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Too much face and not enough books: The relationship between multiple indices of Facebook use and academic performance

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ABSTRACT

Because of the social media platform's widespread adoption by college students, there is a great deal of interest in how Facebook use is related to academic performance. A small number of prior studies have examined the relationship between Facebook use and college grade point average (GPA); however, these studies have been limited by their measures, sampling designs and failure to include prior academic ability as a control variable. For instance, previous studies used non-continuous measures of time spent on Facebook and self-reported GPA. This paper fills a gap in the literature by using a large sample ($N = 1839$) of college students to examine the relationship among multiple measures of frequency of Facebook use, participation in Facebook activities, and time spent preparing for class and actual overall GPA. Hierarchical (blocked) linear regression analyses revealed that time spent on Facebook was strongly and significantly negatively related to overall GPA, while only weakly related to time spent preparing for class. Furthermore, using Facebook for collecting and sharing information was positively predictive of the outcome variables while using Facebook for socializing was negatively predictive.

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1. Introduction

1.1. Facebook use by college students

Since its introduction to a handful of college campuses in 2004, Facebook has become nearly ubiquitous at universities. Recent data are reflective of this trend. For instance, in 2009 and 2010, researchers from the Pew Research Center's Internet and American Life Project found that between 67% and 75% of college-aged young adults used social networking websites (Jones & Fox, 2009; Lenhart, 2009; Lenhart, Purcell, Smith, & Zickuhr, 2010). In late 2010, an EDUCAUSE Center for Applied Research (ECAR) study of 36,950 students from 126 US universities and one Canadian university revealed that of the 90% of students who used social networking sites, 97% said they used Facebook. This 97% reported activity on the site daily (Smith & Caruso, 2010). In another study, students reported devoting a lot of time to Facebook, spending an average of over 1 h and 40 min a day on the site (Junco, 2011).

While research shows that almost all college students use Facebook, factors such as gender, race and socioeconomic status yield varying degrees of technological ownership, adoption and use within the demographic (Cooper & Weaver, 2003; DiMaggio, Hargittai, Celeste, & Shafer, 2004; Hargittai, 2008a; Junco, Merson, & Salter, 2010; Kaiser Family Foundation, 2004). While almost all of the research on digital inequalities focuses on the Internet and communication technologies, Hargittai (2008b) conducted the only published study of gender, ethnic and socioeconomic differences between users and non-users of social networking sites. She found that Latino students were less likely to use Facebook than Caucasians, and that students whose parents had a college degree were more likely to use Facebook than students whose parents did not have a college degree (Hargittai, 2008b). Therefore, not all students use Facebook and it is reasonable to assume that non-users are marked by one or more of several common factors.

Even though there is professional and popular interest in how Facebook use affects student learning, not much research has been conducted on the topic (Abramson, 2011; Kamenetz, 2011; Pychl, 2008). Some studies have examined the relationship between Facebook use and psychosocial outcomes. For instance, Ellison, Steinfield, and Lampe (2007) found that there is a positive relationship between using Facebook and forming and maintaining social capital. Valenzuela, Park, and Kee (2009) found that civic participation, life satisfaction, and social trust were related to the intensity of college students' Facebook use. In newer research, Ellison, Steinfield, and Lampe (2011) extended their previous study and found that engaging in social information-seeking behaviors on Facebook (to learn more about a person with whom the user already has a connection) was related to increased social capital, while using Facebook to maintain relationships and meet strangers was not.

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1.2. Facebook and student engagement

The construct of student engagement, defined as "the amount of physical and psychological energy that the student devotes to the academic experience," was originally proposed by Astin in 1984 (p. 297). Astin's (1984) theory of student engagement was based on five tenets: (1) Engagement refers to the investment of physical and psychological energy; (2) Engagement occurs along a continuum (some students are more engaged than others and individual students are engaged in different activities at differing levels); (3) Engagement has both quantitative and qualitative features; (4) The amount of student learning and development associated with an educational program is directly related to the quality and quantity of student engagement in that program; and (5) The effectiveness of any educational practice is directly related to the ability of that practice to increase student engagement.

Since Astin's (1984) original work, student engagement has evolved to refer to the time and effort students invest in educational activities that are empirically linked to desired college outcomes. In a notable divergence from Astin's (1984) definition of the concept, engagement is no longer limited to time devoted to purely academic outcomes; now, engagement encompasses various factors, including investment in the academic experience of college, interactions with faculty, involvement in co-curricular activities and interaction with peers (Kuh, 2009; Pascarella & Terenzini, 2005). While an exhaustive review of the research on engagement is beyond the scope of this paper, it is important to point out a key finding: in their meta-analysis of how college affects students, Pascarella and Terenzini (2005) reported that student engagement was directly related to student academic performance. Specifically, a more engaged student will earn better grades and have a higher chance of persisting through to graduation (Pascarella & Terenzini, 2005).

Because Facebook is intended as a platform for engagement, and because students spend a significant amount of time using the site, it makes sense to study the relationship between Facebook use and student engagement (Heiberger & Harper, 2008; Morrin, 2007). To date, three studies have examined the relationship between Facebook use and student engagement in order to make inferences about how Facebook use is related to a construct (engagement) related to student success (Heiberger & Harper, 2008; HERI, 2007; Junco, 2011). The Heiberger and Harper (2008) and HERI (2007) studies found positive correlations between social networking website use and college student engagement. For instance, a higher percentage of high-frequency users of social networking websites participated in and spent more time in campus organizations than low-frequency users. Additionally, more high-frequency users reported daily interactions offline with close friends with whom they developed strong connections (HERI, 2007). Conversely, the Junco (2011) study found that while time spent using Facebook was positively related to time spent in co-curricular activities, it was negatively related to scores on a scale designed to measure student engagement.

In 1987, Chickering and Gamson proposed seven principles for good practice in undergraduate education, all of which were related to student engagement. They are: (1) student/faculty contact; (2) cooperation among students; (3) active learning; (4) prompt feedback; (5) emphasizing time on task; (6) communicating high expectations; and (7) respecting diversity. The fifth principle, "emphasizing time on task," is important in conceptualizing the relationship between Facebook use and academic success. Specifically, Chickering and Gamson (1987) state that "time plus energy equals learning," and there can be no substitute for time students spend engaged in academic work (p. 6). If indeed students are spending their time engaging with a technology such as Facebook, their available time to spend on academic tasks might be limited. Furthermore, Astin (1984) states that students reach academic goals because of the time and effort spent on activities designed to reach those goals. For instance, if getting good grades is an important goal, the amount of time students spend studying is a critical factor in reaching that goal. If student time is spent elsewhere—on Facebook, for instance—less time will be allotted to focusing on academic activities and grades may suffer as a result.

1.3. Technology use and academic outcomes

Most of the research on the academic outcomes of technology use has been conducted at the primary or secondary school level and has found disparate results. As with the research on student engagement, a comprehensive review is beyond the scope of this paper; however, the following section highlights a number of studies illustrative of the mixed effects of technology use on academic outcomes. For instance, some studies have found a positive relationship between using technology with elementary and/or high school students and academic outcomes like standardized test scores and course grades (Shapley, Sheehan, Maloney, & Caranikas-Walker, 2010; Suhr, Hernandez, Grimes, & Warschauer, 2010; Tienken & Wilson, 2007). On the other hand, some studies have found a negative relationship between technology use and academic outcomes in these settings (Aypay, Erdogan, & Sozer, 2007; Waight & Abd-El-Khalick, 2007). Still other studies have found contradictory positive and negative results. In a review of the literature on interactive white boards (IWB), DiGregorio and Sobel-Lojeski (2010) found both positive and negative relationships between IWB use and academic outcomes such as learning measures, student attitudes, and motivation. The conflicting results found in these studies are quite possibly due to differences in the technologies being measured (for instance, laptops vs. IWBs) and to differences in how the technologies are used (for instance, using laptops for subject area practice vs. using them for the creation of content).

While studies at the university level have also found contradictory results, they serve to further clarify how specific uses of technology may be related to academic outcomes. For instance, Bliuc, Ellis, Goodyear, and Piggott (2010) discovered that students who reported using discussion boards as tools to find answers—rather than improve their understanding of a topic—were utilizing that technology in ways that encouraged reproduction and task completion rather than deep learning; those students also had lower final course grades. Rizzuto, LeDoux, and Hatala (2009) found that using a course management system for required actions (like posting comments) was positively related to course test scores. Sapp and Simon (2005) found that more students in online courses failed to complete the course and had lower grades than students in matched face-to-face courses. In related research, Weatherly, Grabe, and Arthur (2003) found that students in a section of a psychology course who were provided lecture slides via a course management system had lower exam scores than a control section, presumably because of decreased attendance. Research on college students has largely focused on institutionally supported technologies like course management systems, while very few studies have examined the effects of technologies more commonly used by students, such as Facebook.

1.4. Facebook use and grades

As of this writing, three published peer-reviewed studies have examined the relationship between Facebook use and grades (Kirschner & Karpinski, 2010; Kolek & Saunders, 2008; Pasek, More, & Hargittai, 2009). Pasek et al. (2009) examined the relationship between Facebook use and academic performance, and found there was no relationship between Facebook use and grades. Kolek and

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Saunders (2008) found that there were no differences in overall grade point average (GPA) between users and non-users of Facebook. Kirschner and Karpinski (2010), on the other hand, found that Facebook users reported a lower mean GPA than non-users; additionally, Facebook users reported studying fewer hours per week than non-users (Kirschner & Karpinski, 2010).

The lack of consensus in the research may be partially due to the fact that the few existing studies have been limited by their measures and/or sampling designs. The Pasek et al. (2009) study used three datasets, in which Facebook use was quantified with a yes/no question in one sample and an ordinal scale in the others. In the first dataset, researchers used an interval-level scale to ask college students about their Facebook use. The options were: "No, have never used it," "Tried it once, but have not used it since," "Yes, have tried it in the past, but do not use it nowadays," "Yes, currently use it sometimes," and "Yes, currently use it often." Researchers then split the sample into Facebook users and non-users, with those who reported "Yes, currently use it sometimes" and "Yes, currently use it often" as users and those who reported other options as non-users. The second and third datasets included students aged 14–22, which makes generalizing to college students difficult because the lower end of this range falls outside of the college student demographic. For these datasets, the students were asked if they had access to the Internet and if they "Use online social network sites (SNS) like MySpace or Facebook most days, once or twice a week, less often or never," with a follow-up prompt for Facebook use. Respondents who did not have access to the Internet, who reported "never" using SNSs or who reported not using Facebook were considered non-users, and those reporting Facebook use were considered users.

The Kirschner and Karpinski (2010) paper examined differences between Facebook users and non-users but did not analyze actual time spent on Facebook (though their methods suggest this information was collected). It should also be noted the Kirschner and Karpinski (2010) study was conducted with a relatively small ($N = 219$) sample of mostly upper-level undergraduate (junior and senior) and graduate students. Lastly, the study by Kolek and Saunders (2008) examined student Facebook profiles and found there were no differences in overall GPA between users and non-users. It is important to note that "non-users" in the Kolek and Saunders (2008) study were those students from a randomly selected sample of the university's student database that researchers could not find on Facebook. These students could have either been non-users or had privacy settings enabled to disallow searching, confounding the results of these findings.

Previous studies of Facebook use and academic performance have also been limited in how student grades were measured. Until now, all studies have used self-reported, non-continuous measures. Students in the first sample in the Pasek et al. (2009) study were asked to report grades on an 8-point Likert scale with anchors for "Mostly F's" to "Mostly A's" and categories in between such as "A's and B's." For the second and third samples, GPA was coded on a four-point scale from "D or less" to "A." Kirschner and Karpinski (2010) used a five-point Likert scale (where 0 was 1.99 and below, 1 was 2.0–2.49, 2 was 2.5–2.99, 3 was 3.0–3.49, and 4 was 3.5–4.0). Kirschner and Karpinski (2010) also coded time spent studying on a 5-point Likert scale (where 0 was less than 1 h per week, 1 was 1–5 h, 2 was 6–10 h, 3 was 11–15 h, and 4 was 16 or more hours).

None of the previous studies have explored what students *do* on Facebook. The Facebook platform allows for different activities—from commenting on user content to sending private messages, uploading photos, and lurking (seeing what others are doing); these activities could be related to outcomes in different ways than frequency of use. One study that used a small sample ($N = 92$) examined users' activities, but the authors did not relate their findings to academic outcomes (Pempek, Yermolayeva, & Calvert, 2009). Prior studies of Facebook use and academic performance have used rough measures of Facebook frequency of use and have not examined how specific Facebook activities might impact academic outcomes; however, a study by Junco (2011) found that time spent on Facebook was negatively related to scores on a scale of student engagement and that some Facebook activities were positively predictive of student engagement, while others were negatively predictive. Since student engagement is related to important academic outcomes, it could follow that certain Facebook activities may be related to those outcomes as well (Kuh, 2009; Pascarella & Terenzini, 2005).

Like the research on educational applications of technology, other areas of Internet research have progressed to relate activities to psychosocial outcomes. Research on psychological well-being has shown that Internet use and online activities are important in predicting well-being (Cotten, 2008; Gordon, Juang, & Syed, 2007; Morgan & Cotten, 2003). Ellison et al. (2011) found that using Facebook for social information-seeking was related to increased social capital, and Pempek et al. (2009) found that students used Facebook to aid pre-established peer social relationships primarily by communicating via public comments. While not focused on Facebook, a study by Junco, Heiberger, and Loken (2011) supports the idea that online activities matter when examining academic outcomes; the study found that using Twitter in educationally relevant ways led to increases in student engagement. Given these results, it is reasonable to believe that certain types of Facebook activities matter when examining grades.

1.5. Current study and research questions

Given the few studies available, as well as those studies' conflicting findings and methodological concerns, it is important to add to the literature on Facebook use and grades by using expanded assessment measures to evaluate how much time is spent on Facebook and the relationship of time spent engaged in various Facebook activities to GPA. The current study serves to extend previous research by using multiple measures of frequency of Facebook use and frequency of engagement in various types of Facebook activities. The effect of gender, ethnicity and socioeconomic status are important variables when examining the outcomes of technology use, but only one of the previous studies on Facebook use and grades took those factors into account (Pasek et al., 2009). In this study, gender, ethnicity and socioeconomic status are included as control variables. Previous studies relied on self-report of student grades; however, this study will examine actual overall student grade point averages collected through the university registrar. In any linear model of Facebook use and grades, it is important to control for high school GPA (HSGPA), consistently found to be the strongest predictor of overall college GPA (DeBerard, Speilmans, & Julka, 2004; Geiser & Santelices, 2007; Williford, 2009). In this study, HSGPA was included in the analyses in order to parse out the variance attributable to pre-existing differences in academic ability and also to place other predictors in context. Lastly, a continuous measure of time spent studying was used as an outcome variable.

Astin (1984) stated that students reach academic goals because of the time and effort spent on activities designed to reach those goals, and Chickering and Gamson (1987) emphasized that the amount of time students spend engaged in academic work is highly related to academic success. Because students have a fixed amount of time available in any given day, and because time on task is an important factor in academic success, this paper posits that students who spend more time on Facebook will have less time to study and therefore will have lower grades. Research on Internet use has revealed that some online activities have a positive effect and some a negative effect on psychological outcomes;

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a similar pattern has also been detected related to technology use and academic outcomes (Bliuc et al., 2010; Cotten, 2008; Ellison et al., 2011; Gordon et al., 2007; Junco & Cotten, 2010; Junco et al., 2011; Morgan & Cotten, 2003; Pempek et al., 2009; Rizzuto et al., 2009). Junco's (2011) findings confirmed that some Facebook activities were positively related and some negatively related to student engagement. Therefore, this study will also examine the extent to which Facebook activities relate to time spent studying and student grades.

The research questions examined were:

- *Question 1: Is there a relationship among time spent on Facebook, frequency of Facebook activities and grades?*
- *Question 2: Is there a relationship among frequency of checking Facebook, frequency of Facebook activities and grades?*
- *Question 3: Is there a relationship among time spent on Facebook, frequency of Facebook activities and time spent preparing for class?*
- *Question 4: Is there a relationship among frequency of checking Facebook, frequency of Facebook activities and time spent preparing for class?*

2. Methods

2.1. Participants

All students surveyed were US residents admitted through the regular admissions process at a 4-year, public, primarily residential institution in the northeastern United States ($N = 3866$). The students were sent a link to a survey hosted on SurveyMonkey.com, a survey-hosting website, through their university-sponsored email accounts. For the students who did not participate immediately, two additional reminders were sent, 1 week apart. Participants were offered a chance to enter a drawing to win one of 90 $10 Amazon.com gift cards as incentive. A total of 1839 surveys were completed for an overall response rate of 48%. The data were downloaded as an SPSS file directly from SurveyMonkey, screened for anomalies and analyzed using PASW (formally SPSS) Statistics 18.0.

2.2. Instrument/measures

To provide multiple measures for accuracy checks in reporting, students were asked to estimate their time spent on Facebook (FBTime) as well as how often they checked Facebook (FBCheck). Students were asked to determine average time spent daily and time spent "yesterday," as well as the average number of times they check Facebook daily and "yesterday." FBTime was evaluated by asking students: "On average, about how much time per day do you spend on the following activities?" and "How much time did you spend on each of these activities yesterday?" with a prompt for Facebook (along with prompts for other technologies included for forthcoming analyses). Students used a pull-down menu to select the hours and minutes spent using Facebook. FBCheck was evaluated by asking students: "On average, how many times per day do you check Facebook?" and "How many times did you check Facebook yesterday?" Respondents were permitted to input a number of their choosing in a blank field. Hours and minutes using Facebook were converted to minutes for this study. Students were also asked: "About how many hours do you spend in a typical 7-day week doing each of the following?" with a prompt for "preparing for class." As with time spent on Facebook, answers to the question were converted to minutes for these analyses.

Students were asked to approximate the frequency with which they participated in various activities on Facebook. The possible types of Facebook activities change according to the addition or deletion of features, so the list of Facebook activities was developed by soliciting input from the author's Facebook network. The author's Facebook network includes a mix of undergraduate and graduate students, researchers, faculty members, technology industry professionals and personal friends. A public status update was posted stating: "I need your help for my next research project. What are the things you do on Facebook?" The items submitted by 39 members of the network were then collated and compiled into a non-overlapping list of 14 items. These 14 items were shared with two separate groups of undergraduate students for input, revised and posted on Facebook for comments. All of the items from the original list were kept, and most of them were edited for clarity and relevance. The final list of 14 items can be viewed in the Appendix. In the survey, students were asked: "How frequently do you perform the following activities when you are on Facebook?" Facebook activity items were coded using a five-point Likert scale ranging from "Very Frequently (close to 100% of the time)" to "Never." For this study, "Never" was coded as 1; "Rarely (25%)" as 2; "Sometimes (50%)" as 3; "Somewhat Frequently (75%)" as 4; and "Very Frequently (close to 100% of the time) as 5.

Students gave the researcher permission to access their academic records to obtain their overall grade point averages. Overall GPAs were measured on a 4.0 scale ranging from 0 for 'F' to 4.0 for 'A'. Students also gave the researcher permission to obtain their actual high school grade point averages (HSGPAs), which were submitted to the university during the admissions process. High school grades were also measured on a 4.0 scale ranging from 0 for 'F' to 4.0 for 'A'.

2.3. Analyses

Descriptive statistics were run to illustrate the demographic characteristics of the sample and to describe Facebook use. Correlations were examined to evaluate the relationship between Facebook frequency-of-use measures and time spent preparing for class. To answer the research questions, four hierarchical (blocked) linear regression analyses were conducted to determine which variables predict overall college GPA and time spent preparing for class. Using hierarchical linear regression allows for the selection of number and order of predictors inserted into the model, and "blocks" or groups them based upon a theoretical construct. The blocks, in order, were: demographic variables (gender, ethnicity and parental education level), high school GPA, frequency of Facebook use (FBTime or FBCheck) and frequency of Facebook activities. Demographic variables were included in their own block because previous research has found the effect of gender, socioeconomic status and/or ethnicity is significant in relation to technology use (Cooper & Weaver, 2003; DiMaggio et al., 2004; Hargittai, 2008a; Junco et al., 2010; Kaiser Family Foundation, 2004). High school GPA was included as both a control variable and in order to compare other predictors' relative impact on the dependent variables. Frequency and activities were included in separate blocks to evaluate the relative impact of each, as previous research has shown that online activities often matter more than time spent online when evaluating outcomes (Cotten, 2008; Ellison et al., 2011; Gordon et al., 2007; Junco & Cotten, 2010; Junco et al., 2011; Morgan & Cotten, 2003; Pempek et al., 2009). Categorical variables were dummy-coded for purposes of the regression analyses. The reference categories for these variables were: female, Latino students and "some college" for highest parental education.

Analyses were conducted to test whether the data met the assumptions of hierarchical linear regression. To test for homoscedasticity, collinearity and important outliers, collinearity diagnostics and examinations of residuals were performed. The curve estimation procedure of PASW was used to plot both linear and quadratic functions to examine linearity and found that all variables met the requirements of linearity needed for a hierarchical

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blocked linear regression. Examination of model fit using the curve estimation procedure indicated there were a number of outliers, which were removed from subsequent analyses. First, 15 outliers were deleted because they had high school GPAs greater than 4.00 (while some high schools award extra academic points for advanced placement or honors courses, this was not a standard practice of high schools in this sample). Second, 20 outliers were deleted because they had high school GPAs less than 2.00 (like those who had GPAs above 4.00, those below 2.00 were not the norm in this sample and were enrolled through admissions exceptions). Third, 17 outliers were deleted based on frequency of use measures: 15 cases where students reported spending greater than or equal to 600 min per day on Facebook, and two cases where students reported checking Facebook over 500 times per day. Lastly, nine outliers were deleted because they reported studying greater than 4200 min per week. In summary, 61 cases were removed from subsequent analyses, bringing the total sample size to 1778 students. Collinearity diagnostics found that the independent variables were not highly correlated, with all tolerance coefficients being greater than 0.20. Examination of the residual plots show that variance of residual error was constant across all values of independents, indicating homoscedasticity.

3. Results

3.1. Descriptive statistics

Sixty-four percent of those who took the survey were female and 36% were male. The mean age of the sample was 21 with a standard deviation of four. The age of participants ranged from 17 to 56, though over 86% were between 18 and 22 years old. Thirty percent of students in the sample were first year students, 24% were sophomores, 21% were juniors and 25% were seniors. Highest educational level attained by either parent was as follows: 28% had a high school degree or less, 25% completed some college, 34% were college graduates and 13% had a graduate degree. In terms of race and ethnicity, the sample was overwhelmingly Caucasian, with 91% of students listing that as their race. Additionally, 5% of the sample was African American, 2% were Latino, 1% were Asian American, and 2% identified as "other" (Native Americans were included in "other" because there were only four in the sample). The gender, race, and ethnic breakdown of the sample was similar to that of the overall university population, excepting a slight overrepresentation of women in this sample. The average HSGPA in the sample was 3.32 (SD .46) and the average overall GPA was 2.95 (SD .65). Students reported preparing for class an average of 706 min (SD 526) per week.

In this sample, 92% of students reported spending at least some time on Facebook, congruent with findings by Smith and Caruso (2010). Facebook users in this sample spent a substantial amount of time on Facebook, reporting a mean of 106 min (SD 93) on the site per day and spending a mean of 79 min (SD 82) on the site "yesterday." Students also reported checking Facebook frequently, with a mean of 6 (SD 8) times per day on average and a mean of 5 (SD 7) times "yesterday." To further examine the relationship between FBTime and FBCheck, an additional variable was calculated dividing the amount of time students spent on Facebook by the number of times they checked the site. The mean amount of time spent on Facebook per check was 24 min (SD 20). Furthermore, students reported spending an average of 22 min (SD 22) on Facebook each time they checked "yesterday."

The average amount of time spent on Facebook was much higher than reported by Ellison et al. (2007) and Pempek et al. (2009), and closer to averages reported by Junco (2009). A possible explanation for the higher averages in the current study may be that, like in the Junco (2011) study, students were given the opportunity to select a continuous estimate of time spent instead of a forced-choice categorical estimate. This may have led to more introspection about how much actual time is spent on Facebook. Furthermore, categorical questions may reflect an *a priori* bias on the part of the researcher about how much time researchers believe students spend on Facebook that may not be reflected in continuous questions.

Students reported participation in a variety of Facebook activities, with "viewing photos," "commenting on content" and "checking to see what someone is up to" being the three most popular activities (see Fig. 1). Frequencies of Facebook activities found in the current study were generally congruent with those reported by Pempek et al. (2009), though that study used a different measurement scale and did not examine the same activities.

3.2. Correlations

The correlation between HSGPA and FBTime was not significant (Pearson's $r = -.038$, $p > .1$). There was a weak correlation between time spent preparing for class and FBTime (Pearson's $r = -.089$, $p < .001$). There was a weak correlation between time spent preparing for class and overall GPA (Pearson's $r = .220$, $p < .001$). There were moderate correlations between FBCheck and FBTime (Pearson's $r = .422$, $p < .001$) and between FBCheck "yesterday" and FBTime "yesterday" (Pearson's $r = .480$, $p < .001$). Since FBTime and FBTime "yesterday" were highly correlated (Pearson's $r = .76$, $p < .001$), only FBTime was used in the regression analyses. Furthermore, since FBCheck and FBCheck "yesterday" were also highly correlated (Pearson's $r = .81$, $p < .001$), only FBCheck was used in the analyses.

3.3. Regression analyses

- *Question 1: Is there a relationship among time spent on Facebook, frequency of Facebook activities and grades?*

The hierarchical linear regression predicting overall GPA using FBTime ($F_{(25,1736)} = 19.530$, $p < .001$, Adjusted $R^2 = .208$) was significant. In this model, HSGPA, checking to see what friends are up to, sharing links and having a parent (or parents) with an advanced graduate degree were all positive predictors of overall GPA, while FBTime, being African American, posting status updates and being male were negative predictors of overall GPA (Table 1).

- *Question 2: Is there a relationship among frequency of checking Facebook, frequency of Facebook activities and grades?*

The hierarchical linear regression predicting overall GPA using FBCheck ($F_{(25,1741)} = 17.262$, $p < .001$, Adjusted $R^2 = .187$) was significant. In this model, HSGPA and having a parent (or parents) with an advanced graduate degree were positive predictors of overall GPA, while chatting on Facebook chat, posting status updates, being male and FBCheck were negative predictors of overall GPA (Table 2).

- *Question 3: Is there a relationship among time spent on Facebook, frequency of Facebook activities and time spent preparing for class?*

The hierarchical linear regression predicting time spent preparing for class using FBTime ($F_{(25,1736)} = 2.909$, $p < .001$, Adjusted $R^2 = .026$) was significant. In this model, HSGPA was the only positive predictor of time spent preparing for class, while being male, chatting on Facebook chat, and FBTime were negative predictors (Table 3).

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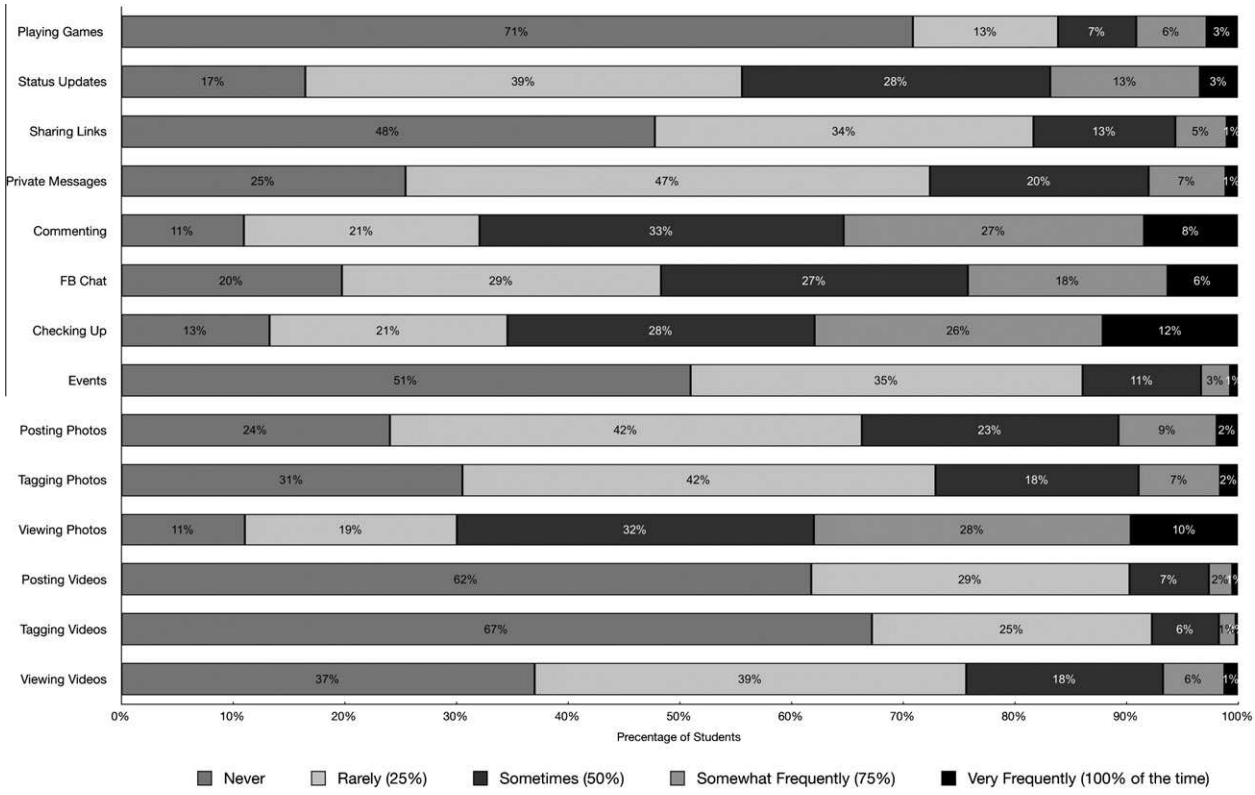


Fig. 1. Frequency of participating in Facebook activities.

Table 1
Hierarchical regression model exploring how demographics, high school GPA, average minutes/day spent on Facebook, and Facebook activities predict overall GPA ($N = 1771$).

Independent variables	Block 1 demographics β	Block 2 HS GPA β	Block 3 frequency β	Block 4 activities β
Male	−.125***	−.049*	−.069**	−.070**
African American	−.107*	−.084*	−.085*	−.079*
Asian American	.013	.002	−.002	−.002
Other ethnicity	−.022	−.023	−.027	−.022
Caucasian	.035	.017	.010	.008
Less than high school	.009	.038	.031	.030
High school	.017	.028	.031	.037
College graduate	.040	.030	.028	.026
Advanced grad degree	.058*	.059*	.056*	.054*
High School GPA		.382***	.371***	.360***
FBTime			−.176***	−.189***
Playing games				.034
Posting status updates				−.077**
Sharing links				.059*
Private messaging				.018
Commenting				−.005
Chatting				−.041
Checking up on friends				.079*
Events				.039
Posting photos				.011
Tagging photos				−.024
Viewing photos				.034
Posting videos				−.051
Tagging videos				.020
Viewing videos				−.027
Adjusted R^2	.033***	.170***	.200***	.208***

Note. β = Beta, the standardized regression coefficient.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

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Table 2
Hierarchical regression model exploring how demographics, high school GPA, Average times/day checked Facebook, and Facebook activities predict overall GPA ($N = 1776$).

Independent variables	Block 1 demographics β	Block 2 HS GPA β	Block 3 frequency β	Block 4 activities β
Male	−.124***	−.048*	−.055*	−.062*
African American	−.102*	−.080*	−.081*	−.069
Asian American	.015	.003	.003	.002
Other ethnicity	−.019	−.020	−.023	−.014
Caucasian	.042	.022	.021	.024
Less than high school	.010	.038	.036	.033
High school	.019	.029	.029	.032
College graduate	.043	.031	.030	.025
Advanced grad degree	.059*	.060*	.059*	.056*
High school GPA		.383***	.382***	.368***
FBCheck			−.072	−.060*
Playing games				−.004
Posting status updates				−.088**
Sharing links				.051
Private messaging				.023
Commenting				−.008
Chatting				−.089**
Checking up on friends				.066*
Events				.042
Posting photos				.026
Tagging photos				−.039
Viewing photos				.031
Posting videos				−.062
Tagging videos				.026
Viewing videos				−.030
Adjusted R^2	.033***	.171***	.175***	.187***

Note. β = Beta, the standardized regression coefficient.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

Table 3
Hierarchical regression model exploring how demographics, high school GPA, average minutes/day spent on Facebook, and Facebook activities predict time spent preparing for class ($N = 1762$).

Independent variables	Block 1 demographics β	Block 2 HS GPA β	Block 3 frequency β	Block 4 activities β
Male	−.100***	−.085***	−.096***	−.101***
African American	−.033	−.028	−.029	−.022
Asian American	.005	.003	.000	−.001
Other ethnicity	.038	.038	.035	.042
Caucasian	.010	.007	.003	.009
Less than high school	.015	.021	.017	.017
High school	−.030	−.028	−.026	−.029
College graduate	−.044	−.046	−.047	−.048
Advanced grad degree	−.017	−.017	−.018	−.019
High school GPA		.077**	.071**	.061*
FBTime			−.095***	−.062*
Playing games				−.019
Posting status updates				−.023
Sharing links				.007
Private messaging				−.017
Commenting				.045
Chatting				−.090**
Checking up on friends				.031
Events				.008
Posting photos				−.008
Tagging photos				−.049
Viewing photos				.023
Posting videos				−.002
Tagging videos				−.039
Viewing videos				.031
Adjusted R^2	.009**	.014***	.023***	.026***

Note. β = Beta, the standardized regression coefficient.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

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Table 4
Hierarchical regression model exploring how demographics, high school GPA, average times/day checked Facebook, and Facebook activities predict time spent preparing for class (N = 1767).

Independent variables	Block 1 demographics β	Block 2 HS GPA β	Block 3 frequency β	Block 4 activities β
Male	−.100***	−.085***	−.088***	−.099***
African American	−.028	−.023	−.024	−.015
Asian American	.007	.004	.004	.002
Other ethnicity	.041	.040	.039	.046
Caucasian	.017	.013	.013	.020
Less than high school	.016	.021	.020	.019
High school	−.027	−.025	−.025	−.028
College graduate	−.042	−.044	−.045	−.048
Advanced grad degree	−.016	−.016	−.016	−.018
High school GPA		.079**	.079**	.065**
FBCheck			−.037	−.017
Playing games				−.030
Posting status updates				−.027
Sharing links				.004
Private messaging				−.016
Commenting				.043
Chatting				−.105***
Checking up on friends				.025
Events				.010
Posting photos				−.003
Tagging photos				−.054
Viewing photos				.021
Posting videos				−.005
Tagging videos				−.037
Viewing videos				.030
Adjusted R^2	.009**	.015***	.015***	.024***

Note. β = Beta, the standardized regression coefficient.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

- *Question 4: Is there a relationship among frequency of checking Facebook, frequency of Facebook activities and time spent preparing for class?*

The hierarchical linear regression predicting time spent preparing for class using FBCheck ($F_{(25,1741)} = 2.744$, $p < .001$, Adjusted $R^2 = .024$) was significant. In this model, HSGPA was a positive predictor of time spent preparing for class, while chatting on Facebook chat and being male were negative predictors (Table 4).

4. Discussion

4.1. Research questions

- *Question 1: Is there a relationship among time spent on Facebook, frequency of Facebook activities and grades?*

FBTime was negatively predictive of overall GPA. Furthermore, frequency of checking to see what friends are up to and sharing links were positively predictive of overall GPA, while frequency of posting status updates was negatively predictive. Confirming previous research, HSGPA proved the strongest predictor of overall GPA with a β weight of .360 (DeBerard et al., 2004; Geiser & Santelices, 2007; Williford, 2009). The β weight of time spent on Facebook was −.189. Therefore, an increase of one standard deviation in time spent on Facebook (93 min) decreased overall GPA by .189 standard deviation, while an increase of one standard deviation in HSGPA (.46) equated to a .360 standard deviation increase in overall GPA. In other words, time spent on Facebook is half as strong of a predictor of overall GPA as HSGPA, the strongest single predictor of college grades.

While taking important control variables into account, time spent on Facebook is a strong negative predictor of overall college GPA. Specifically, large increases in time spent on Facebook relate to lower overall GPAs. In this model, increasing time spent on Facebook by one standard deviation (or 93 min) was related to a .189 standard deviation decrease in GPA. Because the mean time spent on Facebook was 106 min, an increase of one standard deviation serves to double time spent on Facebook. To further illustrate this, consider this example: a student who spends 279 min (or three times the standard deviation of FBTime) more on Facebook than average has an overall GPA .37 points (the standard deviation of overall GPA multiplied by .189 then multiplied by three) lower than average.

This finding is congruent with both Astin's (1984) and Chickering and Gamson's (1987) theories that the amount of time engaged in academic work is predictive of academic success. While time spent on Facebook in and of itself might *theoretically* not be problematic, large amounts of time spent on Facebook seem to detract from time spent focusing on academic work. Focusing less time on academic work would certainly negatively impact academic success, measured in this case by grades. These results show that students have to spend an enormous amount of time on Facebook for that use to have a substantial real-world impact on overall GPA.

- *Question 2: Is there a relationship among frequency of checking Facebook, frequency of Facebook activities and grades?*

Frequency of checking Facebook was also negatively predictive of overall GPA, although the relationship was not strong. Furthermore, frequency of checking to see what friends are up to was positively predictive of overall GPA, while frequency of chatting on Facebook chat and frequency of posting status updates were negatively predictive. Again, HSGPA was the strongest predictor of overall GPA with a β weight of .368. The β weight of FBCheck

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was −.060, which was much lower than the corresponding β weight for FBTime. An increase of one standard deviation in HSGPA (.46) equated to a .368 standard deviation increase in overall GPA, while an increase of one standard deviation in FBCheck (8 checks) decreased overall GPA by .060 standard deviation. In this model, the predictive strength of FBCheck was nowhere near the predictive strength of HSPGA. In fact, frequency of chatting on Facebook chat, posting status updates and checking to see what friends are up to were stronger predictors of overall GPA.

It seems that the behavior of checking Facebook is not related to time spent on Facebook for a few reasons: First, there was only a moderate correlation between FBCheck and FBTime (Pearson's $r = .422$, $p < .001$). While the correlation was significant, the variables do not share a large amount of variance. Squaring Pearson's r gives the proportion of variance shared by the two variables; in the case of FBCheck and FBTime, the proportion of variance shared is only 18%. Second, it is clear that the FBCheck model predicts a substantially lower proportion of the variance in overall GPA both by examining the β weights and by evaluating the adjusted R^2 as compared to the FBTime model. This makes further sense if one considers the difference between the two behaviors illustrated by an example: one student may log into Facebook once and spend 2 h on the site, while another may log into Facebook ten times and spend only 2 min online each time. Lastly, the average amount of time students spent on Facebook each time they checked the site was low, showing that the moderate correlation between FBTime and FBCheck cannot be explained by students checking Facebook few times but staying on for long periods of time during each log in.

While there is a negative relationship between average number of times a student checks Facebook and overall GPA, that relationship is weak and does not contribute much to real-world changes in overall GPA. Therefore, the simple act of checking Facebook is not as worrisome a behavior when it comes to academic outcomes as time spent on Facebook. This conclusion is congruent with both Astin's (1984) and Chickering and Gamson's (1987) theories about time, effort and academic outcomes—that is, using Facebook in and of itself is not problematic; however, large amounts of time spent on Facebook seem to detract from academic activities related to GPA. The following two models explore the relationship between Facebook use and time spent studying in order to evaluate whether the relationship between Facebook use and GPA can be explained by students spending less time preparing for their courses.

- *Question 3: Is there a relationship among time spent on Facebook, frequency of Facebook activities and time spent preparing for class?*

Even though time spent on Facebook was significantly negatively related to time spent preparing for class, the relationship was weak after including Facebook activities. Before activities were included in the third block, time spent on Facebook was a stronger negative predictor of time spent preparing for class (with a β weight of −.095). The inclusion of Facebook activities in the model decreased the predictive ability of time spent on Facebook. One explanation for this drop in β value is that the main activity that produced the negative relationship between FBTime and time spent studying was chatting via Facebook chat. Therefore, participation in Facebook chat is related to less time spent preparing for class, presumably because of the amount of time necessary to engage in chat and the focus needed to do so.

Unlike previous models, HSGPA was not the strongest predictor of time spent studying with a β weight of .061, which made it a weaker predictor than being male, frequency of chatting on Facebook chat or FBTime, respectively. In fact, HSGPA was the weakest predictor of time spent preparing for class, suggesting that prior academic ability is only slightly related to time spent studying. While HSGPA predicted college GPA, it does not seem that this effect is because students with stronger academic abilities study any more (or less) than those with weaker abilities. The β weight of time spent on Facebook was −.062. Therefore, an increase of one standard deviation in time spent on Facebook (93 min) decreased hours spent preparing for class by .062 standard deviation, showing a weak relationship between the two.

While taking important control variables into account, time spent on Facebook is a weak negative predictor of time spent studying. Specifically, large increases in time spent on Facebook related to slightly less time spent preparing for class. In this model, an increase of one standard deviation in FBTime (93 min) related to a .062 standard deviation decrease in time spent preparing for class, which equated to 33 min per week. To further illustrate this, consider an example of a student scoring three standard deviations above the mean on time spent on Facebook. This student would spend 279 min (or 4 h and 40 min) more on Facebook than average and would spend 99 min (or 1 h and 40 min) less per week preparing for class than average.

Interestingly, the fact that Facebook use was weakly related to time spent preparing for class was not congruent with the fact that time spent on Facebook was strongly related to overall GPA, and was not congruent with Astin's (1984) and Chickering and Gamson's (1987) theories of time on task. The fact that time spent on Facebook is only slightly negatively related to time spent preparing for class suggests that there is another mechanism at work other than the detraction of time away from studying that is responsible for a negative relationship between time spent on Facebook and grades. An examination of the relationship between frequency of chatting on Facebook chat and time spent preparing for class may shed some light on this finding. Junco and Cotten (2010) found that time spent chatting online was related to students reporting not getting their schoolwork done. In that study, chatting online was related to multitasking and may have had a direct effect on schoolwork because of learning impairments due to cognitive overload (Junco & Cotten, 2010). While not examined in the current study, it could be that an activity like chatting lends itself more to multitasking and to multitasking's resultant academic impairments.

- *Question 4: Is there a relationship among frequency of checking Facebook, frequency of Facebook activities and time spent preparing for class?*

Facebook checking was not related to time spent preparing for class. Furthermore, a similar pattern of results emerged with HSGPA being weakly, positively related to time spent preparing for class, and chatting on Facebook chat being negatively related. As was discovered in the models examining Facebook use and GPA, checking Facebook is weakly related to time spent on Facebook, and therefore must be treated as a wholly different behavior.

4.2. Summary

Congruent with findings by Kirschner and Karpinski (2010) but conflicting with findings by Kolek and Saunders (2008) and Pasek et al. (2009), time spent on Facebook was strongly negatively predictive of overall college GPA. In this sample, time spent on Facebook was half as strong of a predictor as the strongest single predictor of college GPA, high school GPA. Additionally, while time spent on Facebook was a strong negative predictor of GPA, checking Facebook was a weak negative predictor, supporting the idea that these are two different behaviors. While models predicting overall GPA supported the notion that time spent on Facebook would detract from time spent on academic activities (and therefore lead to poorer academic performance as suggested by Astin's

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(1984) and Chickering and Gamson's (1987) theories), this was not supported by the models predicting time spent preparing for class.

Both models exploring the relationship between Facebook use and time spent preparing for class were significant, and while time spent on Facebook was a significant yet weak negative predictor in one model, Facebook checking was not significant in the other model. This pattern suggests that the negative relationship between Facebook use and grades cannot be completely or even somewhat explained by a relationship between time spent on Facebook and studying as hypothesized. Put in different terms, time spent on the academic task of studying does not seem to be influenced by time spent on Facebook even though time spent on Facebook is negatively related to GPA. This suggests that there is another mechanism at work that would explain the relationship between Facebook use and GPA—a possibility to be explored in future research on this topic.

Frequency of engaging in some Facebook activities was predictive of both GPA and time spent preparing for class, a finding congruent with other research on Internet activities showing that how technologies are used is more important in predicting outcomes than time spent on the technology (Cotten, 2008; Ellison et al., 2011; Gordon et al., 2007; Junco & Cotten, 2010; Junco et al., 2011; Morgan & Cotten, 2003; Pempek et al., 2009). This is also congruent with research on educational technology which demonstrates that how these technologies are used in educational settings makes a difference in whether academic outcomes are positive or negative (Aypay et al., 2007; Bliuc et al., 2010; DiGregorio & Sobel-Lojeski, 2010; Suhr et al., 2010; Rizzuto et al., 2009; Sapp & Simon, 2005; Shapley et al., 2010; Tienken & Wilson, 2007; Waight & Abd-El-Khalick, 2007; Weatherly et al., 2003). Clearly, certain uses of Facebook result in negative academic outcomes, while others result in positive ones.

Specifically, posting status updates and chatting on Facebook chat were negatively predictive of GPA, while checking to see what friends are up to and sharing links were positively predictive. Interestingly, posting status updates was only the fourth most common Facebook activity, yet it would seem an integral part of the Facebook experience, as updates have been one of the highlights of the site's features since the launch of the platform. Later in this paper, posting status updates is explored as one of several activities that points to social Facebook behaviors that negatively predict academic outcomes. As discussed previously, chatting on Facebook chat may involve multitasking and may have had a direct effect on schoolwork because of learning impairments due to cognitive overload (Junco & Cotten, 2010). Sharing links on Facebook seems as close to an academic activity as any others because links usually refer to blog posts or news stories, while checking to see what friends are up to may be related to the construct of student engagement leading to greater academic gains (Junco et al., 2011; Kuh, 2009). Posting status updates, on the other hand, is an activity that is more focused on broadcasting personal information than it is on sharing knowledge (like posting links) or engaging with friends (like checking to see what they are up to). Future research will want to further examine how and why students engage in these Facebook activities in order to better understand their relationship to academic outcomes.

While there was a negative relationship between time spent on Facebook and grades, it is important to look at the real-world implications of these findings. First, while time spent on Facebook was strongly negatively predictive of GPA, the amount of additional time on Facebook needed to produce a substantial decrease in GPA was enormous. For instance, to effect a change of .37 grade points on GPA, a student would have to score three standard deviations from the mean on FBTime. Furthermore, the model using FBTime predicted 20.8% of the variance in overall GPA. This model included high school GPA, the single strongest predictor of college GPA (DeBerard et al., 2004; Geiser & Santelices, 2007; Williford, 2009). And while predicting 20.8% of the variance suggests good predictive power as compared to other studies predicting college GPA, almost 80% of the variance in overall GPA is left to be predicted using other variables (DeBerard et al., 2004; Geiser & Santelices, 2007; Williford, 2009). These other variables may include things like student personality characteristics, motivation, and engagement.

The real-world implications of Facebook use on academic success can be further understood by evaluating the models using Facebook checking as predictors. Facebook checking was weakly associated to GPA and was not associated to time spent preparing for class. This suggests that using Facebook *in and of itself* is not detrimental to an academic outcome such as GPA or a time on task outcome, like time spent studying. Indeed, it seems that only large amounts of time spent on Facebook produce the greatest effect on outcome measures such as GPA and time spent studying.

Even with that caveat, it is important to recognize that there are certain patterns of Facebook use that are related to lower academic performance. For instance, large amounts of time spent posting status updates predicts lower GPAs, while a higher proportion of time spent chatting on Facebook chat predicts less time spent studying. Not only is Facebook checking not strongly related to GPA, but also the average time students spend on Facebook each time they check is not high. Therefore, faculty, advisors, and other higher education staff may be able to use these indices to identify students who are at risk of failure due to how they use Facebook. For instance, a student who spends hours on Facebook posting status updates and chatting on Facebook chat may be more at risk than a student who checks Facebook a few times a day and shares links and checks up on friends. Additionally, when using Facebook in courses or to advertise campus events or services, higher education professionals have an opportunity to encourage beneficial uses and discourage detrimental uses (for instance, faculty could use Facebook for activities similar to the Twitter activities used by Junco et al. (2011) to improve engagement and grades).

4.3. Limitations

The major limitation of this study is that it is cross-sectional and correlational in nature, and therefore it is impossible to determine the causal mechanisms between Facebook use, overall GPA, and time spent preparing for class. While the data show that GPA and Facebook use are negatively related, the direction of the effect is difficult to determine. For instance, it could be that students who spend more time on Facebook have lower GPAs; however, it is equally likely that students who have lower GPAs spend more time on Facebook. Furthermore, other as-yet-to-be-measured variables may be causally linked to Facebook use, GPA and time spent preparing for class. Certainly, the difference between the models predicting GPA and time spent studying raise this issue; if time spent on Facebook is negatively related to GPA, why is there only a weak association between time spent on Facebook and time spent preparing for class? Further longitudinal and controlled studies are needed in order to determine the mechanisms of causation. A related limitation is that, while this sample was representative of the overall university population on which it is based, it may not be representative (with respect to racial, ethnic and income factors) of all institutions in the United States. Future research will want to replicate this study with more diverse samples in terms of race, ethnicity, income and academic institutions.

There are two limitations related to the outcome variable overall GPA: First, the real-world impact of a .12-point decrease in GPA for every 93-min increase in time spent on Facebook is negligible

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at best. That being said, it is important to note that large changes in time spent on Facebook relate to larger changes in GPA. Second, it is unclear if GPA is the best proxy measure of academic success. Certainly, there are other variables related to academic success, such as cognitive development, psychosocial development, self-esteem, locus of control, moral and ethical development and persistence (Kuh, 2009). While this study did not measure these other outcome variables, further research on these outcomes is both encouraged and necessary to obtain a better picture of the relationship between Facebook use and academic success. Additionally, as suggested previously, future research may want to include multitasking as a predictor variable to attempt to parse out the effects of divided attention while using Facebook.

A final limitation was related to estimating time spent on Facebook and time spent preparing for class. Specifically, FBTime, FBCheck, Facebook activities and time spent preparing for class were all assessed via self-report. Investigators conducting further research on this topic should keep in mind that self-reported time spent on Facebook and checking Facebook yield different estimates of frequency of use and that asking to estimate average time and time spent "yesterday" yield subtle differences as well. Therefore, future research will want to combine multiple measures of Facebook frequency of use to arrive at a more complete picture of the relationship between Facebook use and outcome variables. Additionally, future research may want to ask students how much time they are active on Facebook in addition to how long they are logged on. Ideally, further research will attempt to make assessments of actual time spent on Facebook, either through observations or other logging methods.

5. Conclusion

Results from this study show that time spent on Facebook and checking Facebook were negatively related to overall GPA, while time spent on Facebook is slightly negatively related to time spent studying. These results do not completely align with Astin's (1984) and Chickering and Gamson's (1987) models of time on task; that is, while time spent on Facebook relates negatively to overall GPA, it does not relate in a meaningful way to time spent preparing for class. Furthermore, while the relationship between time spent on Facebook and grades is negative, the real-world impact of said relationship does not seem to be a major detriment to academic success. In other words, there may be other variables that are more strongly related to overall GPA and time spent preparing for class that should be the focus of examination and intervention, instead of student use of Facebook. On the other hand, the ability of time spent on Facebook to significantly predict overall GPA indicates that there may be some negative academic impacts for students who use Facebook in certain ways.

Specific uses of Facebook are related to positive outcomes while others are related to negative ones. Sharing links and checking to see what friends are up to are positively related to GPA, while posting status updates is negatively related. Furthermore, using Facebook chat is negatively related to time spent studying. It seems that using Facebook for activities that involve collecting and sharing information (checking to see what friends are up to and sharing links, respectively) is more positively predictive of outcomes than using Facebook for socializing (status updates and chatting). The distinction is seen offline on college campuses—those students who spend more time socializing to the exclusion of engaging in academic work have poorer academic outcomes (Pascarella & Terenzini, 2005). Further, this distinction is similar to the one reported by Junco (2011), who found that using Facebook for communicative activities (such as commenting and creating or RSVP'ing to events) was positively related to engagement, while using Facebook for non-communicative activities (playing games and checking to see what friends are up to) was negatively related to engagement.

The connection between Facebook use, student engagement, and academic outcomes is worthy of further exploration. The research on student engagement is clear—a more engaged student is a more successful student (Kuh, 2009; Pascarella & Terenzini, 2005). Therefore, it is important for future research to evaluate how Facebook use influences student engagement and how, in turn, that engagement influences academic performance. The current study shows that certain uses of Facebook that mimic educational behaviors—primarily, gathering information (checking to see what friends are up to) and sharing information (sharing links)—relate to positive academic outcomes. While considering Junco's (2011) finding that communicative uses of Facebook relate to positive outcomes, and in tandem with the assessment of extraneous variables like student personality characteristics and motivation, we can hope to furnish more accurate predictive models to help higher educators generate interventions where appropriate. The categories of "communicative" and "collecting and sharing information" do not seem to be mutually exclusive (for instance, checking to see what friends are up to is included in both). There may be extraneous variables, like student personality characteristics and motivation that relate to these important outcomes. Assessing these variables more fully can help lead to predictive models that can suggest interventions for higher educators. For example, given the results of the current study, educators may want to target interventions at not just students who spend a great deal of time socializing offline, but also those who spend a great deal of time socializing online as well.

As the interest in using social media, like Facebook, in educational settings increases, educators must be aware of how to integrate these sites and services in educationally relevant ways (Junco et al., 2011). The results from the current study will help inform not only interventions for students who exhibit problem behaviors, but also interventions to support student learning and engagement. As Junco et al.'s (2011) research has shown, having students communicate (and therefore socialize) about course content leads to greater gains in academic performance. With Facebook, a faculty member might create a Facebook group for a course and ask students to socialize about course content and share course-related information from news sources. Information presented via such a familiar platform—and one with generally contemporary and social implications—might seem more accessible or relevant to students; further research should explore the outcomes of academic information delivered in this way compared to traditional means of information dissemination (e.g., paper handouts, emails, course management systems). Facebook technology should be manipulated by higher education professionals in a way that leverages the site's ubiquity and popularity toward positive academic outcomes; by identifying and exploring the relationship between individual Facebook activities and student learning behaviors, educators might transform activities currently related to poorer outcomes into beneficial academic experiences.

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Appendix A. Facebook activities

- Playing games (FarmVille, MafiaWars, etc.).
- Posting status updates.
- Sharing links.
- Sending private messages.
- Commenting (on statuses, wall posts, pictures, etc.).
- Chatting on Facebook chat.
- Checking to see what someone is up to.
- Creating or RSVPing to events.
- Posting photos.
- Tagging photos.
- Viewing photos.
- Posting videos.
- Tagging videos.
- Viewing videos.

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