Computers in Human Behavior 29 (2013) 2179–2182

Contents lists available at SciVerse ScienceDirect

Computers in Human Behavior

journal homepage: www.elsevier.com/locate/comphumbeh

When it comes to Facebook there may be more to bad memory than just multitasking ☆

Scott T. Frein [a,*], Samantha L. Jones [a], Jennifer E. Gerow [b]

[a] Department of Psychology, Virginia Military Institute, United States
[b] Department of Economics and Business, Virginia Military Institute, United States

ARTICLE INFO

Article history:
Available online 31 May 2013

Keywords:
Facebook
Memory
Divided attention
Social networking
Social media

ABSTRACT

Previous research has shown that high levels of Facebook use are associated with lower grades in college students. Divided attention in the form of trying to use Facebook during class or while studying has been suggested as a possible explanation for this finding. In the current study, 44 participants were divided into high and low Facebook users and completed a memory test for 72 words. Participants were not allowed to use Facebook, or any other electronic device, during the study thereby eliminating divided attention between Facebook and the task at hand as a possible explanation for the results. High Facebook users (defined as spending more than one hour a day on Facebook) scored significantly lower on the free recall test than low Facebook users. Possible explanations for this finding are discussed.

1. Introduction

Facebook is a social networking site designed to help individuals connect with one another. Since its founding in 2004, it has grown to over one billion users in more than 70 countries. When it was first introduced, the purpose of Facebook was to help students attending Harvard connect with other Harvard students. It soon expanded to other college campuses; in 2006, Facebook became available to the general public (Facebook.com, 2012). Not surprisingly, researchers are interested in understanding how Facebook users are being affected by the social networking site. One area of particular interest is determining the impact of Facebook use on academic performance.

1.1. Facebook and academic performance

Kirschner and Karpinski (2010) found that Facebook users reported lower GPAs and spent less time studying each week than non-Facebook users. Similarly, Junco (2012) and Junco and Cotten (2012) found that Facebook use was negatively associated with college GPAs. These findings are not too surprising for a number of reasons. First, if Facebook users are spending less time studying than non-Facebook users as reported by Kirschner and Karpinski, it is not unexpected that they would report having lower GPAs. Second, Junco and Cotten found that students frequently reported accessing Facebook during lectures. If students are directing their attention to Facebook instead of class lecture or activities, it would be expected that they do not do as well in their classes compared to students who pay more attention to the course content during lectures. Third, previous research has shown that students who spend more time on the internet have lower GPAs. Chen and Peng (2008) found that heavy internet users had lower grades than non-heavy internet users. In addition, heavy internet users reported lower learning satisfaction and worse relationships with administrative staff at their schools. Likewise, Englander, Terregrossa and Wang (2010) found a negative relationship between hours of Internet use and students' grades. Therefore, even though Facebook is a single internet site designed specifically for social networking, the finding that increased Facebook use is associated with lower grades is similar to what researchers have found when they examined general internet use and grades.

1.2. Effects of multi-tasking on cognitive performance

There is ample evidence that trying to perform two tasks at once results in lower performance. Strayer and Johnston (2001) found that individuals who talk on a cell phone during a simulated driving task took longer to both detect and react to traffic signals. Similarly, Owens, McLaughlin, and Sudweeks (2011) found that texting while driving results in longer periods of time with the drivers looking away from the road than just driving does. In addition, it interferes with steering and produces higher mental demands than driving without texting. Both articles suggest that the primary reason for the degraded driving performance of cell phone users and text messagers is the fact that their attention is divided between the task of driving and the use of technology.

☆ Portions of this manuscript were presented at the 2012 Association for Psychological Science annual meeting.

* Corresponding author. Address: Department of Psychology, Virginia Military Institute, Lexington, VA 24450, United States. Tel.: +1 540 464 7097.
E-mail address: freinst@vmi.edu (S.T. Frein).

0747-5632/$ - see front matter © 2013 Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.chb.2013.04.031

Bowman, Levine, Waite, and Gendron (2010) examined the effect of multitasking on reading by having students read a passage while instant messaging. Although they did not find any difference in performance on the reading comprehension task among the groups, they did find that it took individuals significantly longer to finish the reading passage if they were also instant messaging (even when controlling for the time taken to instant message). This suggests that students who read while instant messaging may have to re-read the information multiple times in order to achieve the same level of understanding as those who read the passage without instant messaging. The American Psychological Association also published a paper reviewing the costs of multitasking and concluded that multitasking tends to lead to slower performance rather than more rapid completion of tasks as is frequently believed by those who engage in multitasking (American Psychological Association, 2006).

Finally, Wood et al. (2012) examined the effects of multitasking on classroom learning in a university setting. They compared multiple types of multitasking (Facebook use, e-mailing, texting) to various note-taking conditions such as paper-and-pencil and using a computer for note taking; they found that students who did not use any type of technology outperformed those students who used some type of technology during the lecture. They explained the results in terms of a bottleneck in attention in which off-task use of technology impaired students' ability to remember information presented during the lecture. Given this wide range of findings regarding the negative effects of multitasking on performance, the finding that students who frequently use Facebook while studying or during class lectures do not perform as well academically as other students seems to fit within the existing literature.

1.3. Long term impact of Facebook use

These research findings suggest that divided attention plays a key role in the reduced performance associated with Facebook use. This leads to the question of whether or not high Facebook users would demonstrate performance similar to low Facebook users if they were not allowed to use Facebook during testing (i.e. there was no divided attention). This question was first addressed by Jones (2012). In her study, participants were divided into groups of high and low Facebook users and given both a temporal memory test as well as a free recall memory test. She found that there was no difference in temporal memory between the two groups, but there was a non-significant trend toward reduced free recall memory ($p = .07$) for high Facebook users compared to low Facebook users. This finding was intriguing because other researchers have previously shown a relationship between memory and academic achievement (Fulton, Yeates, Taylor, Walz, & Wade, 2012; Geary, 2011; Swanson, 2011). If high levels of Facebook use are negatively associated with free recall memory performance even when Facebook use is not allowed during the study, it suggests that divided attention may not be the only explanation for the negative correlations between Facebook use and student grades discussed earlier. However, the results reported by Jones may have been influenced by the second exposure to the words in the temporal memory test, which preceded the free recall memory test. The current study addresses this issue and builds on the work originally done by Jones.

2. Methodology

2.1. Participants

Forty-four participants (six females) at a small liberal arts college in Virginia ranging in age from 18 to 25 years old completed the study.

2.2. Materials

For the memory test, seventy-two words (twenty-four pleasant, twenty-four unpleasant, twenty-four neutral) taken from Maddock, Garrett, and Buonocore (2003) were used.

2.3. Procedures

Participants took part in the study in groups ranging in size from 11 to 20. At the start of the study, participants completed an informed consent form and were given a packet of blank paper containing four sheets. In addition, they were told that they would be taking part in a memory test and their task was to remember as many of the words that they saw as possible. Participants were shown two sets of 42 words each. Three extra neutral words were included at the beginning and end of each word set to account for primary and recency effects. Words were presented at a rate of one word every two seconds on a screen at the front of the classroom using PowerPoint. After the forty-second word, a slide instructed participants that they would be taking a math test and to complete as many problems as possible within the allotted time. This slide advanced after 30 s. The next slide contained twelve complex multiplication problems for participants to complete by hand. At the end of three minutes, this slide automatically advanced to the next slide, which instructed participants to turn to a clean sheet of paper. Participants were given four minutes to write down as many of the words from the first set of words as they could remember. This entire procedure was completed again with a second set of 42 words. After the second free recall test, participants were given a demographic sheet and a survey packet that asked them about their Facebook habits.

2.4. Results

Participants were divided into two groups based on their response to the item "How much time do you spend logged on to Facebook each day." Those that responded more than one hour per day were classified as high Facebook users and those that used it for an hour or less a day were classified as low Facebook users. There were 20 low Facebook users and 24 high Facebook users. An independent groups t-test found that low Facebook users recalled significantly more words than high Facebook users ($t(41) = 3.774$, $p = .008$, see Fig. 1). One high Facebook user was excluded from data analysis for scoring more than three standard deviations above the group average (Daniel & Terrell, 1995; Tabachnick & Fidell, 2007).

3. Discussion

3.1. Similarity to previous research

This experiment builds on the findings reported by Jones (2012). In that paper, she found a non-significant trend for high Facebook users to have reduced free recall compared to low Facebook users. However, the results reported in Jones' article were based on a different question than the one used in this article. Jones divided Facebook participants into high and low users based on the amount of "active Facebook use" they reported. Active Facebook use involved things like posting updates and pictures, commenting on other people's posts, and instant messaging with a friend. The current study divided Facebook participants into high and low users by asking how much time they spent logged onto Facebook each day as opposed to actively using Facebook. Although the time logged onto Facebook per day was recorded by Jones, that analysis was not previously done or reported in