



Effects of loneliness and differential usage of Facebook on college adjustment of first-year students



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ABSTRACT

The popularity of social network sites (SNSs) among college students has stimulated scholarship examining the relationship between SNS use and college adjustment. The present research furthers our understanding of SNS use by studying the relationship between loneliness, varied dimensions of Facebook use, and college adjustment among first-year students. We looked at three facets of college adjustment: social adjustment, academic motivation, and perceived academic performance. Compulsive use of Facebook had a stronger association with academic motivation than habitual use of Facebook, but neither were directly correlated with academic performance. Too much time spent on Facebook was weakly but directly associated with poorer perceived academic performance. Loneliness was a stronger indicator of college adjustment than any dimension of Facebook usage.

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1. Introduction

As social network site (SNS) usage becomes endemic among young adults (Madden & Zickuhr, 2011), there has been increasing interest in the social and psychological effects of the medium (e.g., Ellison, Steinfield, & Lampe, 2007; LaRose, 2010b; Valkenburg, Peter, & Schouten, 2006) with much of the evidence pointing to positive impacts. However, there is presently conflicting evidence about the impact of SNS use on academic performance (e.g., Kirschner & Karpinski, 2010; Junco, 2011b; Pasek, More, & Hargittai, 2009). The present research focuses on SNS use during a period of life that is fraught with both psychological and academic stress: the transition from high school to college. This article attempts to resolve null and inconsistent findings by examining the relationships of three components of college adjustment—social adjustment, academic motivation, and perceived academic performance—among first year college students as they are affected by varying dimensions of SNS use.

2. Loneliness and the first-year college student

The psychological, social, and academic adjustment of first year college students are topics of ongoing interest to educators (e.g., Pascarella & Terenzini, 1983; Robbins et al., 2004). Studies have shown that adjustment during the first year of college has a strong impact on academic achievement and persistence (Westwood & Barker, 1990; Wintre & Bowers, 2007) and thus can have an enduring impact on the life prospects of many individuals.

Loneliness has long been recognized as a reality for college students in their first year (Russell, Peplau, & Cutrona, 1980) and has been strongly associated with college adjustment in prior research (Nicpon et al., 2007). Since SNSs, such as Facebook, make it easier to access and interact with social network ties that are not co-located (Ellison et al., 2007), SNS use could either amplify loneliness by making distant ties more salient or could ameliorate it by facilitating provisions of social support—prior research supports both hypotheses.

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In “positive” examples, studies show that SNSs have the potential to foster successful college adjustment by helping new students identify like-minded friends and obtain useful information from peers about classes and study strategies (e.g., Lampe, Wohn, Vitak, Ellison, & Wash, 2011; Liccardi et al., 2007; Madge, Meek, Wellens, & Hooley, 2009). Studies have also shown that SNSs can ameliorate loneliness through infusions of social support (Mattanah et al., 2010) and social capital (Ellison et al., 2007; Ellison, Steinfield, & Lampe, 2011). However, SNS usage also has negative outcomes: college adjustment could also be impeded by continuing to engage in SNS-enabled communication with precollege friends (Paul & Brier, 2001). SNSs could intensify loneliness by encouraging withdrawal from offline social interactions (LaRose, Kim, & Peng, 2010) or by substituting superficial online relationships for more intimate ones (Moody, 2001). It is thus important to understand the relationship between Facebook use and feelings of loneliness among first-year students. The transition to college is of particular interest since it marks a time in which individuals undergo drastic changes in their physical, social, and academic environment, as well as interpersonal relationships and media habits.

In prior research, the association between indicators of SNS use and loneliness were statistically significant but rather weak. Burke, Marlow, and Lento (2010) used server-level behavioral data of specific Facebook feature use combined with self-reports of loneliness and presented a regression model that explained 42% of the overall variance for loneliness. Facebook-related factors that contributed to loneliness included lower levels of directed communication through Facebook, number of Facebook Friends, and active consumption of Facebook content (e.g., clicking on newsfeeds or photos posted by others) but not the overall amount of use. However, Facebook-related factors accounted for little variance in loneliness compared with self-esteem and life satisfaction; in other words, the main variables driving the explanation for loneliness were other psychological well-being factors.

Burke et al. (2010) used cross-sectional data collected from a sample solicited from the general Facebook population through a Facebook advertisement. The research reported here extends this work by focusing a particular sample that is known to struggle with loneliness—first-year undergraduate students—and employing longitudinal data to make stronger claims about the directionality of the relationships.

Past work has established that general Internet use is equally plausible as either the cause or the effect of loneliness among college populations (Kim, LaRose, & Peng, 2009) and previous research has argued that loneliness is a cause of Internet use (Caplan, 2006; Ceyhan & Ceyhan, 2007). Therefore, in the context of studying first-year college students, it is plausible to test whether loneliness affects Facebook use rather than the other way around. Research indicates that the transition into college itself is a process that creates loneliness. This in turn may stimulate changes in media use, including social network site use. Our overall research agenda, therefore, is to explore the relationship among loneliness, SNS use, and college adjustment. Specifically, we explore whether loneliness is directly associated with SNS use and how SNS use is associated with academic motivation and academic performance.

3. SNS usage and college adjustment

Research examining the relationship of SNS usage to college adjustment have mainly focused on academic performance (i.e., grades), and have had mixed results. One study found a significant positive relationship and two nulls across three samples (Pasek et al., 2009), four studies found significant negative relationships (Jacobsen & Forste, 2011; Junco, 2011b; Kirschner & Karpinski, 2010; Raacke & Bonds-Raacke, *in press*), and two others found no relationships (Kalpidou, Coston, & Morris, 2011; Kolek & Saunders, 2008). Non-significant but negative relationships between SNS use and academic performance were found in Kalpidou et al. (2011). Junco (2011b) found that the time spent on studying was not influenced by time spent on Facebook although time spent on Facebook was negatively related to GPA.

It is difficult to draw any definitive conclusions from the literature on SNS usage and academic performance, because the concept and measurement of SNS usage varied across studies. A variety of operational definitions of SNS usage can be found, including self-reports of the number of hours spent on SNS in a typical day, the frequency with which sites are accessed, the duration of the average session (e.g., Ellison et al., 2007; Kalpidou et al., 2011; Pasek et al., 2009; Valkenburg et al., 2006), time spent derived from time allocation diaries (Jacobsen & Forste, 2011), and measures of the duration of SNS use and activation of SNS features derived from server logs (Burke et al., 2010).

Time spent on Facebook is one component of a widely cited index, Facebook Intensity (FBI, Ellison et al., 2007) used both in previous research on the effects of SNS on academic performance (Kalpidou et al., 2011) and loneliness (Burke et al., 2010). FBI measures several related, but distinct, constructs that will be disaggregated here to obtain a more nuanced understanding of the effects of SNS on first year college students. Here, we define SNS usage as an overt, observable behavior, following LaRose (2010b). The three types of SNS usage that we will examine will be time, habitual use, and compulsive use. The number of Facebook Friends, which is included in FBI, will not be included in our measure of Facebook usage, but rather used as a separate measure that indicates the size of an individual's online network.

3.1. Habitual use of SNS

Habits exist when individuals engage in a behavior without conscious knowledge, awareness or intention (Verplanken, 2006) and are considered a form of automaticity (Bargh & Chartrand, 1999). They come about in the service of cognitive efficiency when control over a behavior switches from the prefrontal cortex to the basal ganglia in the cerebrum so that routine, repetitive behaviors can be executed without exerting limited cognitive resources (LaRose, 2010a). However, repeat behaviors are manifestations of the mental construct of habit rather than its defining quality (Verplanken, 2006). Thus time and habitual use are distinct but related constructs.

There is limited evidence of a relationship between SNS habits and the adjustment of first year students to college. Kalpidou et al. (2011) combined the six “attitudinal” items of the FBI into a measure they called “emotional connection to Facebook.” They found non-significant negative correlations between this index and emotional adjustment and academic performance and a non-significant relationship to social adjustment. Another study (LaRose, 2010b) found a relationship between a measure of habitual use of Facebook and an index of three negative consequences: missing class or work and losing a grade in a class.

3.2. Compulsive use of SNS

Another type of SNS use that we will use in this study is compulsive use. Like habitual use, compulsive use is also a mental state rather than a directly observable behavior. Compulsive use, also known as deficient self-regulation (LaRose, Lin, & Eastin, 2003) reflects lack of controllability (Bargh & Chartrand, 1999). Indicators of compulsive use include unsuccessful attempts to cut down on time, the perception that use is out of control (Caplan, 2010; LaRose et al., 2003), or attempts to hide use from others (LaRose et al., 2003).

Compulsive use is related to the amount of usage (LaRose et al., 2003); however, the amount of use is not necessarily an indicator of problematic use as some (e.g., Caplan, 2005) have argued. Rather, it is the user's perception that use needs to be brought under control that determines whether or not it is problematic. Four hours of SNS use a day may not be a problem for some, while an hour a day might be a problem for others. In the context of SNS use, compulsive use would be manifested as a failure to curb SNS usage that may disrupt important life activities. Most individuals learn to control behavior they regard as problematic by applying self-reactive influence, such as by making commitments to moderate the behavior in question, avoiding the situations in which the behavior is likely to occur, indulging pangs of guilt, or self-administering rewards for moderation (Bandura, 1986). However, in the course of restoring effective self-regulation, an initial step is to recognize a problem exists followed by a struggle to restore self-control.

Thus, one could argue that it is compulsive use that is problematic, not the overall amount of usage. Caplan (2005, 2010) found that compulsive Internet use was associated with negative life consequences such as missing school or work, getting a lower grade, or missing out on social events and LaRose (2010b) extended that finding to SNS compulsive use. Heavy SNS use, even when defined according to some arbitrary number of hours, should not in itself be the cause of problems. That is perhaps even so when the usage has become so habitual that it is no longer subject to effective self-observation. That being the case, it is possible that overall levels of Facebook use and habitual use mask the problems of a subset of users for whom SNS usage is compulsive (e.g., LaRose, 2010b).

4. Synthesis

The literature reviewed above suggests that the conflicting findings of previous research could result from a failure to investigate patterns of use deeply enough to isolate compulsive users. However, the potential impacts of overall amount of usage and habitual, but non-compulsive usage, on academic performance must still be considered.

As mentioned earlier, evidence is inconsistent in regards to relationships between SNS usage and academic performance. Early studies, which employed dichotomous measures of Facebook usage by classifying respondents either as users or non-users (Kirschner & Karpinski, 2010; Kolek & Saunders, 2008) or as current/non-current users (Pasek et al., 2009), did not find any negative relationship between Facebook usage and academic performance. However, more recent studies that used more granular measures of Facebook use, such as frequency of Facebook use (Junco, 2011a, 2011b) and time spent on Facebook (Jacobsen & Forste, 2011) found negative relationships between academic variables and Facebook use. Using time allocation diaries that yielded ratio scaled estimates of usage, Jacobsen and Forste (2011) found a significant negative relationship between SNS usage and GPA. Junco (2011a, 2011b) found that general Facebook use was significantly negatively related to academic engagement and academic performance, but certain specific uses of Facebook, such as sharing information, was positively predictive of academic performance, while using Facebook for social purposes was negatively predictive. One exception was the study by Kalpidou et al. (2011), which employed an FBI item that categorized daily usage into six different levels ranging from less than 10 min to more than 3 h. This study, however, had a very small sample size ($n = 70$), which may have had insufficient power to detect significant negative relationships between usage and first year adjustment variables. Thus, range restrictions on the usage variable could explain the null findings: when the range was not restricted, a negative effect was found.

Furthermore, the studies that used dichotomous measures of Facebook usage were all completed between 2006 and 2008 at a time when Facebook was still in its early growth stages. Now that Facebook use is nearly ubiquitous among college populations, it no longer makes sense to compare users with non-users. The extant studies were also completed before Facebook had deeply penetrated high school populations. That means many of the first year college students included in those studies were undergoing a novel experience and their usage may not as yet have matured into ingrained habits or compulsions. The evidence for a relationship between habitual use and academic performance is also mixed, as discussed above. There is some evidence that compulsive use is strongly related to negative academic outcomes, but it originates from studies (Caplan, 2006; LaRose, 2010a) in which indicators of academic outcomes included both academic performance as well as social adjustment outcomes, making it difficult to ascertain whether or not compulsive use is associated with academic performance, social adjustment, or both. Thus, the possible relationships between SNS usage, habits, compulsive use, and different aspects of college adjustment remain an open question that will be investigated further in the present research.

Recent attention (e.g., Burke et al., 2010; Junco, 2011a, 2011b) has turned to how SNSs are used in addition to how much time is spent on the sites. The number of Facebook Friends may be considered in that light, as a reflection of a particular type of observable SNS consumption behavior (i.e., responding to friend requests issuing from Facebook). Here, we propose that the demands of maintaining these friendships on Facebook drive SNS habits and compulsions. Following Burke et al. (2010), we hypothesize that the number of friends will be negatively related to loneliness and act indirectly through loneliness on academic outcomes. Moreover, Steinfeld, Ellison, and Lampe (2008) previously found evidence of a curvilinear relationship between the number of Facebook Friends and positive outcomes, while Tong, Van Der Heide, Langwell, and Walther (2008) also found a curvilinear relationship between Facebook Friends and perceived social attractiveness. These studies suggest that the relationship between number of Facebook Friends and loneliness may be also show a positive relationship to certain point before turning into a negative relationship. Accordingly, a quadratic component will also be tested here. We will explore the causal relationships between the number of friends and Facebook usage and loneliness through time series data.

5. Research model and hypotheses

To examine the relationship of Facebook use and related constructs to academic outcomes, a basic model was constructed based on prior research (Nicpon et al., 2007) about the social and academic adjustment of first year students. In this model, academic performance is

hypothesized to be a function of academic motivation and social adjustment (e.g., Fortier, Vallerand, & Guay, 1995; Wentzel & Wigfield, 1998) and academic motivation is preceded by social adjustment (Paul & Brier, 2001).

H1. Academic motivation is positively associated with perceived academic performance

H2. Social adjustment is positively associated with perceived academic performance

H3. Social adjustment is positively associated with academic motivation

Loneliness is hypothesized to predict social adjustment and academic motivation (e.g., Riggio, Watring, & Throckmorton, 1993; Van Etten, Pressley, Freebern, & Echevarria, 1998).

H4. Loneliness is negatively associated with social adjustment

H5. Loneliness is negatively associated with academic motivation

To this basic model, we added Facebook-related factors: number of Facebook friends, time spent on Facebook, and two types of Facebook use: compulsive and habitual. According to Ellison et al. (2007), we predicted that number of Facebook Friends would be positively associated with time spent on Facebook:

H6. Number of Facebook Friends is positively associated with time spent on Facebook

Time spent on Facebook was hypothesized to have a positive relationship with both habitual use and compulsive use based on prior studies (e.g., LaRose, 2010a; LaRose et al., 2010):

H7a. Time spent on Facebook will be positively related with habitual use

H7b. Time spent on Facebook will be positively related with compulsive use

The relationship between habitual use and compulsive use, however, was an open question. We were interested in seeing if these two types of Facebook use relate differently to college adjustment variables. We thus have several research questions examining the relationship between habitual use, compulsive use, and college adjustment.

RQ1a. What is the relationship between time spent on Facebook and motivation?

RQ1b. What is the relationship between time spent on Facebook and perceived academic performance?

RQ2a. What is the relationship between habitual use of Facebook and motivation?

RQ2b. What is the relationship between compulsive use of Facebook and motivation?

RQ3a. What is the relationship between habitual use of Facebook and perceived academic performance?

RQ3b. What is the relationship between compulsive use of Facebook and perceived academic performance?

RQ4a. What is the relationship between habitual use of Facebook and social adjustment?

RQ4b. What is the relationship between compulsive use of Facebook and social adjustment?

The final hypothesized model can be seen in Fig. 1.

6. Methods

6.1. Participants

Incoming first year students assigned to four residence halls at a large U.S. university were invited to participate in a study of their SNS use and college adjustment in June prior to beginning college but after they had indicated their intention to attend. These four dormitories were selected to be broadly representative of the general student population at the institution in which the study was conducted. Students

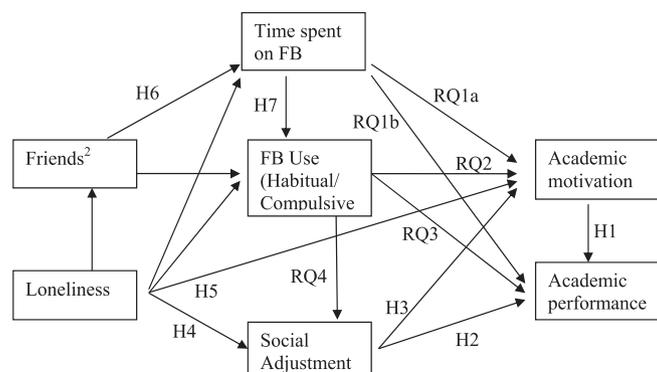


Fig. 1. Hypothesized model.

were recruited online with sweepstakes drawings and with nominal cash incentives delivered by postal mail. A total of 1639 students completed this survey with a response rate of 49%. A second data collection was conducted at the end of the first semester using the same method—1616 students responded to the second data collection. The present study is based on the 380 of the 391 students who completed both surveys—11 participants were removed from the data analysis due to large amounts of missing data. Participants were mostly female (70.1%) around the age of 18 ($m = 17.75$, $sd = .741$). Ethnicity was predominantly Caucasian (81.2%), followed by Asian (6.9%), African American (5.8%), Hispanic (4.8%), and Native American (.5%).

6.2. Measures

Except as noted, all items were rated on a 5-point Likert-type scale from “strongly disagree (scored 1)” to “strongly agree (5).” Loneliness (Cronbach’s alpha .72 at T1 and .74 at T2) was measured with a four item short version of (rated on a 4-point scale ranging from “never” to “always”) the UCLA Loneliness Scale (Russell et al., 1980): “I feel in tune with people around me (reverse),” “No one really knows me well,” “I can find companionship when I want it (reverse),” and “People are around me but not with me.” Student adjustment to college (SACQ) was three subscales from an inventory by Baker and Siryk (1989). The subscales used here were academic motivation (“I am not motivated to study (reverse),” “I doubt the value of a college degree (reverse),” “I enjoy academic work,” and “most of my interests are not related to coursework (reverse)”), perceived academic performance (“I do not do well academically considering effort (reverse),” “I do not use study time efficiently (reverse),” “I am satisfied with my academic performance,” and “I find academic work difficult (reverse)”), and social adjustment to college (“I am satisfied with my social participation at college,” “I fit in well with my college environment,” “I am very involved with college social activities,” and “I am adjusting well to college.”).

Multi-item measures of SNS use were also comprised of 5-point Likert-type items. Compulsive SNS use ($\alpha = .76$, $m = 2.16$, $sd = .78$) was comprised of four items drawn from Caplan (2010) and Meerkerk, Van Den Eijnden, Vermulst, and Garretsen (2009): “I think of Facebook as a problem in my life,” “I have tried to stop using Facebook for long periods of time,” “I am unable to reduce the amount of time I spend on Facebook,” and “I have made unsuccessful attempts to control my use of Facebook.” Habitual use ($\alpha = .85$, $m = 3.73$, $sd = .80$) was a six-item including five previously identified with Facebook Intensity (“Facebook is part of my everyday activity,” “Facebook has become part of my daily routine,” “I feel out of touch when I haven’t logged onto Facebook for a while” and “I would be sorry if Facebook shut down,” and “I am proud to tell people I’m on Facebook”) from Ellison et al. (2007) as well as an additional item: “I use Facebook because it’s a habit” (LaRose et al., 2003). The items taken from FBI aligned closely with items from a validated measure of habit (Verplanken & Orbell, 2003, p. 1329) that indicate a routinized behavior that is missed when not performed, and that has been incorporated in one’s self-concept. The number of friends was log transformed.

Time spent on Facebook in a typical day was a drop-down menu of eight choices, from “none,” “less than 10 min,” “between 10 and 30 min,” “more than 30 min, less than 1 h,” and then in 1 h increments up to “more than 4 h” Finally, gender was dummy coded, 1 if male, 2 if female. SPSS version 19 was used for univariate and bivariate analyses. AMOS 19 (Arbuckle, 2006) was used for structural equation modeling.

7. Results

7.1. Loneliness and Facebook use

To examine the impact of the transition to college on loneliness and Facebook use, comparisons were made between responses provided prior to attending college with those made at the end of the first semester. Paired sample *t*-tests were used to compare the means of time one and time two (Table 1). Time spent on Facebook ($t(380) = -22.94$, $p < .001$) and number of Facebook Friends significantly increased over the course of the semester ($t(380) = -7.79$, $p < .001$); those who did not report the number of Facebook Friends were excluded from the means comparison test. Despite the significant increase in friends, participants were more lonely at the end of semester ($t(380) = -7.07$, $p < .001$). There were also major shifts in academic perceptions. Participants had higher motivation at the end of their first semester than before ($t(380) = -7.72$, $p < .001$) but perceived performance ($t(380) = 10.553$, $p < .001$) and social adjustment ($t(380) = 10.988$, $p < .001$) were significantly diminished at the end of the semester. Means and standard deviations of variables at both time points are provided in Table 1.

Thus, students were spending more time on Facebook and had more Facebook Friends, yet they were feeling more lonely. Did Facebook use cause loneliness or did loneliness cause Facebook use? A cross-lagged technique was employed to test the direction of causality. Cross-lagged correlation compares variables across time points and attributes differences in correlations to causal effects; although this does not account for spurious effects of mediating variables, it has utility in exploratory technique (Locascio, 1982).

A cross-lagged correlation analysis (Fig. 2) showed that time spent on Facebook did not explain loneliness. There was no significant relationship between time spent on Facebook and loneliness either before entering college or at the end of the first semester. Lonely people

Table 1
Means and standard deviations of variables.

	Before semester	End of semester
No. of Facebook Friends***	$m = 405.38$, $sd = 245.22$	$m = 486.12$, $sd = 281.07$
Time Spent on Facebook***	$m = 2.89$, $sd = 1.177$	$m = 4.94$, $sd = 1.52$
Loneliness***	$m = 1.89$, $sd = .55$	$m = 2.08$, $sd = .61$
Academic Motivation***	$m = 4.06$, $sd = .467$	$m = 4.66$, $sd = 1.55$
Academic Performance**	$m = 3.69$, $sd = .62$	$m = 3.27$, $sd = .75$
Social Adjustment**	$m = 4.03$, $sd = .53$	$m = 3.62$, $sd = .77$

Significance level of differences between two groups are ** $p < .01$, *** $p < .001$.

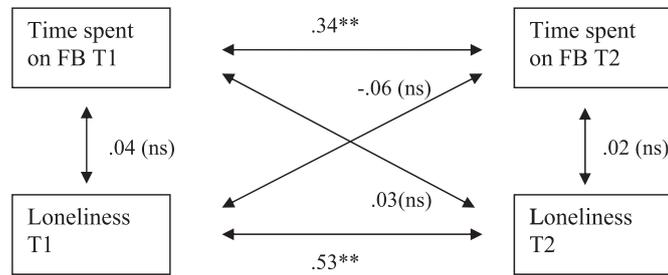


Fig. 2. Cross-lagged correlation of Facebook usage and loneliness.

before the semester started were still likely to be lonely at the end of the semester, but they were not likely to spend more time on Facebook. Likewise, spending time on Facebook had no relationship with being subsequently lonely.

The number of Facebook Friends was squared, as a curve estimation analysis showed that the relationship between loneliness and number of Facebook Friends was curvilinear such that loneliness decreased as the number of Facebook Friends increased up to a certain point but then increased again. Number of Facebook Friends also had an inverted U-shape curvilinear relationship with compulsive use and habitual use. Accordingly, quadratic terms for the number of Facebook Friends were introduced into subsequent analyses by centering and squaring the number of friends.

A cross-lagged analysis (Fig. 3) showed that loneliness was correlated to number of Facebook Friends. Following Kenny (1979), a modified Pearson-Filon z (ZPF) index was computed to test the significance of the difference in the lagged correlations. A significant difference was found ($z = -2.02, p < .05$), meaning that the correlation between loneliness at time 1 and Facebook Friends at time 2 was significantly greater than the number of Facebook Friends at time 1 and loneliness at time 2.

7.2. Loneliness, Facebook use, and college adjustment

The hypothesized model was tested separately with habitual use and compulsive use as the intervening variables between Facebook Friends and college adjustment variables. Finally, an integrated model with all three types of Facebook use (time spent on Facebook, habitual use of Facebook, compulsive Facebook use) was employed to compare the effect of each type of use.

To examine the roles of Facebook usage, habitual use and compulsive use in perceived academic performance, we tested a structural model with AMOS. The first model (Fig. 4) looked at the relationship among loneliness, time spent on Facebook, compulsive use of Facebook, and college adjustment. Only manifest variables were used in the figure for sake of clarity.

The model was a good fit (CFI = .999, $df = 4$, chi-square = 4.45, RMSEA = .02, $N = 380$, $R^2 = .30$); CFI indices over .9 indicate acceptable fit (Bentler, 1990) and RMSEA values below .05 indicate good fit (Kline, 1998). As hypothesized, academic motivation and social adjustment were both positive predictors of academic performance. H1–H2 were supported. Loneliness was a significant negative predictor of the squared value of Facebook Friends, social adjustment, and academic motivation. Social adjustment, however, was not significantly associated with academic motivation: H3 was not supported. Loneliness was negatively associated with academic motivation and social adjustment, supporting H4 and H5. However, loneliness did not directly contribute to compulsive use of Facebook ($\beta = .05, p = .31$); rather, it was mediated by number of Facebook Friends and time spent on Facebook. Time spent on Facebook contributed to compulsive use of Facebook (H7b) but did not have any direct association with academic motivation ($\beta = -.04, p = .46$) or perceived academic performance ($\beta = .08, p = .08$). Compulsive use of Facebook was negatively associated to motivation (RQ2b) but had no direct relationship with performance (RQ3b). Neither time ($\beta = .01, p = .84$) nor compulsive use of Facebook use ($\beta = -.07, p = .12$) was associated with social adjustment (RQ4b), suggesting that for the first semester of students' first year, Facebook did not play a major role in increasing social adjustment.

A second model looked at the relationship between loneliness, time spent on Facebook, habitual use of Facebook, and academic variables (Fig. 5). The model was also a good fit (CFI = .999, $df = 4$, chi-square = 4.44, RMSEA = .02, $N = 380$, $R^2 = .35$). Similar to the previous model, motivation and social adjustment were positive predictors of perceived academic performance. Number of friends again mediated loneliness and time spent on Facebook. Habitual use was negatively associated with academic motivation (RQ2a) but was not significantly related with perceived academic performance (RQ3a; $\beta = -.13, p = .21$). Neither time ($\beta = -.01, p = .80$) nor habitual use of Facebook ($\beta = .01, p = .86$) were associated with social adjustment.

Finally, time spent on Facebook, compulsive use, and habitual use of Facebook were put into the same model with college adjustment variables, removing paths that were insignificant in previous models (Fig. 6). Covariances were drawn between error values of habitual and compulsive use, as they are not mutually exclusive constructs. The integrated model explained the most variance and was a good model fit (CFI = .999, $df = 7$, chi-square = 7.25, RMSEA = .02, $N = 380$, $R^2 = .40$). Multigroup analysis was used to compare path coefficients across the different types of Facebook use by imposing cross-group equality constraints. The chi-square of the model with each path coefficient constrained to equality was compared against that of the unconstrained model by seeing if the chi-square decrease was statistically significant depending on the difference in degrees of freedom (Kline, 1998). The differences between the model with and without habitual use added (current model) were significantly different at the $p < .001$ level. This integrated model allowed us to compare the effects of habitual use and compulsive use. The model showed again that loneliness is indirectly associated with time spent on Facebook through number of Facebook Friends.

Compulsive use of Facebook is negatively related with academic motivation more strongly than habitual use of Facebook. Time spent on Facebook, however, was not directly linked with motivation. Neither compulsive use nor habitual use were directly associated with

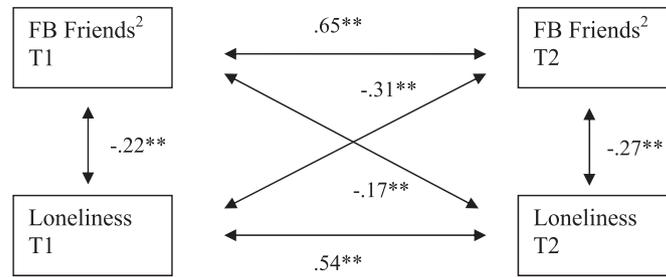


Fig. 3. Cross-lagged correlation of squared friends and loneliness.

performance, but mediated through motivation. Time spent on Facebook had a small but significant negative association with perceived academic performance.

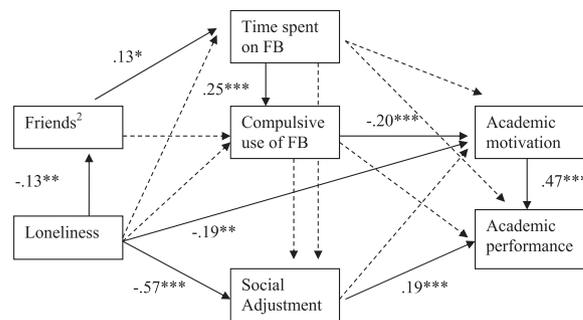
8. Discussion

The current research re-opens the question of the relationship between SNS use and college adjustment. It appears that there may be a significant negative relationship between participation in SNSs and perceived academic performance, as mediated by academic motivation and social adjustment. These results are consistent with the more recent literature on SNS use and academic performance (e.g., Jacobsen & Forste, 2011; Junco, 2011b). However, building on previous findings, we found that the degree of self-regulation exerted over SNS as well as the sheer amount of usage (i.e., the amount of time spent on the SNS) matters. All three indicators of use had negative effects on academic outcomes, but the nature of those effects differed somewhat. Compulsive use and habitual use tended to work through academic motivation and had a slightly less direct impact on perceived academic performance compared to the amount of usage. Also, compulsive use of Facebook had a stronger negative relationship with academic motivation than habitual use.

In more colloquial terms, the compulsive users have perhaps developed “bad” SNS habits that they are trying to correct, but with incomplete success in restoring effective self-regulation. A few of these might turn into truly “problematic” or “addictive” cases (see LaRose, 2010b) resulting in dire life consequences, such as dropping out of college in the context of the present study. However, most individuals succeed in restoring effective self-regulation before that happens.

In this study, none of the three types of SNS use—time, compulsive use, or habitual use—contributed to social adjustment. This is consistent with literature that found significant effects of Facebook on bridging social capital (Ellison et al., 2007; Steinfield et al., 2008) but little effect of Facebook on bonding social capital (Vitak, Ellison, & Steinfield, 2011). Also, Kalpidou et al. (2011) did not find a significant relationship between Facebook use and emotional support. There could be two different explanations. First, it could be that our measurements of Facebook use (time, habitual use, compulsive use) were those that were not related to social adjustment; other Facebook uses, such as organizing events or interacting with student clubs, that we did not measure, might be related to social adjustment. Secondly, it could be that Facebook is used by some students to retain connections with high schools friends at the expense of meeting new people on campus. Lampe, Ellison, and Steinfield (2006) found that Facebook is used more to maintain old ties than create new ones; the first year presents a unique situation to the student in which social adjustment requires meeting new people. This could imply that among college students, Facebook is used as means for broadly and loosely connecting with others to obtain information, but not so much for emotional support, which is required for social adjustment. Finally, it could also be that the time period we examined (the first semester for first-year students) was too short to see any significant effects of Facebook use on social adjustment. Future studies that look at longer longitudinal studies may be able to see how time plays an effect on the relationship between Facebook use and emotional support.

The present results suggest a need for further refinement of SNS use concepts and measurement. In the current study, the nature of the relationships with academic performance and psychological variables depended upon which indicator of SNS use was involved. There is the



Note. Values are standardized regression weights, * $p < .05$, ** $p < .01$, *** $p < .001$. Dotted lines are insignificant relationships

Fig. 4. Relationship among loneliness, college adjustment variables, time spent on Facebook, and compulsive use of Facebook.

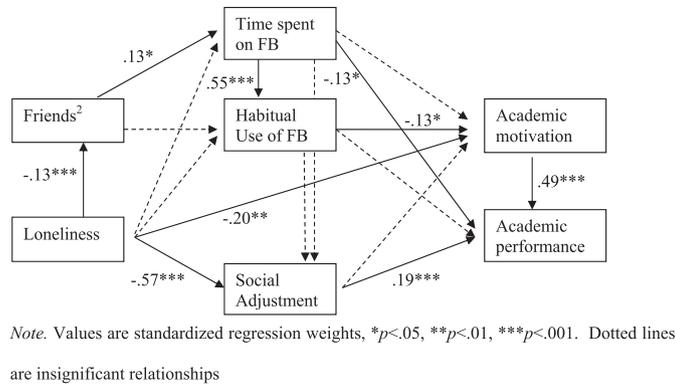


Fig. 5. Relationship among loneliness, college adjustment variables, time spent on Facebook, and habitual use of Facebook.

possibility that the true effect of SNS will be disguised by the combination of indicators that point in different directions if only a generic measure of SNS use is employed.

We agree with Meerkerk et al. (2009) that greater conceptual clarity would be a welcome addition to this stream of research. At the same time, the present argument takes issue with Meerkerk et al.'s (2009) conceptual framework in which compulsive use was an umbrella concept overarching the separate indicators of SNS use examined above. Here, we drew from models advanced by Caplan (2010) and LaRose et al. (2010), which reserved the term compulsive use for behavior that is perceived to be out of control by the user. Those models make an important distinction between usage that is habitual but functional (a concept possibly corresponding to preoccupation in Meerkerk et al. (2009) and that which is potentially problematic in that it is related to negative outcomes, including diminished academic outcomes.

Further clarification of the relationship between Facebook Intensity and habitual use is needed. As was demonstrated above, there is a very high degree of overlap in the operational definitions of the two constructs. Yet, the varying nomenclature implies very different conceptualizations of the construct. “Intensity” connotes very active and concentrated involvement. Habitual use denotes just the opposite in that habitual media behaviors are to a considerable degree performed automatically without conscious awareness or intention (LaRose, 2010a; Verplanken, 2006). The present research does not resolve the issue, although it can be noted that the relationships among time, habitual use, and compulsive use, observed here were consistent with a model of deficient self-regulation of Internet use that supports the habitual use interpretation (LaRose et al., 2003).

The academic performance dimensions of motivation and performance had a negative relationship with compulsive use. Based on the present results, should compulsive Facebook users be advised to curtail their SNS use to improve academic performance? That requires further research, since it also depends on the individual’s state of loneliness. Cross-lagged analyses based on time-series data suggested that Facebook in itself has very little to do with causing or creating loneliness, and that the student’s level of loneliness before entering college has a “domino” effect on subsequent Facebook usage and academic performance. From a clinical standpoint, these results could mean that identifying these students before they enter college and providing a more active form of clinical or social intervention could potentially help students with their college adjustment. In other words, at least in the duration of the first semester, Facebook alone may not be enough to provide the social support needed for students who are feeling very lonely.

8.1. Limitations

The generalizability of the present study is limited to a single college campus and first-year students. Time series analysis provides information about the direction of causation but is inferior to experimental manipulation. In addition, time series analysis cannot rule out the operation of third variables. Interpretation of results should be taken into consideration within the boundary of the surveyed sample and timeframe of one semester. Moreover, the measure of academic performance in this study relied on self-report rather than actual grades.

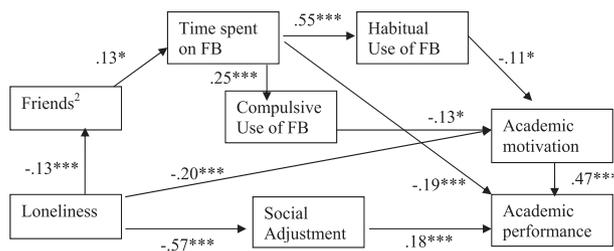


Fig. 6. Integrated model of the relationship among loneliness, college adjustment variables, and Habitual and compulsive Facebook Use.

Although perception of academic performance has been extensively used in education research, it could be that students over or underestimate how well they are doing in classes.

8.2. For further research

Although we found that certain uses of Facebook can lead to negative academic motivation and performance, this does not disprove the possibility of Facebook contributing to positive academic performance outcomes. Our results lend further support to recent studies (e.g., Lampe et al., 2011; Junco, 2011a, 2011b) that have tried to provide a more nuanced explanation of Facebook use. Indeed, researchers have started looking at more nuanced effects and found support for both positive and negative outcomes. For example, Lampe et al. (2011) found that students are using Facebook for both positive collaboration (e.g., forming study groups) and negative collaboration (e.g., sharing answers on a test) and that knowledge of specific Facebook features, such as privacy settings, and psychological factors like self-esteem predicted different outcomes. Smock, Ellison, Lampe, and Wohn (2011) found that use of specific Facebook features are driven by different motivations, suggesting that SNS use should not be conceptualized as a uniform entity. Studies that look at a more specific subset of Facebook use (e.g., Burke et al., 2010; Junco, 2011a) have found that certain types of Facebook use can be related to positive or negative academic outcomes. Now that Facebook has become a host for a variety of functions, it is important to separate the effects of these different facets of SNS participation. In this study, we built on previous literature that mainly looked at different uses based on specific features (e.g., social, informational) to examine use based on psycho-cognitive properties (e.g., self-regulation, automaticity). Future research may want to look into more granular aspects of Facebook and which specific features contribute to positive college adjustment.

Moreover, it could also be that Facebook helps some people and not others. For example, one study (Wohn, Ellison, Khan, Fewins-Bliss, & Gray, 2013) found that informational resources available through Facebook were correlated with college aspiration for first-generation students (those who would be the first in their family to go to college) but not for students whose parents graduated from college. There may be other personal or socio-demographic variables that could act as moderators in assessing the impact of Facebook on educational outcomes.

9. Conclusion

This study examined the complex relationship between loneliness, number of Facebook friends, different measures of Facebook use, and three college adjustment variables: academic motivation, social adjustment, and perceived academic performance. By employing a longitudinal study design and surveying first-year college students before they started college and after their first semester, we were able to see that during this timeframe, Facebook use does not contribute to nor detract from one's feeling of loneliness, and that loneliness prior to entering college was significantly related to continued feelings of loneliness in college, as well as the number of Facebook friends the individual has after joining college.

Loneliness also had a direct negative connection with academic motivation, which was the strongest variable related with perceived academic performance. Too much time spent on Facebook was significantly, albeit weakly associated with lower perceptions of academic performance. Neither habitual nor compulsive use of Facebook was directly related with perceived academic performance.

These results suggest that contrary to popular media hype surrounding the negative role of Facebook on academic performance, the effect of Facebook is miniscule. In fact, the effect of an individual's level of loneliness was more strongly related with all dimensions of college adjustment than any factor related to Facebook. In addition, none of the measures of Facebook in this study positively contributed to social adjustment in a six-month period. Interventions to use Facebook as a means of enhancing academic motivation or social adjustment should thus focus on more specific activities within Facebook, such as those associated with interpersonal communication, as engagement with the site in general does not seem to elicit overly strong positive or negative educational outcomes.

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