.22 years (SD=1.57). There were more male participants in the study (72%), than female (26%). Five participants (2%) have not answered the question related to gender or stated "other/undefined". Participants were largely students from two vocational high schools in Croatia (84%), from programs focused on computer science and engineering. The rest of the sample (16%) consisted of public university students, all of which were first-year students in applied computer science program. There were 37 first-year, 37 second-year, 36 third-year, 80 fourth-year high school students, and 35 first-year university students.

### C. Data Collection

The participants were told that the research focuses on examining students' technology usage habits and that their participation is voluntary. They were given a questionnaire (Social Media Questionnaire – SMQ) and were told that their answers were anonymous and interpreted only on a group level. Initially, students answered socio-demographic questions related to their gender, age, school/university program, and their previous year's GPA. Participants answered questions separately for each of the popular social media networks (FB and IG). Their participation was not followed by compensation of any kind. All data was collected via the paper-pen method. Prior to data collection, research approval from the Ethics committee of the Faculty of Organization and Informatics was obtained.

### D. Measures

*FB & IG usage* - participants were first asked if they had a FB/IG profile. Out of 225, only 3 participants (1.3%) answered that they do not have a FB profile, and 21 participants (8.5%) answered they do not have an IG profile. If the answer was "yes", they were asked to estimate how much time they typically spend on a certain media site daily. They were provided four possible answers with gradually increased time spent on the certain platform (1= ''30 minutes or less'', 2= "around 1 hour or less", 3= "around 2 hours or less", 4= "more than two hours'').

*Frequency of FB & IG checking* - participants were asked to estimate how often they check or turn on the mobile application FB/IG. This was a single item question in an open response format.

*Smartphone checking while studying and during lessons* - these constructs were assessed as two separate single item questions *("How often do you check your smartphone while you are studying/during lessons?")*. The items were rated on a 5-point Likert-type scale ranging from 1 to 5 (1= almost never, 2= rarely, 3= sometimes, 4= often, 5= almost all the time).

*Academic achievement* - participants were simply asked to write down their GPA (with two decimals) from last academic year which means that academic achievement was evaluated with a single item. For the first-year high school students, it was their average grade in the 8th grade of elementary school. For first-year university students, it was their grade point average from the fourth year of high school education.

## III. RESULTS

### A. Descriptive Statistics

Descriptive statistics for all study variables are displayed in Table 1. Variables regarding time spent

on and frequency of checking FB/IG are expressed in minutes. The distribution of students' estimations of their FB/IG usage is positively skewed. Participants' estimations of the frequency of checking FB/IG have high variability. Answers which implied that a person is, on average, checking FB/IG less often than once every 12 hours (720 minutes) were removed from the study because they arguably do not qualify as regular users of the application. Average checking times for both FB and IG are slightly over 1 hour, every 71.10 minutes for FB and 65.24 for IG. Overall, the participants are checking their smartphones while studying and during lessons moderately often (studying-M=3.19, SD=1.01, lessons-M=3.01, SD=1.17). The distribution of students' GPA is negatively skewed with a small standard deviation (M=4.18, SD=0.51). The correlation matrix showed a moderate correlation between time spent on FB and IG (r=0.44, p<0.01) and between frequency of FB and IG checking (r=0.35, p<0.01). Two measures of smartphone checking are also moderately correlated (r=0.35, p<0.01). Students' GPA is significantly correlated with the participants' age (r=-0.20, p<0.01), time spent on both FB (r= -0.19, p<0.01) and IG (r=-0.32, p<0.01), with checking smartphone during studying (r=-0.23, p<0.01), and during lessons (r=-0.18, p<0.01).The correlations between the two different measures of using FB and IG are both negatively moderately correlated, which confirms the stated hypothesis (FB =-0.37, p<0.01, IG=-0.44, p<0.01).

TABLE 1. DESCRIPTIVE STATISTICS AND FREQUENCIES FOR ALL STUDY VARIABLES

| | N | Min. | Max. | Mean | SD |
|---|---|---|---|---|---|
| age | 220 | 14 | 21 | 17.22 | 1.57 |
| gender | 220 | 0 | 1 | - | - |
| FB –time spent | 221 | 1 | 4 | 2.14 | 1.08 |
| | N | % | c. % | | |
| 30min or less | 77 | 34.8 | 34.8 | | |
| Around 1h or < | 74 | 33.5 | 68.3 | | |
| Around 2h or < | 32 | 14.5 | 82.8 | | |
| More than 2h | 38 | 17.2 | 100 | | |
| FB – checking | 217 | 2 | 720 | 71.10 | 108.69 |
| IG –time spent | 201 | 1 | 4 | 2.28 | 0.97 |
| | N | % | c. % | | |
| 30min or less | 47 | 23.4 | 23.4 | | |
| Around 1h or < | 78 | 38.8 | 62.2 | | |
| Around 2h or < | 49 | 24.4 | 86.6 | | |
| More than 2h | 27 | 13.4 | 100 | | |
| IG – checking | 201 | 2 | 600 | 65.24 | 100.77 |
| Phone-studying | 225 | 1 | 5 | 3.19 | 1.01 |
| Phone- lessons | 225 | 1 | 5 | 3.01 | 1.17 |
| GPA | 221 | 2.59 | 5.00 | 4.18 | 0.51 |

Note: C.% - cumulative percent, Phone - Smartphone

## B. Hierarchical regression analysis

A hierarchical regression analysis was conducted, with GPA as the dependent variable and FB-time spent, FB-checking, IG-time spent, IG-checking, smartphone-studying, and smartphone-lessons as predictors. To account for the possible effects of socio-demographic factors, age and gender were added in the first step as control variables. The predictors were added in the second step of the analysis. Before conducting the regression analysis, certain underlying assumptions were checked, including the multicollinearity, linearity, normality, independence, homoscedasticity, and absence of outliers [26]. Absence of outliers was checked with Cook's distance value which shows the influence of each individual observation on the fitted response values. The highest Cook's distance value in the dataset was 0.1 which would imply the absence of outliers. The multicollinearity assumption was tested with intercorrelations among the independent variables and VIF values. First, there was no correlation between any study variables higher than r=0.5. Second, the highest VIF value in the analysis was 1.46 which is acceptable and implies a specific contribution of every independent variable. The residual plot was used to test linearity and homoscedasticity assumptions. The plot shows the relationship between standardized residuals and standardized predicted values, in this case the residuals were scattered randomly around the horizontal and vertical lines representing residuals equal to zero. The normality assumption was tested using the Normal P-P Plot of the standardized residuals. The observations are falling on the straight diagonal line which means the assumption is met. Lastly, Durbin-Watson value was used to test the independence assumption and test for auto correlation in the residuals of a statistical regression analysis. The observed value was 2.20, which falls in the acceptable range. Including socio-demographic variables in the first step of the analysis explained only 5% of the variance in the criteria but reached the statistical significance (F $_{(2,221)}$ = 4.57, $R^2$ = 0.05, p<0.05). Adding the predictor variables increased the variance explained by 16%, making total variance explained 20% (F $_{(8,213)}$ = 5.81, $R^2$ = 0.20, p<0.05). The regression model is predicted by the sociodemographic factors and independent variables related to social media/smartphone usage. As seen in Table 2, significant predictors of the students' GPA were age (β= -0.24, p<0.01), female gender (β= 0.16, p<0.05), time spent on IG (β= -0.35, p<0.01), and FB checking (β= -0.20, p<0.01). The main hypothesis is partially supported.

TABLE 2. HIERARCHICAL REGRESSION ANALYSIS OF THE CONTROL AND INDEPENDENT VARIABLES ON GPA

| | GPA | |
| | Step 1 | Step 2 |
|---|---|---|
| **Predictor** | β | β |
| Age | -0.21** | -0.24** |
| Gender | 0.11 | 0.16* |
| FB - time spent | | -0.06 |
| FB - checking | | -0.20** |
| IG - time spent | | -0.35** |
| IG - checking | | -0.01 |
| Smartphone – studying | | -0.08 |
| Smartphone - lessons | | 0.03 |
| F | 4.57* | 5.81** |
| $R^2$ | 0.05 | 0.20 |
| $\Delta R^2$ | - | 0.16 |

Note: * $p<0.05$, ** $p<0.01$

## IV. DISCUSSION

The main hypothesis of this study is partially confirmed. According to the results, only the frequency of FB checking, and the time spent on IG significantly predict the criteria. Surprisingly, the frequency of FB checking is negatively related to the GPA, which means that students who check FB more frequently have a higher GPA. Conversely, the more time spent on IG, the lower the GPA. One possible explanation for this finding is the fact that FB is often used for educational activities, such as exchanging course materials, or forming lesson groups, while IG is not. Typically, IG is quite rarely researched or mentioned in the educational context. This result replicates a finding of a study conducted by Junco [25] who reported that there is no negative correlation between spending time on FB and GPA. If this explanation is true, it still does not explain why time spent on FB does not predict the GPA, while the frequency of checking does. It is possible that students who are highly conscientious, motivated, or even anxious about their academic results, check FB more often in case new course material or test results in their group appear.

The amount of time spent on IG is found to be a significant negative predictor of GPA. As a rapidly evolving social media platform, IG offers plenty of content and has advanced algorithms that predict users' interests, resulting in excessive scrolling and spending time in the application. It is reasonable to presume that more time spent on IG means less time left for productive work (learning), which is reflected in the grades (GPA). Although the correlational matrix showed a negative correlation between smartphone checking (while studying and during lessons) and GPA, the two variables were not significant predictors in the hierarchical model. It needs to be considered that oftentimes participants will purposefully decrease their frequency of checking their smartphone during lessons or while studying. That can especially happen in the educational context because of social desirability. The control variables were both significant predictors of the outcome. Age was a negative predictor of the GPA, which is expected considering that educational challenges increase as a person's academic pathway progresses. On average, female participants had a higher GPA in this sample. However, the study sample is not balanced by gender, so this difference needs to be interpreted with caution. There are several important limitations to this study that need to be addressed. First, the cross-sectional nature of this study makes causal explanations impossible. In the future, longitudinal research should be considered. Second, the sample size is acceptable, but a larger sample with a better gender balance would make the study results more generalizable to the broader population. The sampling method may also limit the generalizability of the findings. This sample is not probabilistic, it is convenient. Arguably, it is possible that the high school and university students involved in this study do not differ significantly from the average Croatian student. One reason for that claim could be the lack of untypical or extreme characteristics related to this group. For example, they are not students at art schools, academies, or private institutions, and high school students come from vocational schools with, typically, average state exam results. Their average GPA is also in accordance with the GPA of vocational school students in Croatia. Many of them continue their education in the university program included in this study [27]. Future studies could consider gathering information from different institutions in a certain municipality or in the whole country. Also, future studies could include possible mediator or moderator variables which could explain the link between social media and academic achievement. Such factors may include self-efficacy, learning-related habits, personality factors, or intellectual ability. Also, future research could make a comparison between different types of students (e.g., public vs. private institutions, STEM vs. the non-STEM field). Different ways of measuring SMU or the usage of a certain device are discussed in the introduction. Future studies could incorporate various measures, it would especially be useful to include a direct measure of SMU. The contribution of this study is the finding that using different social media platforms can have indigenous relationships with academic achievement. Another contribution is the comparison of the two measures of SMU and the finding that they are only moderately congruent. This field of study has significant challenges regarding the measurement of SMU, so studies that include and compare various types of

screen time measurement are possibly of value for future researchers.

## V. CONCLUSION

This study explored the link between SMU (FB and IG), smartphone checking, and the GPA of students in secondary and tertiary education. Control variables (age and gender) were both significant predictors of the GPA; older students had lower GPAs, while female students had higher GPAs. The results indicate that the amount of time spent on IG negatively predicts the student's GPA score. The more time a student spends on IG, the lower his GPA. Students' frequency of FB checking is also a predictor of the GPA, those who check FB more often have higher GPAs. In total, the regression model explained 20% of the variance in the criterion (GPA).

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