THE NEW INTERNET VIRUS – FACEBOOK DEPRESSION? THE ROLE OF GENDER AND FACEBOOK SOCIAL COMPARISON ON DEPRESSIVE SYMPTOMS

A Thesis

Presented to

The Faculty of the Department

of Psychology

University of Houston

In Partial Fulfillment

of the Requirements of the Degree of

Masters of Arts

By

Mai-Ly Nguyen

August, 2012

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Abstract

Two studies were conducted which provide evidence that the association between time on Facebook and depressive symptoms is mediated by Facebook social comparisons. The cross-sectional pilot study (N= 180), revealed an association between time spent on Facebook and depressive symptoms for both men and women. However, results demonstrated that, for men only, making non-directional social comparisons on Facebook mediated the link between time spent on Facebook and depressive symptoms. In the follow up 14-day diary study (N=152), gender was not found to be a moderator. Non-directional and upward social comparisons on Facebook served as a mediator between time on Facebook and depressive symptoms as well as a mediator between number of logins into Facebook and depressive symptoms across all participants. Finally, the extent to which daily experiences on Facebook were negative positively moderated the association between upward and non-directional Facebook social comparison and depressive symptoms across all participants.

Key words: Facebook, social comparison, depressive symptoms, moderation, mediation

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The New Internet Virus -Facebook Depression? The Role of Gender and Facebook Social Comparison on Depressive Symptoms

Introduction

Over forty years ago, communications theorist Marshall McLuhan (1964) coined the phrase, "the medium is the message". He did not mean to imply that humans should ignore the messages we communicate through a particular medium. Rather, he wanted individuals to not only be cognizant of a medium's obvious properties but also be aware of how it subtly influences culture. He argued that important technological advances become extensions of the people using them and can in turn redefine human interactions. He also envisioned that technology would someday provide people with the tools to create a global village.

Thus, technological media have the power to organize societies, and can profoundly change interpersonal relationships for better or worse. For example, with more than 901 million monthly active users worldwide (see www.facebook.com demographics, 2012), the social networking site, Facebook, has undoubtedly revolutionized human interactions and brought Mcluhan's ideals of a global village to fruition. However, for some individuals the results of such cyber exchanges may be more dystopian than utopian.

For instance, internet addiction, defined as using the internet to an excessive degree, has been widely documented to be associated with depressive symptoms among young people as well as older adults (e.g., Morrison & Gore, 2010). Specifically with regards to Facebook, a recent analysis of 200 college student's "status updates", a mechanism by which individuals often divulge their current innermost thoughts and emotions en masse to their Facebook friends, revealed over 25% of the Facebook profiles analyzed met the DSM criteria for depression. The most prevalent depressive symptom was negative mood (Moreno et al., 2011).

Moreover, another study surveyed 400 Facebook users and found that individuals who spent more hours per week and who also be-friended people they did not know were significantly more likely to agree that others on Facebook had better lives than themselves. In addition, individuals who possessed a Facebook account over a longer period of time (i.e., for several years) tended to perceive that others were happier and life is unfair (Chou & Edge, 2012). Finally, a related study which was inspired by Facebook but did not test Facebook interactions (Szalavitz, 2011) found that people underestimate others' negative emotions which often leads to emotional pluralistic ignorance (people think others feel less negative than they really do). Thus, those who struggle with emotional difficulties feel isolated and alone. The researchers concluded that this is due to the fact that people publically portray themselves as happier than they actually are (Jordan, Monin, Dweck, Lovett, John, & Gross, 2011).

Social Comparison

The aforementioned studies have tapped into the fact that people's perceptions of the Facebook friends' happiness and well-being are often distorted. However, those studies did not examine what motivates individuals on Facebook to make these comparisons in the first place and how this relates to *their* sense of well-being. Mckenna and Bargh (2000) theorized that although technological media provide an alternate way for individuals to interact, people's goals, motives, and interests often remain the same whether the interactions are made online or face-to-face. One core drive of human nature is the need to socially compare oneself to others.

Leon Festinger (1954) theorized that individuals have an innate desire to compare themselves to others as a way to evaluate their own opinions and abilities. He proposed that people selectively choose whom to compare themselves to and more often than not, choose

people who they view as similar to themselves. Thus, people tend to compare themselves to peers or friends on issues or concepts they feel are important to the self.

Social comparison is also commonly associated with mental well-being in normal populations (Allan & Gilbert, 1995; Gilbert, Allan, Brough, Melley, & Miles, 2002; Troop, Allan, Treasure, & Katzman, 2003). Allan and Gilbert (1995) proposed that engaging in downward social comparisons, seeing one's self as superior to or at the same level with peers, are associated with positive health outcomes, such as increased well-being or positive self-esteem. On the other hand, they suggested that making upward social comparisons, seeing oneself as inferior as compared to others, is associated with negative health outcomes, such as higher depressive symptoms and lower self-esteem.

Furthermore, research has indicated that there are gender differences in social comparison at both the individual and group level. In their studies on uniqueness bias, Goethals, Messick, and Allison (1991) consistently found that males differentiated themselves from others more than women did. In other words, men believed they were more unique on dimensions such as intelligence, creativity, and athletic ability. In contrast, women viewed themselves the same or below others, on most levels. Women only tended to exhibit self-other differentiation on the dimension of moral behaviors.

In addition, the social comparison literature has steadily demonstrated that individuals prefer same-sex social comparisons as opposed to cross-sex social comparisons (e.g., Major & Farcey, 1985; Suls, Gaes, & Gastorf, 1979) due to perceived similarity and that the genders experience differing effects as a result of their comparisons. Researchers found that men tend to have lower self-esteem when engaging in upward social comparison with other males. However, women tended to only have lower self-esteem when making upward social

comparisons with males, not other females (Martinot, Redersdorff, Guimond, & Dif, 2002, exp. 1). There were primary two reasons for this phenomenon: 1) females viewed themselves as subordinate to males, which negatively impacted their self-esteem, and 2) women protected their self-esteem when making upward comparisons with other females by relating more to females as their group (Redersdorff & Martinot, 2003, exp. 1). Researchers found that men experienced lower levels of self-esteem only when engaging in upward social comparisons with women in traditionally female-oriented domains (Redersdorff, 2002, exp. 4).

The Pilot Study

Overview of the Pilot Study

Although Facebook is a pervasive tool that individuals use (often on a daily basis) to interact and communicate with their friends, no studies to my knowledge have analyzed how social comparisons on Facebook relate to user's health outcomes. Thus, a pilot study was conducted to see if people do indeed make social comparisons on Facebook. Furthermore, I also wanted to examine how making such social comparisons would be related to depressive symptoms.

Facebook is seen as a platform by which active Facebook users compare themselves with their friends. Facebook users spend over 700 billion minutes per month on Facebook (see www.facebook.com demographics, 2010). A recent report estimated that Facebook users spend an overwhelming 16 percent of their total internet time on Facebook in the U.S. alone (Davis & Angelova, 2011). Hence, it was proposed that the more time individuals spend on Facebook the more likely they are to engage in upward social comparisons, which in turn predicts greater depressive symptoms. It was also hypothesized that gender might significantly moderate this relationship since previous research has established sex differences in the way men and women

socially compare themselves and in terms of depressive symptoms with women more than twice as likely to be depressed than men (Piccinelli & Wilkinson, 2000).

Method of Pilot study

The pilot study was conducted with 180 students (39 males, 141 females) who were at least 18 years old from the University of Houston. Having a Facebook account was not a prerequisite; however, most participants did have a Facebook account (92%). The overall age of the participants ranged from 19 to 57 years (M = 24.41, SD = 5.88) from an ethnically diverse sample (17% African-American, 17% Asian-American, 26% Hispanic, 32% Caucasian, 3% Middle Eastern, 4% Multiracial, and 1% Native American). If they had a Facebook account, participants were asked if they considered themselves an active user of Facebook. An active Facebook user was defined as someone who checks his or her Facebook account on a regular basis. In contrast, a non-active Facebook user was outlined as one's whose account was deactivated, rarely checked his/her account, or did not consider him/herself as an active member.

There were 133 active users (26 males, 107 females), 33 non-active Facebook users (7 males, 26 females), and 14 participants who did not have a Facebook account (6 males, 8 females). Because only 14 individuals did not have a Facebook account, their scores were combined with the 33 non-active Facebook users to make 47 non-active Facebook users in total. The mean age of active male Facebook users was 25.58 (SD= 7.03) whereas the mean age for active female users was 23.93 (SD= 5.52). Moreover, the mean for non-active male Facebook users was 27.62 (SD= 8.32) whereas the mean for non-active female Facebook users was 23.79 (SD= 4.66).

Procedure

Announcements were made in undergraduate psychology classes during which participants were given instructions on how to sign up for the study via SONA, an internal University of Houston psychology department research website. Since the study required active Facebook users, non-active Facebook users, and individuals who did not have a Facebook account, participants were told that the study was exploring internet use and personality. After signing up on SONA, participants were able to access an online questionnaire.

Respondents were asked to complete demographic information, social comparison measures, and depressive symptoms measures. In addition, if they indicated they had a Facebook account and were an active user of Facebook (defined as someone who checks his or her Facebook account on a regular basis), they were directed to take Facebook-related questions (i.e., average amount of time per day they spent on Facebook) and measures adapted for Facebook use. The primary measures used in the analysis for the pilot study are discussed in detail in the next section. However, additional measures assessing self-esteem, mood, anxiety and exploratory measures are further elaborated in the description of measures for the present study. Upon successful completion, participants were given extra credit, which could be applied to participating psychology courses.

Measures

Social Comparison. The Iowa-Netherlands Comparison Orientation Measure (Gibbons and Buunk, 1999) is an assessment which gauges participants' tendencies to socially compare themselves to others (See Appendix C). The scale consists of 11 items such as, "I always pay a lot of attention to how I do things compared with how others do things." The measure also

employs a 5-point Likert scale, ranging from 1, *I disagree strongly*, to 5, *I agree strongly.* The Cronbach's alpha reliability coefficient was .86.

In addition, the Iowa-Netherlands Comparison Orientation Measure (Gibbons and Buunk, 1999) was adapted to a Facebook context (COM-F) to specifically determine social comparison tendencies on Facebook (See Appendix O). The measure is non-directional in that it does not measure whether people are engaging in upward or downward social comparison but simply asks people whether they compare themselves to others. Like the INCOM, the COM-F utilizes a 5-point Likert scale with the same anchors. The scale included items such as, "When I am on Facebook, I always pay a lot of attention to how well I have done something compared to how others do things." The Cronbach's alpha reliability coefficient was .85.

Depressive symptoms. Depressive symptoms were measured utilizing the Center for Epidemiological Studies Depression Scale (CES-D) (Radloff, 1977) (See Appendix L) and the Beck Depression Inventory (BDI-II) (Beck, Steer, & Brown, 1996) (See Appendix M). The BDI-II differs from the CES-D in that it is mostly used to diagnose depressive symptoms among clinical rather than normal populations. The 20 items on the CES-D are rated on a scale of 0-*Rarely or none of the time (less than 1 day) to 3 – More of all of the time (5-7days).* Possible scores range between 0-60 with higher scores indicating more depression. The Cronbach's alpha reliability coefficient was .93.

The BDI-II is a revised version of the scale which contains 21 questions in total. Each answer is scored on a scale value of 0 to 3. The cutoffs used in the newer version differ from the original version of the scale: 0–13: negligible depression; 14–19: mild depression; 20–28:

modest depression; and 29–63: severe depression. The Cronbach alpha reliability coefficient was .95

Time on Facebook. The amount of time participants spent on Facebook was assessed through one item which asked participants, "How long on average do you spend per day on Facebook?" Respondents could choose from seven possible answer choices ranging from "Less than 5 minutes" to "5+ hours".

Hypotheses and Results of the Pilot Study

The means, standard deviations, and Pearson correlations between the main study variables for male and female active Facebook users are presented in Table 1.

Hypothesis 1: Active Facebook users would be significantly higher in general social comparison orientations than non-active Facebook users or individuals who do not have a Facebook account. In other words, active Facebook users would be more likely to engage in social comparisons (on and offline) than non-active Facebook users or individuals who do not have a Facebook account. It was proposed that active Facebook users would be higher in general social comparison orientations because active Facebook users might have a greater need to compare themselves to their friends. As previously mentioned, Facebook is viewed as a platform for people to discover intimate information about their friends that they might not have known otherwise.

In order to test hypothesis 1, an independent samples t-test was conducted. Results indicated there was no significant difference between active Facebook users (M=36.55, SD= 7.40) and non-active Facebook users (M=34.77, SD=8.21); t (178) = 1.32, p =.19 (two-tailed) on the general measure of social comparison. Thus, hypothesis 1 was not confirmed. This suggests

that people compare themselves to others, regardless of whether it is in face-to-face or computer-mediated contexts. Hypothesis 2, 3, 4, and 5 are interrelated. As such, the discussion of the results for these hypotheses will be combined below.

Hypothesis 2: The amount of time an active user spends on Facebook predicts depressive symptoms.

Hypothesis 3: The amount of time on Facebook is positively related to non-directional COM-F such that the more time an individual spends on Facebook the more he or she is likely to socially compare.

Hypothesis 4: Furthermore, non-directional COM-F serves as a mediator between time on Facebook and depressive symptoms. Thus, the more time an individual spends on Facebook, the more likely they are to engage in social comparisons. This in turn will predict higher depressive symptoms. For the purpose of this research, activities on Facebook (i.e., status updates, viewing newly uploaded pictures, friends posting on each other's walls) are conceptualized as serving as a stimulus for people to engage in social comparisons.

Hypothesis 5: The possibility that gender serves as a moderator between non-directional COM-F and depressive symptoms was also explored. In other words, the prospect of moderated mediation was assessed.

To test hypotheses 2, 3, 4, and 5, a multiple group path analysis was performed in the statistical program Mplus, to predict depression scores (CES-D) (see Figure 1 for a conceptual moderated mediation model). Mediation analysis were conducted in accordance with the *ab* products method described by MacKinnon and colleagues (Mackinnon, Fairchild, & Fritz, 2007;

MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). Bootstrapping was used to test the significance of indirect effects (Shrout & Bolger, 2002).

Results demonstrated that time on Facebook was positively related to CES-D depression for both males ($\beta = .36$, $p < .01$) and females ($\beta = .32$, $p < .01$). Furthermore, results revealed that time on Facebook was positively related to non-directional COM-F for males ($\beta = .51$, $p < .01$) and females ($\beta = .22$, $p < .05$) for females. Thus, hypotheses 2 and 3 were supported. However, COM-F was only significantly related to CES-D depression scores for males ($\beta = .43$, $p < .01$), whereas it was not significant for females ($\beta = .00$, $p = .986$). Hence, the b path was significant for males only.

The test of the indirect effects showed that the mediating effect of non-directional COM-F on time on Facebook was significant for males ($\beta = .219$, $p < .05$) but not for females ($\beta = .00$, $p = .986$). Consistent with expectations non-directional COM-F served as a mediator between time on Facebook and depressive symptoms for males only (hypothesis 4 and 5). The results for the analysis of hypotheses 2, 3, 4, and 5 are shown on Figure 2.

Additionally, an independent samples t-test was conducted to determine whether there was a gender difference in the amount of time spent on Facebook. Results showed there were no significant differences between males (M=3.46 or approximately 75 min per day, SD= 1.77) and females (M=3.36 or approximately 75 min. per day, SD=1.58); t (35) = .28, p=.76 (two-tailed) in terms of the amount of time spent on Facebook.

To assess in what path the moderated mediation occurred, two Wald Test of Parameter Strengths Chi-Square Difference tests were performed. The Chi-Square Difference Test for the a path between time on Facebook and non-directional COM-F was not significantly different for men and women, $\chi^2(1, N = 133) = 1.62$, $p = 0.20$. However, the Chi-Square Difference Test for

the b path between non-directional COM-F and depressive symptoms was significantly different for men and women $\chi^2(1, N = 133) = 5.42$, $p < 0.05$. Thus, although there were no significant gender differences in the amount of time spent on Facebook, more time spent on Facebook is associated with greater Facebook social comparison, which in turn predicts greater depressive symptoms for men only (hypotheses 4 and 5).

The test for moderation was significant only when CES-D was the outcome variable but was not significant using the BDI-II. So, while it is only men who exhibit significant mediation (using both the BDI-II and CES-D as outcome variables), the depressive symptoms are only significantly different from women when using the CES-D as the criterion. There was a minimal difference in the expected direction predicting BDI-II scores. However, results may not have been significant due to lack of power to detect an effect since active female Facebook users outnumbered active male participants by a four to one ratio (107 women versus 26 men). Finally, the BDI-II may not have been as good of a measure to test depressive symptoms in normal populations as the CES-D because it was designed to measure depressive symptoms in clinical populations.

Discussion

A study on the uses and gratifications of Facebook and Myspace found that men were significantly more likely than women to use these social-networking sites for dating purposes (Raacke & Bonds-Raacke, 2008). The authors also found that men also logged on to social networking sites significantly more than women per day, although both men and women reported spending about the same amount of time on Facebook per day (similar to the results of the pilot study). Previous research has also demonstrated that individuals prefer same-sex social

comparisons due to perceived similarity (e.g., Major & Farcey, 1985; Suls, Gaes, & Gastorf, 1979).

Thus, from an evolutionary psychology perspective, the more time men spend on Facebook the more likely they are to compete with other males (possibly for mates) and to feel inadequate when comparing their accomplishments to those of their peers. Time spent on Facebook did not predict women's outcomes in the same way. I reasoned that women might use Facebook as a way to maintain connections with friends or to bond with other women, not to compete with them.

The Present Study

Overview of the Present Study

Because it is not possible to recreate participants' daily Facebook activities in the laboratory, event sampling through a 14-day interval-contingent diary was conducted for the present study, which focused solely on Facebook users. This method was chosen because it limits possible retrospection bias that can occur through just administering global measures and provides greater statistical power. It was anticipated that active Facebook users might also view the website more than once per day. Thus, an interval-contingent design (in which participants fill out short diary questionnaires once before going to bed) was chosen over an event-contingent design (in which participants fill out a questionnaire each time they view Facebook) in order to minimize participant burden.

Since participants were responding to questions on a daily basis over a two week period, the study design gauged a more accurate assessment of 1) how much time participants spend on Facebook and 2) what types of social comparisons participants are making across the 14 days. The previous hypotheses regarding time on Facebook in the pilot study were retained. In

addition, I explored whether the number of logins (or frequency) in which participants viewed Facebook per day might be related to depressive symptoms and whether Facebook social comparisons might mediate this association in a similar manner to what I found with the Facebook time variable in the pilot study. This was measured through the open-ended question: "How many times did you log on/view Facebook today?" Finally, the present study also evaluated whether feeling negatively about experiences on Facebook would moderate the association between Facebook social comparisons and depressive symptoms.

Unlike the pilot study which utilized a non-directional measure of social comparison (non-directional COM-F) asking *whether* participants compared themselves to others on Facebook, the present study contained additional questions adapted from the INCOM to measure upward and downward social comparison (COM-F). In addition, since previous literature has postulated that upward social comparison may be related to negative psychological outcomes, select items from the Social Comparison Scale (Allan & Gilbert, 1995) adapted for Facebook (upward SCS-F) were also added.

The Present Study Hypotheses:

Hypothesis 1: The amount of time spent daily on Facebook will be positively related to daily depressive symptoms.

Hypothesis 2: The amount of time spent daily on Facebook will be related to daily Facebook social comparisons. No specific hypotheses on how the different types of social comparison (non-directional, upward, and downward) might relate to time on Facebook were made.

Hypothesis 3: Daily Facebook social comparisons (specifically upward and non-directional) will mediate the relationship between daily time on Facebook and daily depressive symptoms.

Hypothesis 4: Similar to the pilot study, gender will serve as a moderator between Facebook social comparisons (upward and non-directional) and depressive symptoms. Thus, moderated mediation will also be investigated.

Hypothesis 5: The frequency in which participants view/log onto Facebook per day will predict daily depressive symptoms.

Hypothesis 6: Daily frequency/views per day will be positively related to daily Facebook social comparisons (upward and non-directional).

Hypothesis 7: Daily Facebook social comparisons (upward and non-directional) will mediate the association between the frequency in which participants view/log onto Facebook per day and daily depressive symptoms.

Hypothesis 8: The association between daily Facebook social comparison (upward and non-directional) and daily depressive symptoms is expected to be moderated by gender.

Hypothesis 9: Participants will experience an increase in depressive symptoms as a function of the interaction between Facebook social comparisons (upward and non-directional) and negative experiences on Facebook. In other words, the extent to which experiences on Facebook are negative is expected to moderate the relationship between Facebook social comparison and depressive symptoms such that for those who report experiences on Facebook as more negative, an increase in depressive symptoms is expected.

Hypotheses 1, 2, 3, and 4 are similar to the hypotheses for the pilot study. However, rather than just examining non-directional social comparisons on Facebook, the present study

also tests whether engaging in upward (as measured through the COM-F items and the SCS-F items) or downward social comparisons (as measured through the COM-F items) on a daily basis are differentially associated with depressive symptoms. In addition, hypotheses 5, 6, 7, and 8 extend upon the previous hypotheses by suggesting that Facebook social comparisons will mediate the relationship between Facebook logins/views and depressive symptoms and the association between Facebook social comparisons and depressive symptoms is moderated by gender. See Figure 3a and 3b for the conceptual models.

Based on the results from the pilot study, it is expected that non-directional social comparison (COM-F) will serve as a mediator in both mediational models. Moreover, based on previous social comparison research, upward social comparison is anticipated to be a significant mediator in both models (Allan & Gilbert, 1995). Finally, hypothesis 9 examines negative Facebook experiences as a moderator between Facebook social comparisons within-person (Level 1) and between-persons (Level 2) across the 14 days. See Figure 4 for the hypothesized relationship.

Method

Participants

In total, 154 individuals (95 females, 59 males) from the University of Houston completed approximately 2035 entries of the 2156 possible diary entries (94% of total possible entries) across the 14 days. The overall age of the participants ranged from 18 to 42 years old (M =22.55, SD = 4.22). Similar to the pilot study, the sample was ethnically diverse and consisted of 15% African-American, 22% Asian-Americans, 31% Hispanic, 25% Caucasian, 2% Middle Eastern, 4% Multiracial, and 1% Native American.

All participants had to be at least 18 years old in order to give informed consent to participate. In contrast to the pilot study in which participants could be Facebook users or non-Facebook users, for the present study students had to be an active Facebook user. An active Facebook user was defined as someone who checks their Facebook account *on a daily basis*.

Procedure

The present study consisted of three components: 1) an orientation, 2) a baseline survey (the same survey administered in the pilot study with the addition of two social comparison measures adapted for Facebook), and 3) an interval-contingent diary study, which participants filled out daily for 14 days. Participants signed up for an orientation time on SONA, which is the University of Houston's internal research website. At the orientation, trained research assistants reviewed a hard copy of diary form along with participants and explained that they should complete one diary record each night before bed for 14 days. Participants were also instructed that if they missed a diary entry, they could still fill out the survey immediately in the morning. In addition, participants were given hard copies of the daily diary record in case they lacked internet access on a given night. Hard copies were collected and the data was entered in manually. Each participant created their own unique id number so that their entries to the baseline and daily diary questionnaires could be matched up.

Special emphasis was placed upon clarifying the open-ended question pertaining to Facebook log on/views. Participants were instructed to consider anytime they clicked on Facebook and/or read an automated e-mail/text/smartphone alert from Facebook as a view. If they ignored the automated e-mail/text/smartphone alert from Facebook or kept Facebook running on their browser but did not look at it, this was not considered a view. In addition, participants were instructed to only consider the amount of time they were *actively viewing*

Facebook towards their total estimate of the amount of time they spent on Facebook. Actively viewing Facebook was defined as engaging in some activity on Facebook (i.e. reading status updates, viewing photos). At the end of orientation, participants were granted access to the baseline questionnaire, emailed a link to access the daily diary records, and were given several hard copies of the diary record. Upon successful completion of the study, volunteers were given extra credit which could be applied to their psychology courses.

Baseline Measures

The measures which were previously outlined in the pilot study are not discussed in great detail for the present study. In addition, the Cronbach alpha reliability coefficients are reported for both the pilot and present study if they were used in both studies but not previously reported in the pilot study measures.

Demographics and Facebook-related questions. Participants were asked to indicate their gender, age, ethnicity, and current relationship status. In addition, they were asked to estimate in open-ended questions how many times per day they logged on/viewed Facebook and how many Facebook friends they had.

Time on Facebook was measured by asking participants to, "Please estimate, approximately how long you were ACTIVELY viewing Facebook." Items ranged from "less than 5 minutes" to "5+ hours per day". The scores ranged from 1-13. The response choices to the question regarding Facebook time was changed from the pilot study to the present study in both in the baseline questionnaire and the daily diary surveys to encompass a greater number of response choices (seven response choices at mostly hour intervals versus 13 possible response choices broken down mostly by half an hour intervals). The goal in doing so was to obtain more precise estimates regarding the amount of time participants spent on Facebook. Thus, aside from

for the first three answer choices which consisted of "less than 5 minutes", "5-15 minutes" and "16-29" and the last answer choice "5+ hours per day", participants were asked to estimate their time on Facebook in half an hour increments. Finally, respondents were asked to check off what they typically did on Facebook (i.e., update your status, upload videos/photos, view friend(s) photos).

Social Comparison. As previously mentioned, the Iowa-Netherlands Comparison Orientation Measure (Gibbons and Buunk, 1999) measures participants' tendencies to socially compare themselves to others (See Appendix C). The Cronbach alpha reliability coefficient for the present study was .81.

Similar to the pilot study, the COM-F was used to measure non-directional social comparison tendencies on Facebook (See Appendix O). The Cronbach alpha reliability coefficient was .82 for the present study. In addition, six items from the scale were adapted to specifically to measure upward (the Cronbach alpha reliability was .35 for the three items) and downward social comparison (Cronbach alpha reliability was .67 for the three items) (See questions 2, 4, and 6 for upward COM-F and questions 1, 3, and 5 for downward COM-F in Appendix Q).

The Social Comparison Scale (SCS-F) (Allan & Gilbert, 1995) was also adapted to a Facebook context (See Appendix P). The scale was designed to measure individuals' perceived social standing and social status after they have made social comparisons. Participants are asked how they would compare themselves on specific dimensions relative to other people and to rate themselves on a 10-point Likert scale. This is measured using items such as, "In relationship to others on Facebook, I feel: *Incompetent* 1 2 3 4 5 6 7 8 9 10 *More competent*". This scale

was not used in the pilot study but was reverse coded to represent upward social comparison for the present study. The Cronbach alpha coefficient was .91.

Depressive Symptoms. Corresponding to the pilot study, the Center for Epidemiological Studies Depression Scale (CES-D) (Radloff, 1977) and the Beck Depression Inventory II (Beck, Steer, & Brown) (BDI-II) were used to measure depressive symptomology (See Appendix J and Appendix K). The Cronbach alpha reliability coefficient for the CES-D for the present study was .91 whereas the Cronbach alpha reliability coefficient was .92 for the BDI-II.

Self-Esteem. The Rosenberg Self-Esteem Scale (RSES) (Rosenberg, 1989) is a 10-item measure designed to assess the degree of global self-worth or self-acceptance (See Appendix F). The scale consists of five positively worded items and five negatively worded items. Responses are based on a 4-point Likert scale with options ranging from 0 (*strongly disagree*) to 4 (*strongly agree*). Scores ranged from 10-40 with higher scores indicating higher self-esteem. The Cronbach alpha reliability coefficient for the pilot study was .92 whereas it was .91 for the present study.

Mood. Affect was assessed using the Positive Affect Negative Affect Scale (PANAS) (Watson, Clark, & Tellegen, 1988),which is a 20-item measure designed to assess the distinct dimensions of positive and negative affect (See Appendix F). Responses are based on a 5-point Likert scale with options ranging from 1 (*very slightly* or *not at all*) to 5 (*extremely*). Scores range from (20-100). The Cronbach alpha reliability coefficient for the pilot study was .90 whereas the Cronbach alpha reliability coefficient for the present study was .84.

State Anxiety. The State-Trait Anxiety Inventory (STAI; Speilberger, Gorsuch, & Lushene, 1970) consists of 20 items designed to assess state and trait levels of anxiety (See

Appendix G). The scale evaluates feelings of apprehension, tension, nervousness, and worry. Items are measured on a 4-point Likert scale with responses ranging from 1 (*almost never*) to 4 (*almost always*). The Cronbach alpha coefficient was .92 for the pilot study as well as for the present study.

Exploratory Measures

Friendship-Contingent Self-Esteem. The Friendship Contingent Self-Esteem scale (Cambron, Acitelli & Steinberg, 2010) is an 8-item self-report scale that measures the degree to which individuals base their self-esteem on the quality of their friendships. Items were measured on a 5-point Likert scale with responses ranging from 1 (*very little like me*) to 5 (*very much like me*) with items such as, "How I feel about myself depends on how well I am getting along with my friends." The Cronbach alpha coefficient for the pilot study was .82 whereas it was .92 for the present study.

Need to Belong. To assess affiliation needs participants completed the Need to Belong Scale (Leary, Kelly, Cottrell, & Schreindorfer, 2007) (See Appendix E). This scale includes 10 items such as "If other people don't seem to accept me, I don't let it bother me" (reverse scored), and "I want other people to accept me." Items were measured on a 5-point scale with responses ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The Cronbach alpha coefficient for the pilot study was .83. For the present study, the Cronbach alpha coefficient was .82.

Personality Traits. The five-factor model of personality was assessed using the Big-Five Inventory (BFI; John, Donahue, & Kentle, 1991). The 44-item scale consists of five subscales are Extraversion (8 items), Agreeableness (9 items), Conscientiousness (9 items), Neuroticism (8 items), and Openness (10 items) (See Appendix I). All items consist of short phrases (e.g., is talkative; is depressed, blue; tends to be lazy) and were measured on a 5-point scale with

responses ranging from 1 (*disagree strongly*) to 5 (*agree strongly*). In the pilot study, the Cronbach alpha coefficient was .84 for extraversion, .76 for Agreeableness, .81 for Conscientiousness, .84 for Neuroticism, and .75 for Openness. In the present study, the Cronbach alpha coefficient was .84 for extraversion, .72 for Agreeableness, .77 for Conscientiousness, .84 for Neuroticism, and .73 for Openness.

Perceived social support. Perceived social support was measured using the Interpersonal Support Evaluation List (ISEL) (Cohen, Mermelstein, Kamarck, & Hoberman, 1985). The scale is a 12-item instrument designed to test perceptions of belonging (i.e., the perceived availability of someone to do things with), appraisal help (i.e., perceived availability of someone to talk to about problems), tangible support (perceived availability of material aid), and self-esteem support (i.e., perceived availability of a positive comparison when comparing one's self to others) (See Appendix J). The participant indicates the extent to which he/she believed statements such as: ''There are several people I trust to help solve my problems,'' ''There is someone who takes pride in my accomplishments,'' and ''I often meet or talk with family or friends,'' from 1, *definitely true,* to 4, *probably false*. The Cronbach alpha coefficient for the pilot study was .89 whereas it was .86 for the present study.

Contingencies of Self-Worth. Contingencies of Self-worth (CSW) (Crocker, Luhtanen, Cooper, & Bouvrette, 2003) were used to determine which dimensions are important to participant's sense of self (See Appendix K). The 35-item self-report questionnaire measures such domains as: family support, competition, appearance, God's Love, academic competence, virtue, and approval from others. Each item was scored on a 7-point Likert scale ranging from 1, *strongly disagree,* to 7, *strongly agree.* There are five items associated with each dimension. In the pilot study, the Cronbach alpha coefficient was .89 for Family support, .88 for Competition,

.75 for Appearance, .94 for God's Love, .83 for Academic Competence, .83 Virtue, and .72 for Approval from others. In the present study, the Cronbach alpha coefficient was .78 for Family support, .84 for Competition, .81 for Appearance, .95 for God's Love, .81 for Academic Competence, .77 Virtue, and .77 for Approval from others.

Interval-Contingent Daily Diary Measures

As previously mentioned, the present study utilized interval-contingent (i.e., daily) reports which participants filled out before going to bed over a 14-day period in order to analyze their daily Facebook interactions. The time span of the study is uniform with similar diary studies (e.g., Duck, Hurst, & Strejc, 1991; Knee, Canevello, Bush, & Cook, 2008). Four items from the PANAS (Watson, Clark, & Tellegen, 1988), three items from the Rosenberg self-esteem (Rosenberg, 1989), and three items from the STAI (Speilberger, Gorsuch, & Lushene, 1970) were included as exploratory measures. Most items from established measures (e.g., the PANAS, CES-D) were selected based on the results of an exploratory factor analysis of the pilot study with the exception of the additional upward and downward COM-F items. These items were not included in the pilot study (see Appendix R for the full Facebook Interval-Contingent Diary Report).

Positive and Negative experiences. To access how participants were feeling at the moment they were filling out the questionnaire, they were asked "How do you feel right now?" Response choices ranged from *not at all positive* to *extremely positive* or *not at all negative* to *extremely negative* based on a 9-point Likert scale. Likewise, participants were asked "How positively did you feel about your Facebook experiences TODAY?" and "How negatively did you feel about your Facebook experiences TODAY?" Response choices ranged from *not at all*

positive to *extremely positive* or *not at all negative* to *extremely negative* based on a 9-point Likert scale.

Facebook-related questions. Participants were also asked to record the number of times they logged onto Facebook (an open-ended question); approximately how long they were on Facebook (an item with the previously mentioned 13 response categories); what their primary reason for viewing Facebook today was (responses included: out of boredom, needed a break, received Facebook alert(s) via my email or on my phone), and checked off what applications they used while on Facebook (responses included: updated your status, uploaded photos/videos, viewed friend(s) photos). The latter question consisted of 22 possible response choices, including an open-ended "other" category which participants could fill out.

Facebook Social Comparison. Six items from the Iowa-Netherlands Comparison Orientation Measure (Gibbons & Buunk, 1999) were adapted for a Facebook context to measure non-directional, downward, and upward social comparisons. Non-directional items included: "TODAY, when I was on Facebook, I paid a lot of attention to how I do things compared to how others do things," and "TODAY, when I was on Facebook, if I wanted to find out how well I have done something, I compared what I have done with how other have done". Downward items included: "TODAY, when I was on Facebook, I paid attention to how I do things versus how others do things and felt my way was better," and "TODAY, when I was on Facebook, I believed that I had accomplished more than other people had". Finally, upward items included: "TODAY, when I was on Facebook, I felt less confident about what I have achieved compared to other people," and "TODAY, when I was on Facebook, I concluded I am not as popular as other people" (see questions 5 and 6 in Appendix R). All COM-F items were measured on a 9-point Likert scale ranging from *I disagree strongly* to *I agree strongly.* The 3 items from the SCS-F

were reverse coded to examine upward Facebook social comparison. Items included the following stem and response choices: "TODAY, in relation to others on Facebook, I felt": *Inferior* 1 2 3 4 5 6 7 8 9 10 *Superior* ; *Left out* 1 2 3 4 5 6 7 8 9 10 *Accepted*; *Unattractive* 1 2 3 4 5 6 7 8 9 10 *Attractive* (Allan & Gilbert, 1995).

Depressive Symptoms. Depressive symptoms were measured through 5 items from the CES-D (Radloff, 1977) and 5 items from the BDI-II (Beck, Steer, & Brown, 1996). The CES-D items ranged from *none of the time today* to *most of the time today* on a 9-point Likert scale. Each of the five BDI-II items was rated on a 0-3 scale.

Analysis Strategy

The diary data was analyzed using Multilevel Random Coefficient Modeling (MRCM), which is also known as Multilevel Modeling (MLM) in SAS PROC MIXED (Singer, 1998) and also in Hierarchal Linear Modeling (HLM). This approach adjusts for non-independence in data. Daily diary data create multilevel data structures where data from one level of analysis (time) are nested within a second level (individual). The distributional assumptions are such that residuals have a normal distribution (M= 0 and SD =1), are uncorrelated with each other, and have uniform variances across all levels of the predictors (homoscedasticity). However, heteroscedasticity can be caused by outliers, severe non-normality in observed scores, and measurement errors at the level of the predictors or the dependent variable.

When conducting this type of analysis, two sources of random error must be considered: 1) the random error that exists with sampling individuals, and 2) the random error that exists with sampling events. Traditional techniques of analyzing data, such as ANOVA and regression, are insufficient since they fail to simultaneously account for the two types of random error.

MRCM is also useful in that it allows for unequal number of observations which are often found in diary data whereas analyzing diary data as repeated measures ANOVA may violate these assumptions (Byrk & Raudenbush, 1992). An additional advantage of multilevel models is that they can simultaneously estimate the within- and between-persons effects and their interactions and can handle multiple continuous predictors that have an unbalanced number of cases per person (Reis & Judd, 2000).

Multi-level models are often viewed as a "slopes as outcomes" models in which a regression slope for each participant at Level 1 (diary data) is calculated, and then the slope is treated as the dependent variable in comparisons across Level 2 person variables (Nezlek, 2003). Therefore, for the present study, the diary ratings of depressive symptoms (the criterion variable) and other diary predictor variables of time on Facebook and upward Facebook social comparison are treated as Level 1 phenomena nested within Level 2 (the individual). Furthermore, individual differences were analyzed at Level 2, with the individual participant and/or the participant's gender as the unit of analysis. Analyses at Level 2 permit a way to analyze the cross-level interaction of gender (a Level 2 predictor) with the various types of Facebook social comparisons (a Level 1 predictor) on daily depressive symptoms (a Level 1 outcome variable) (hypothesis 8).

Although the different types of Facebook social comparisons were examined as potential mediators between time on Facebook/Facebook frequency (or view) and depressive symptoms at the daily level (Level 1/within-person), Level 2 aggregates of the Level 1 predictors were simultaneously entered into the equations to parse out the within- and between-effects (Hypotheses1-8). Level 2 aggregates were produced by taking the aggregate means for those predictors across the 14-days for each individual and grand mean centering the variables so that

the coefficients represent the mean average of the predictors for all participants during the 14-days (the between-persons level). All Level 1 predictors were cluster mean centered so that the coefficients would represent the averages for the individual (the within-person level). The only variable which was not centered was the Level 2 variable of gender since it is a dichotomous variable with an already meaningful zero. As such, females were dummy coded as 1 and males were dummy coded as zero.

Finally, hypothesis 9 examines daily negative experiences on Facebook as a moderator between Facebook social comparisons and daily depressive symptoms at both the within persons (Level 1) and between-persons level (Level 2). To test this hypothesis, the Level 1 model, within-person outcomes (daily depressive symptoms) on a given day are regressed on within-person predictors (daily Facebook social comparisons, daily negative Facebook experiences, and daily Facebook social comparisons by daily negative experiences interaction term). For the Level 2 model, the within-person slope determined from the Level 1 regression models is regressed on between-persons predictors (the Level 2 aggregate for Facebook social comparison, the Level 2 aggregate for negative experiences on Facebook and the interaction term between the Level 2 aggregate for Facebook social comparisons and the Level 2 aggregate for negative Facebook experiences). Because the MRCM method of analysis does not output standardized parameter estimates(β), the unstandardized parameter estimates (b) are reported for the present study.

Data Cleaning

Each response for the baseline data was duplicated 13 times and was merged with the 14-day diary data in univariate format. The participant-level variables were carefully examined for irregularities. Due to heteroscedasticity concerns, two women were excluded from the analysis because they reported unusually high number of logins per day (108 and 365 views/logins on

average per day) when compared with the mean of 6.93 views/logins per day (*SD*=8.017), leaving a total of 93 females and 59 males (152 participants in total). The missing values throughout the diary level data appeared to be randomly distributed throughout the dataset.

Results

Means, standard deviations, and correlations for the relevant baseline variables and the diary variables for males and females are presented in Table 2 and Table 3 respectively. All hypotheses were tested using a random intercept slope model where the intercept and Level 1 predictor(s) were allowed to vary. Similar to the pilot study, mediation was assessed using the test of the *ab* products (see Figure 3a). Unlike normal regression, the *ab* products in multilevel modeling are not equivalent to the c-c' estimates but rather they represent an exclusive mediated effect (Krull & MacKinnon, 1999). See Appendix T for model equations corresponding to all nine hypotheses.

Random-intercept Model with no Predictors

Before running the mediational analysis, null models (without predictors) were run for both criterion depressive symptoms variables to see if enough variance at the within-person level could be predicted at the within-person level for the mediational analysis. These unconditional models provide information for where the variance lies at both the within- and between-persons level. With the CES-D as the criterion, the mean depressive symptoms level was 14.29 (*SD* =.42) ($\hat{\gamma}_{00}$) across the 14 days. The within (Level1) variance $\hat{\sigma}^2$ of depressive symptoms was 41.52 (*SD* =1.36) and the between (Level 2) variance $\hat{\tau}_{00}$ was 24.34 (*SD* =3.16). The intraclass correlation indicated that 37% of the total variance in depressive symptoms was due to the

between-persons differences in mean levels. Therefore, 63% of the variance is due to within-person variability.

With regards to the BDI-II as the criterion, the mean depressive symptoms level was 2.31(*SD*=.13) ($\hat{\gamma}_{00}$) across the 14 days. The within (Level 1) variance $\hat{\sigma}^2$ of depressive symptoms was 3.35 (*SD*=.11) and the between (Level 2) variance $\hat{\tau}_{00}$ was 2.34(*SD*=.30). The intraclass correlation specified that 41% of the total variance in depressive symptoms was due to the between-persons differences in mean levels. Consequently, 59% of the variance is due to within-person variability.

Moderated Mediation Analysis with Time on Facebook as Predictor

Hypotheses 1-4 and hypotheses 5-8 were related to the moderated mediation hypotheses and therefore each separate hypothesis represented a mediational pathway. Hypothesis 1 predicted that the daily amount of time spent on Facebook would be positively related to depressive symptoms at the daily level (the c path). Both the Level 1 and Level 2 aggregate for time on Facebook were entered into the equation with daily depressive symptoms (Level 1) serving as the criterion. Results showed that hypothesis 1 was unsupported using both daily CES-D depressive symptoms (b = .057, $t(151)$ = .43, p = .666) and BDI-II depressive symptoms as the criterion (b = -.017, $t(151)$ = -.47, p = .642). Thus, time on Facebook appeared to be unrelated to depressive symptoms.

Hypothesis 2 indicated the daily amount of time on Facebook would be related to daily Facebook social comparisons. The model specification for hypothesis 2 included both the Level 1 and Level 2 (aggregate) for time on Facebook entered into the equation with daily Facebook social comparisons (Level 1) as the criterion (the a path). Results revealed that time on Facebook significantly predicted all four measures of social comparison: upward COM-F (b =

.152, *t (151)* = 3.0, *p* = .003); non-directional COM-F (*b* = .358, *t(151)* = 6.3, *p* < .0001); downward COM-F (*b* = -.264, *t(151)*= -4.42, *p* < .0001); and upward SCS-F (*b* = -.064, *t(151)* = 2.6, *p* = .01) across all participants. As expected, the more time participants spent on Facebook, the more likely they were to engage in non-directional and upward Facebook social comparisons. In contrast, there was a negative association between time on Facebook and downward COM-F and upward SCS-F. The more participants engaged in daily downward or daily upward SCS-F the less time they spent on Facebook.

It was predicted that daily Facebook social comparisons would mediate the relationship between daily time on Facebook and daily depressive symptoms (hypothesis 3). Thus, both the b and c' paths were entered into the analysis simultaneously. The combined equation consisted of Level 1 and Level 2 (aggregate) predictors of time on Facebook and Level 1 and Level 2 (aggregate) predictors of Facebook social comparisons with daily depressive symptoms (Level 1) as the criterion. Because the association between daily time on Facebook and daily depressive symptoms (the c path) was not significant, likewise, the c' path was also not significant using either the CES-D or the BDI-II as the criterion.

However, the b path, which examines the relationship between Facebook social comparisons and depressive symptoms, was significant for all four types of social comparison: upward COM-F (*b* = .607, *t(137)* = 6.88, *p* <.0001); non-directional COM-F (*b* = .161, *t(133)* = 2.24, *p* = .027); downward COM-F (*b* = .140, *t(139)* = 2.03, *p* = .0445); and upward SCS-F upward (*b* = 1.974, *t(149)* = 10.7, *p* < .0001) utilizing the CES-D as the criterion across all participants. The Sobel formula (Sobel, 1982) was used to test the significance of indirect effects. The use of the Sobel formula to test for multilevel mediation is consistent with other recent diary studies (i.e., Uysal, Lin, Knee, & Bush, 2011).

Across all participants there was a significant indirect effect from time on Facebook to depressive symptoms (CES-D) through upward COM-F ($Z = 2.75$, $p = .006$), non-directional COM-F ($Z = 2.11$, $p = .006$), and upward SCS-F ($Z = 2.53$, $p = .012$). In contrast, downward COM-F was not found to be a mediator ($Z = 1.84$, $p = .065$) across all participants. In other words, as anticipated, upward and non-directional measures of social comparisons serve as mediators between time on Facebook and depressive symptoms. See Figure 5a-5c for the significant mediational models.

Using the BDI-II as the criterion yielded similar results. The b path was significant when participants reported engaging in upward COM-F ($b = .089$, $t(137) = 3.69$, $p < .0003$); non-directional COM-F ($b = .043$, $t(132) = 2.04$, $p < .0001$); and upward SCS-F ($b = .318$, $t(148) = 6.10$, $p < .0001$). Downward COM-F ($b = .162$, $t(138) = 1.43$, $p = .155$) was positively related to depressive symptoms but was not significant.

In addition, similar to the results using the CES-D as the criterion, across all participants there was a significant indirect effect from time on Facebook to depressive symptoms (BDI-II) via upward COM-F ($Z = 2.32$, $p = .020$), non-directional COM-F ($Z = 1.94$, $p = .052$), and upward SCS-F ($Z = 2.39$, $p = .016$). Therefore, on days that participants spent more time on Facebook they were more likely to upwardly and/ or non-directionally socially compare themselves to their Facebook peers and in turn report higher depressive symptoms. In addition, all coefficients were positive suggesting that participants who engaged in daily Facebook social comparisons of any kind reported greater daily depressive symptoms. See Figure 6a-6c for the significant mediational models using the BDI-II as the criterion.

Analysis of whether gender served as a moderator for the association between Facebook social comparisons and depressive symptoms was tested by entering both the b and c' paths

along with a gender (Level 2) by daily time on Facebook (Level 1) cross-level interaction term and a gender (Level 2) by daily Facebook social comparison (Level 1) cross-level interaction term. Therefore, the model included Level 1 and Level 2 (aggregate) predictors of time on Facebook; Level 1 and Level 2 (aggregate) predictors for Facebook social comparisons; a cross-level interaction with gender (a Level 2 variable) and time on Facebook (at Level 1); and finally, an interaction between gender (Level 2) and Facebook social comparison (Level 1). Daily depressive symptoms (Level 1) serve as the criterion. Gender did not significantly interact with any of the four types of Facebook social comparison to predict daily depressive symptoms (CES-D or BDI-II). Thus, results revealed that gender did not moderate the relationship between daily Facebook social comparisons and daily depressive symptoms.

Moderated Mediation Analysis with Facebook Logins as Predictor

Hypotheses 5-8 also predicted moderated mediation but with Facebook views/logins as the predictor and gender as the moderator (see Figure 3b for the conceptual model). Hypothesis 5 predicted that the frequency with which participants view/log onto Facebook per day predicts daily depressive symptoms (the c path). Both the Level 1 and Level 2 (aggregate) for Facebook logins/views were entered into the equation with daily depressive symptoms (Level 1) serving as the criterion. Although the results were not significant, the coefficients were negative whether daily CES-D (b= -.03, $t(152)$ = -.68, p = .495) or daily BDI-II (b = .00, $t(152)$ = -.13, p = .893) was the criterion.

Hypothesis 6 predicted that the frequency with which participants view/log onto Facebook per day would be related to daily Facebook social comparisons. The Level 1 and Level 2 (aggregate) for daily views/logins were entered into the equation along with daily Facebook social comparisons (Level 1) as the criterion (the a path). Across all participants, daily

views/logins to Facebook significantly predicted three measures of Facebook social comparisons: upward COM-F (b = .07, t *(152)* = 3.18, p = .002); non-directional COM-F (b = .11, *t(152)* = 4.44, p < .0001); and downward COM-F (b = -.07, *t(151)*= -3.43, p =.001). Daily Facebook views/logins did not significantly predict upward SCS (b = -.087, *t(150)* = -1.21, p =.230). Hypothesis 6 demonstrated that the frequency of logins related to most forms of social comparison (path a). Thus, people who viewed their Facebook page more frequently on a given day were more likely to engage in daily upward (COM-F) and non-directional social comparisons. In addition, people who made downward social comparisons viewed their Facebook page less frequently per day.

Hypothesis 7 stated that daily Facebook social comparisons would mediate the relationship between daily Facebook views/logins and daily depressive symptoms. To test Hypothesis 7, both the b and c' paths were entered into the analysis simultaneously. The combined equation consisted of Level 1 and Level 2 (aggregate) predictors of daily Facebook views/logins and Level 1 and Level 2 (aggregates) predictors of Facebook social comparisons with daily depressive symptoms (Level 1) as the criterion. Like with the previous mediational hypothesis involving Facebook time, the association between Facebook views/logins and depressive symptoms (the c path) was not significant and therefore, the c' path was also not significant.

Using the CES-D as the criterion, the b path, which examines the relationship between Facebook social comparisons and depressive symptoms, was significant for three types of social comparisons: upward COM-F (b = .625, *t(137)* = 6.88, p <.0001); non-directional COM-F (b = .173, *t(133)* = 2.37, p = .019); and upward SCS-F (b = 1.93, *t(149)* = 10.53, p < .0001) across all participants. In addition, there was a significant indirect effect from Facebook views/ logins to

depressive symptoms (CES-D) through upward COM-F (Z = 2.88, p =.004), and non-directional COM-F (Z = 2.09, p =.037). Therefore, upward (COM-F) and non-directional social comparisons served as mediators between Facebook frequency/views and depressive symptoms. Downward COM-F (Z = 1.68, p =.093) and the upward SCS-F (Z = .07, p =.95) were not found to be significant mediators across all participants. See Figure 7a and 7b for the significant mediational models.

When the BDI-II was used as the criterion, upward COM-F (b = .499, $t(136)$ = 3.34, p <.001); and upward SCS-F (b = .315, $t(148)$ = 6.03, p <.0001) were significantly associated with depressive symptoms. Non-directional COM-F (b = .041, $t(132)$= 1.92, p =.056) was marginally significant whereas downward COM-F (b = .007, $t(138)$ = .39, p = .699) was not significant. Although there were direct effects from daily downward, upward (COM-F and SCS-F), and non-directional Facebook social comparisons to daily depressive symptoms across all participants, there was a significant indirect effect from Facebook views/ logins to depressive symptoms (BDI-II) via upward COM-F only (Z = 2.09, p =.037; Figure 8).

Similar to the previous moderated mediational model, gender was tested as a moderator between Facebook social comparisons and depressive symptoms (hypothesis 8). This was tested by entering both the b and c' paths along with a gender (Level 2) by daily Facebook views/logins (Level 1) cross-level interaction term and a gender (Level 2) by daily Facebook social comparison (Level1) cross-level interaction term. Thus, the model included Level 1 and Level 2 (aggregate) predictors of time on Facebook; Level 1 and Level 2 (aggregate) predictors for Facebook social comparisons; a cross-level interaction with gender (a Level 2 variable) and Facebook views/ logins (at Level 1); and finally, an interaction between gender (Level 2) and Facebook social comparison (Level 1) with daily depressive symptoms (Level 1) as the criterion.

Gender failed to interact with any of the four types of Facebook social comparison to predict daily depressive symptoms (CES-D or BDI-II). Therefore, similar to results for hypothesis 4, the relationship between the number of Facebook views/logins and depressive symptoms did not differ for men or women.

Negativity of Experiences as Moderator

Finally, the moderating effect of negativity of Facebook experiences on the association between Facebook social comparisons and depressive symptoms was examined at both the between- and within-person levels (Hypothesis 9). The model equation included daily depressive symptoms (Level 1) predicted by negative experiences on Facebook (Level 1), Facebook social comparisons (Level 1), and interaction between Facebook social comparisons and negative experiences on Facebook (Level 1). In addition, Level 2 aggregates for Facebook social comparisons, negative experiences on Facebook, and the interaction term between the two Level two aggregates are entered in at step two. Significant interaction terms at Level 1 indicate there is a significant difference within-person (i.e., on days in which a given person reports highly negative experiences on Facebook, the association between Facebook social comparisons and depressive symptoms may be higher, such that there is an increase in depressive symptoms from that person's mean). Significant interaction terms at Level 2 indicate that there is a significant difference between-persons (e.g., individuals who are higher in Facebook social comparisons tend to report greater depressive symptoms when they experience more negative experiences on Facebook relative to those who are lower on Facebook social comparisons.)

Results revealed that negative experiences on Facebook significantly moderated the relationship between upward (COM-F) and depressive symptoms (CES-D) both at the within-person level (b = .132, $t(152)$ = 2.13, p = .035) and between-persons level (b = .253, $t(149)$ =

2.53, p = .009). The simple slopes were computed and showed that the slopes for both low and high negativity of experiences on Facebook were both significantly different from zero (b =.298, $t(152)$ = 2.79, p = .006 and b = .657, $t(152)$ = 5.10, p = .00001, respectively) at the within-person level. In other words, the slopes were significant such that people who engage in more upward social comparisons (at one standard deviation above the mean) on a given day will report an increase in depressive symptoms. Low negativity on Facebook (at one standard deviation below the mean) showed a weaker but still significant relation between upward Facebook social comparison and depressive symptoms (see Figure 9a). However, this was not true at the between-persons level. The test for the simple slopes at the between-persons level found that only the slope for high negativity of experiences on Facebook was significantly different from zero (low: b =.136, $t(149)$ = .677, p = .499; high: b =.716, $t(149)$ =4.71, p =.00001). For those individuals who are high in negativity, there is a significant relation between upward COM-F and depressive symptoms, whereas for those low in negativity, there is no relation between upward COM-F and depressive symptoms (see Figure 9b).

In addition, negative experiences on Facebook significantly moderated the relationship between non-directional (COM-F) and depressive symptoms (CES-D) both at the within-person level (b = .085, t (152) = 1.94, p = .054) and between-persons level (b = .240, $t(149)$ = 2.26, p = .025). The test of the simple slopes demonstrated that for individuals low in negative experiences on Facebook non-directional COM-F the slope was not significantly different from zero (b = .048, $t(152)$= .621, p = .536), whereas for those high in negative experiences on Facebook, non-directional COM-F was significantly different from zero (b = -.31, $t(152)$ = -3.44, p = .001) at the within-person level. The same was true at the between-persons level. Only the slope for high negativity of experiences on Facebook was significantly different from zero (low:

b =-.011, *t(149)* = -.061, *p* = .952; high: *b* =.541, *t(149)* =2..99, *p* =.003). Therefore, highly negative experiences on Facebook may affect people's depressive symptoms levels more if they also engage in more upward and/or non-directional social comparisons (at one standard deviation above the mean) on average. See Figure 10a and 10b.

Discussion

In sum, most of the hypotheses for the present study were supported. In addition, across all hypotheses, using the predictors of upward COM-F and non-directional COM-F with CES-D depressive symptoms as the criterion yielded significant results. This is not surprising because the use of the CES-D has been highly effective for testing for depression in normal populations (Radloff, 1977) rather than BDI-II which has been predominantly used for clinical populations (Beck, Steer, & Brown, 1996). Thus, overall results revealed the act of merely comparing one's self to others (non-directional social comparison) or comparing one's self to others and feeling less accomplished (upward social comparison) is significantly associated with depressive symptoms.

Similar to the pilot study, the present study found that non-directional Facebook social comparison mediated the relationship between time on Facebook and depressive symptoms. Furthermore, in the present study, we explored additional types of Facebook social comparisons and found that as expected, both types of upward social comparisons (COM-F and SCS-F) served as mediators between time on Facebook and depressive symptoms (using the CES-D or the BDI-II). Hence, the findings were consistent with the hypothesized relationship that daily time on Facebook and depressive symptoms are mediated by (upward and non-directional) Facebook social comparisons.

In contrast, downward social comparisons did not serve as a mediator between time on Facebook and depressive symptoms. Time on Facebook was negatively associated with downward social comparisons. Therefore, people who engage in daily downward social comparisons (i.e., feel they are more accomplished than their Facebook peers) spend less time on Facebook per day. Nevertheless, daily downward social comparisons are still positively associated with daily CES-D depressive symptoms. Because this positive association was not predicted, interpretations are made with caution. This result might suggest that engaging in downward social comparisons is indicative of being defensive. Thus, it is possible that participants who make any type of social comparisons may feel more depressed.

Although it did not affect the results of the mediational analysis, a notable difference between the pilot study and the present study was that the relationship between the predictor (Facebook social comparisons) and the criterion (depressive symptoms) was not significant. In fact, depressive symptoms were uncorrelated with time on Facebook in both the baseline questionnaire and the diary study (see Table 2 and Table 3) whereas these two variables were highly correlated at $p < .01$ in the pilot study (see Table 1). One reason for this might be that the variable of time on Facebook was changed from seven response choices in the pilot study to 13 response choices in the present study.

According to Schwartz (1999), having different response choices to the same question can dramatically change how participants respond since they often use the middle range of the scale as a reference point for average behavior. The mid-point of the scale for the pilot study was the response choice *1-2 hours* whereas the mid-point of the scale for the present study was the response choice *2-2 ½ hours*. The modification in response choices indeed altered participants' responses. Most participants in the pilot study indicated that they spent over an

hour on Facebook on average whereas for the present study participants specified they spent about 30 minutes to an hour per day in the daily diary. Therefore, switching the response choices might have resulted in participants underestimating the amount of time they spent on Facebook.

The second distinction between the two studies was that gender was not found to be a moderator in the daily diary. In the pilot study, results demonstrated that making non-directional social comparisons on Facebook mediated the association between time spent on Facebook and depressive symptoms for men only. However, due to the fact that there were merely 26 male participants in the pilot study (versus 59 males in the present study), the results for the pilot study may not be generalizable. Furthermore, diary methodology is generally considered to be a more precise representation of everyday behavior than cross-sectional studies due to a decrease in retrospection bias. Regardless of gender, people who spend more time on Facebook on a daily basis are more likely to compare themselves to others (non-directional social comparison) or feel they are inferior to their Facebook peers (upward Facebook social comparison) and in turn report greater daily depressive symptoms.

In the present study, upward (COM-F) and non-directional Facebook social comparisons were found to mediate the association between daily Facebook views/logins and daily CES-D depressive symptoms supporting the original hypotheses. As anticipated, downward and upward SCS-F were not found to be mediators. In addition, negative experiences on Facebook did not serve as a moderator between upward SCS-F and depressive symptoms.

The results using the upward SCS-F items were not comparable to the upward COM-F. The difference may be due to the fact that the upward SCS-F items (e.g., "TODAY in relationship to others on Facebook, I feel": *Incompetent* 1 2 3 4 5 6 7 8 9 10 *More competent*) may tap into more of the affective component of social comparison, whereas the

upward COM-F items (i.e., "TODAY, when I was on Facebook, I felt less confident about what I have achieved compared to other people.") may access a more cognitive component.

Finally, daily negative experiences on Facebook were found to moderate the relationship between COM-F (non-directional and upward) social comparisons and CES-D depressive symptoms both within-person and between-persons. Results revealed those who rate their experiences on Facebook as highly negative and engage in high number of upward social comparisons on a given day reported a significant increase in daily depressive symptoms. The relation between daily depressive symptoms and daily upward Facebook social comparisons is weaker but still significant for those who report lower negativity. In contrast, at the between-persons level, only people who were at the upper end of making upward social comparisons and experienced highly negative experiences on Facebook were likely to report a significant increase in depressive symptoms across the 14 days. There was no relation between upward Facebook social comparison and depressive symptoms for those low in negativity across the 14-days.

The latter result is similar to the within- and between-person effects we found for the interaction between non-directional social comparisons and negative experiences on Facebook. That is, people who engage in more non-directional social comparisons on a given day will report higher depressive symptoms if they experienced highly negative experiences on Facebook. Also, at the between-persons level, highly negative experiences on Facebook moderated the association between non-directional Facebook social comparisons and depressive symptoms for those who are at the upper end of making non-directional social comparisons only.

These results can be interpreted to mean that individuals who report their experiences on Facebook as being more negative feel worse as a result of engaging in upward and non-

directional social comparisons. In contrast, those who do not perceive their experiences on Facebook to be negative feel less depressed after making upward and non-directional social comparisons. This phenomenon is hardly exclusive to Facebook. However, individuals who perceive their Facebook experiences to be highly negative and engage in a high number of Facebook social comparisons may feel worse from online encounters than their offline ones. The reason they might feel worse is that people often use Facebook (as opposed to offline socializing) as a way to publically tout their achievements and/or more notable life events (i.e., a vacation, marriage, or birth a child). In addition, Facebook often allows users to learn details about their Facebook friends' lives they might not normally be privy to offline.

Limitations and Future Directions

A limitation of both the present study and the pilot study was that causality cannot be inferred with as much confidence as experimental designs would allow. In addition, extraneous influences on participants could not be controlled because participants were filling the reports out online at their leisure rather than in the laboratory. Also, both studies solely utilized self-reports, which might not be entirely accurate. However, the daily diary design is still considered to be more accurate than a one-time report on "general" frequencies of Facebook use and "general" feelings about Facebook experiences. Furthermore, a major strength of the diary design is that inclusion of the Level 2 aggregates parse out the within and between effects. Thus, it is possible to see precisely at what level(s) Facebook social comparisons may be influencing depressive symptoms.

Moreover, participants were informed they should fill out the report before they went to bed in order to capture as much information about their daily Facebook usage as possible. In order to reduce the amount of missing data, participants were also given the option to fill the

record out in the morning if they missed an entry. It is unclear whether participants were able to accurately recall the details of the previous day. However, due to feasibility issues (i.e., it is not possible to monitor participants' Facebook activities on their phones and personal computers without violating their privacy), the diary method seems to be the best way available to access participants' Facebook activities.

An arguably important factor that was not explored in the current studies is how variability in mood might influence participants' responses. Perhaps differences in mood might change whether people engage in particular Facebook social comparisons which in turn might differentially affect depressive symptoms. For instance, people who are typically good natured (e.g., report happy moods) may report engaging in upward or non-directional social comparisons much less whereas people in chronically bad moods might be more prone to making upward social comparisons. In addition, self-esteem might also be a relevant factor to explore. Those with low self-esteem may engage in more non-directional and upward social comparisons on Facebook whereas those with high self-esteem may engage in downward social comparisons or no social comparisons on Facebook. The diary reports contained short measures of both the PANAS and the Rosenberg self-esteem scale. Thus, future research is planned to address both of these questions. Finally, in future, lag effects should be investigated to see if engaging in upward and/or non-directional social comparisons on a given day have carry over effects on participants' self-reported self-esteem, mood, and depressive symptoms over time.

In conclusion, a major contribution of the present research is that it provides evidence that computer-mediated interactions on Facebook may indeed negatively impact user's psychological health. More specifically, these studies found that engaging in upward and non-directional social comparisons on Facebook may be associated with greater depressive

symptoms. Other research on Facebook has demonstrated that people tend to think they are alone in feeling negative emotions because their Facebook friends might be self-censoring what they post on Facebook (Jordan et al., 2011). That is, their friends may only be sharing the positive news in their lives but not fully presenting their daily struggles. The pluralistic ignorance of other people's negative emotions combined with upward and/or non-directional Facebook social comparisons could potentially lead some people to experience increases in negative cognitions, which may in turn contribute to a cycle of depression. This downward spiral into depression may be especially true for college students since many are living away from home for the first time and may still be struggling to establish their identities. Thus, the current research holds important implications for general populations and particularly, college students who are depressed and might also be addicted to Facebook.

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Table 1. Means, Standard Deviations, and Correlations between Main Variables for active Facebook users for the pilot study.

	1	2	3	4	5
1. INCOM General Social Comparison	-	.60	.15	.51**	.56**
2. Non-directional social comparison scale (COM-F)	.63**	-	.22	.61**	.47*
3. Time on Facebook	.22	.51**	-	.57**	.45*
4. CES-D	.04	.07	.32**	-	.85**
5. BDI-II	.05	.06	.20*	.84**	-
Males M (SD)	33.62 (6.97)	28.85 (8.74)	3.46 (1.44)	16.54 (12.45)	9.00 (10.71)
Females M (SD)	37.03 (7.26)	30.94 (9.12)	3.36 (1.59)	14.55 (10.89)	10.30 (10.19)

*Note. Correlations for Females (N = 107) are presented below the diagonal. Correlations for Males (N = 26) are presented above the diagonal. ** p < .01, *p < .0*

Table 2. Means, Standard Deviations, and Pearson Correlations between main variables from the baseline questionnaire for the present study

	1	2	3	4	5	6	7	8
1. Time on Facebook	-	.36**	-.03	-.18	-.15	.08	.02	-.12
2. Facebook Frequency/views	.40**	-	-.21	-.32	.15	.16	-.13	-.08
3. Upward social comparison (SCS-F items)	-.16	-.06	-	.44**	.25*	.15	.48**	.46**
4. Upward social comparison (COM-F items)	-.03	.13	.31**	-	-.12	-.18	.37	.34
5. Non-directional social comparison (COM-F items)	.17	.30	.08	-.31**	-	.55**	.41**	.42**
6. Downward social comparison (COM-F items)	.15	-.20	.16	-.21*	.49**	-	.31*	.27*
7. CES-D	.07	.03	.32**	.07	.12	.19	-	.80**
8. BDI-II	.13	-.00	.32**	-.01	.14	.22**	.81**	-
Males M (SD)	4.44	7.69	4.63	9.63	31.47	8.42	14.00	9.85
	(2.44)	(6.05)	(1.58)	(2.75)	(8.75)	(2.38)	(9.87)	(8.33)
Females M (SD)	4.76	8.59	4.30	9.06	33.06	7.88	14.94	11.10
	(2.26)	(9.82)	(1.57)	(2.40)	(8.21)	(2.37)	(10.66)	(9.30)

*Note. Correlations for Females (N = 93) are presented below the diagonal. Correlations for Males (N = 59) are presented above the diagonal. ** p < .01, * p < .05*

Table 3. Means, Standard Deviations, and Pearson Correlations between main variables at the daily diary level for the present study.

	1	2	3	4	5	6	7	8	9
1. Time on Facebook	-	.52**	-.08*	.02	.11**	-.01	-.06	-.01	.01
2. Number of times viewing Facebook	.45**	-	-.07	.02	.06	.03	-.04	-.08*	-.06
3. Negative experiences on Facebook	-.03	-.00	-	.23**	.20**	.12**	-.33	.40**	.20**
4. Upward social comparison (SCS-F items)	-.10**	-.07	.38**	-	.39**	.08*	.19**	.46**	.31**
5. Upward social comparison (COM-F items)	.05	.03	.36**	.40**	-	.53**	-.33**	.31**	.24**
6. Non-directional social comparison (COM-F items)	.15**	.15**	.16**	.08**	.55**	-	-.59**	.09**	.14**
7. Downward social comparison (COM-F items)	-.11**	-.14**	.01	.31**	-.32**	-.62**	-	.08*	-.07*
7. CES-D	.02	.04	.39**	.46**	.35**	.20**	.05	-	.52**
8. BDI-II	.03	.03	.25**	.24**	.21**	.14**	.01	.50**	-
Males M (SD)	4.03	6.41	2.67	4.81	4.67	4.80	14.31	13.99	2.11
	(2.15)	(6.07)	(1.62)	(1.78)	(3.53)	(3.53)	(3.95)	(7.57)	(2.17)
Females M (SD)	3.97	6.75	2.56	4.64	4.68	4.98	13.93	14.46	2.43
	(2.17)	(7.86)	(1.87)	(1.83)	(3.62)	(3.93)	(4.33)	(8.44)	(2.50)

*Note. Correlations for Females (N = 93) are presented below the diagonal. Correlations for Males (N = 59) are presented above the diagonal. ** p < .01, *p < .05*

Figure Captions

Figure 1. Conceptual moderated mediation model for the pilot study.

Figure 2. Results of moderated mediation model for males and females for the pilot study.

Figure 3a. Conceptual moderated mediation model for hypotheses 1-4 for the present study.

Figure 3b.Conceptual moderated mediation model for hypotheses 5-7 for the present study.

Figure 5a. Results of mediation model for all participants with upward social comparison (COM-F items) as the mediator and depressive symptoms (CES-D) as the criterion. Time on Facebook is the predictor.

Figure 5b. Results of mediation model for all participants with non-directional social comparison (COM-F items) as the mediator and depressive symptoms (CES-D) as the criterion. Time on Facebook is the predictor.

Figure 5c. Results of mediation model for all participants with upward social comparison (SCS-F items) as the mediator and depressive symptoms (CES-D) as the criterion. Time on Facebook is the predictor

Figure 6a. Results of mediation model for all participants with upward social comparison (COM-F items) as the mediator and depressive symptoms (BDI-II) as the criterion. Time on Facebook is the predictor.

Figure 6 b. Results of mediation model for all participants with non-directional social comparison (COM-F items) as the mediator and depressive symptoms (BDI-II) as the criterion. Time on Facebook is the predictor.

Figure 6 c. Results of mediation model for all participants with upward social comparison (SCS-F items) as the mediator and depressive symptoms (BDI-II) as the criterion. Time on Facebook is the predictor.

Figure 7a. Results of mediation model for all participants with upward social comparison (COM-F items) as the mediator and depressive symptoms (CES-D) as the criterion. Facebook views/ logins serve as the predictor.

Figure 7b. Results of mediation model for all participants with non-directional social comparison (COM-F items) as the mediator and depressive symptoms (CES-D) as the criterion. Facebook views/ logins serve as the predictor.

Figure 8. Results of mediation model for all participants with the upward social comparison (COM-F items) as the mediator and depressive symptoms (BDI-II) as the criterion. Facebook views/ logins serve as the predictor.

Figure 9a. The interaction slope of negative experiences on Facebook and upward social comparison (COM-F items) on depressive symptoms (CES-D) at the within- person level.

Figure 9b. The interaction slope of negative experiences on Facebook and upward social comparison (COM-F items) on depressive symptoms (CES-D) at the between-persons level.

Figure 10a. The interaction slope of negative experiences on Facebook and non-directional social comparison (COM-F items) on depressive symptoms (CES-D) at the within-person level.

Figure 10b. The interaction slope of negative experiences on Facebook and non-directional social comparison (COM-F items) on depressive symptoms (CES-D) at the between-persons level.

Figure 1. Conceptual moderated mediation model for the pilot study.

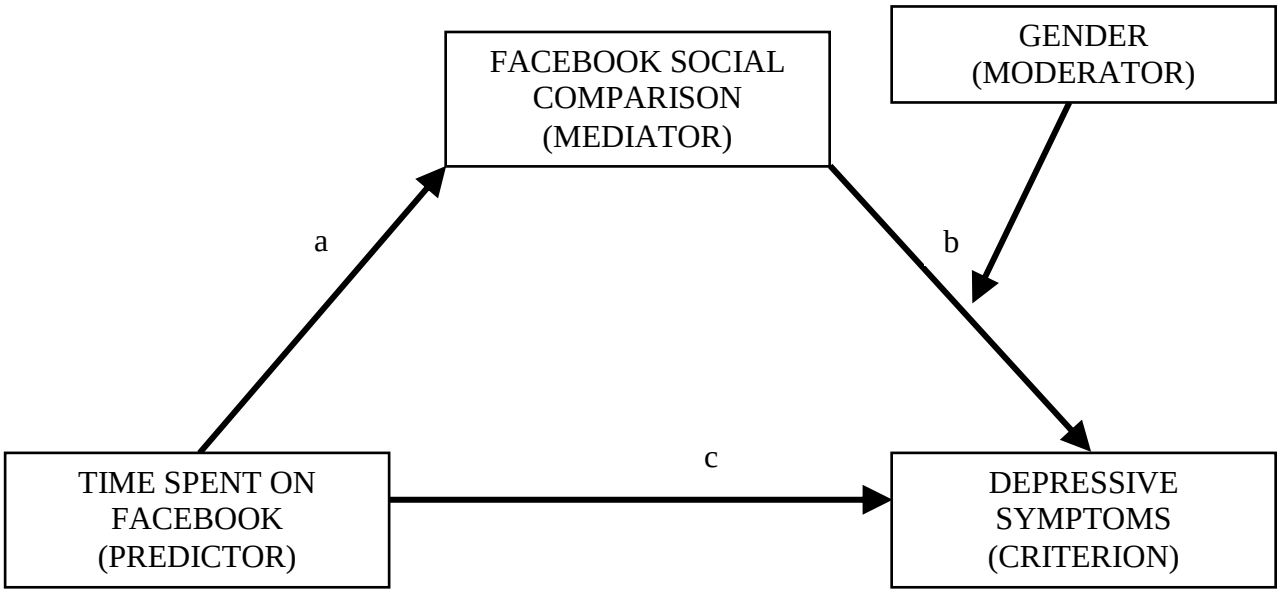
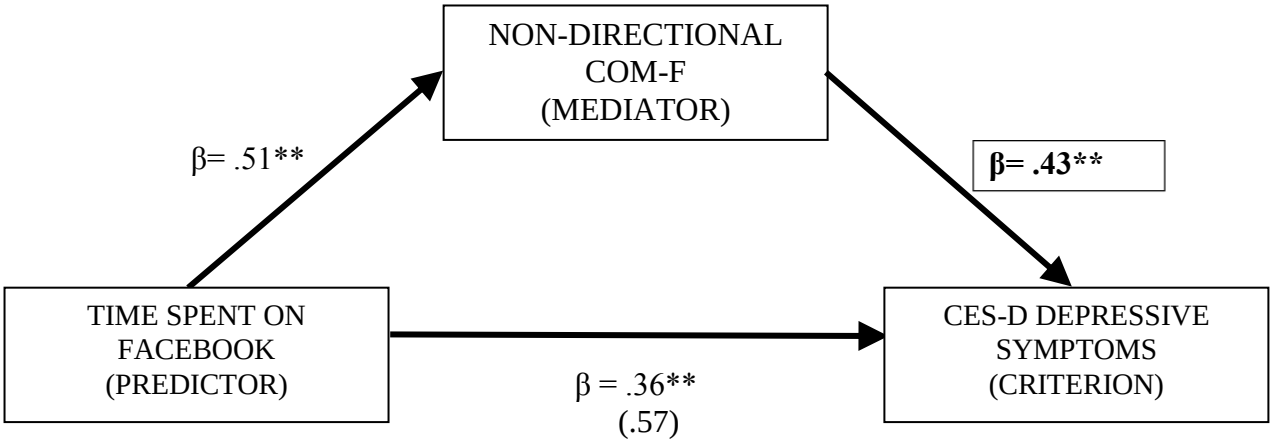
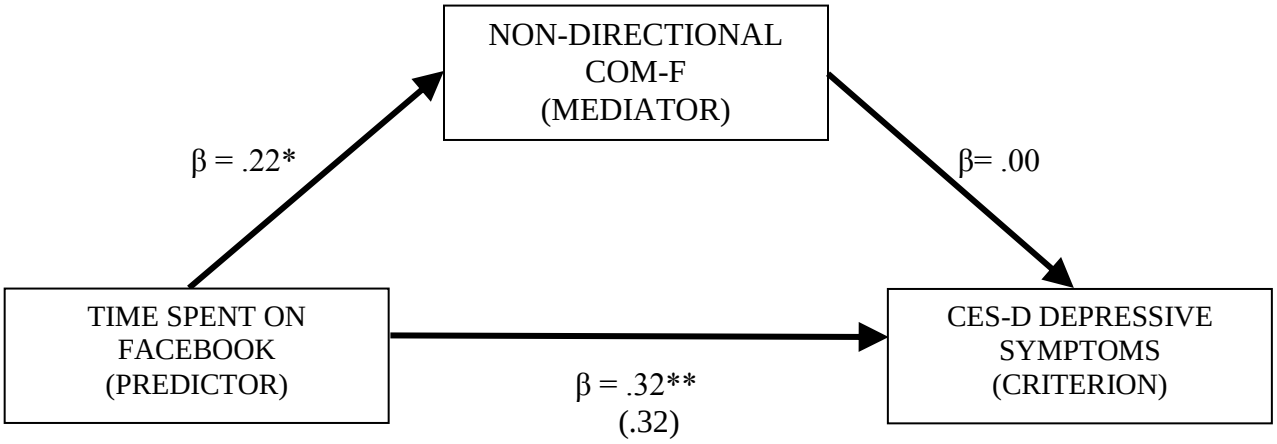


Figure 2. Results of moderated mediation model for males and females for the pilot study.

MALES



FEMALES



Note. * p < .05. ** p < .01.

Figure 3a. Conceptual moderated mediation model for hypotheses 1-4 for the present study.

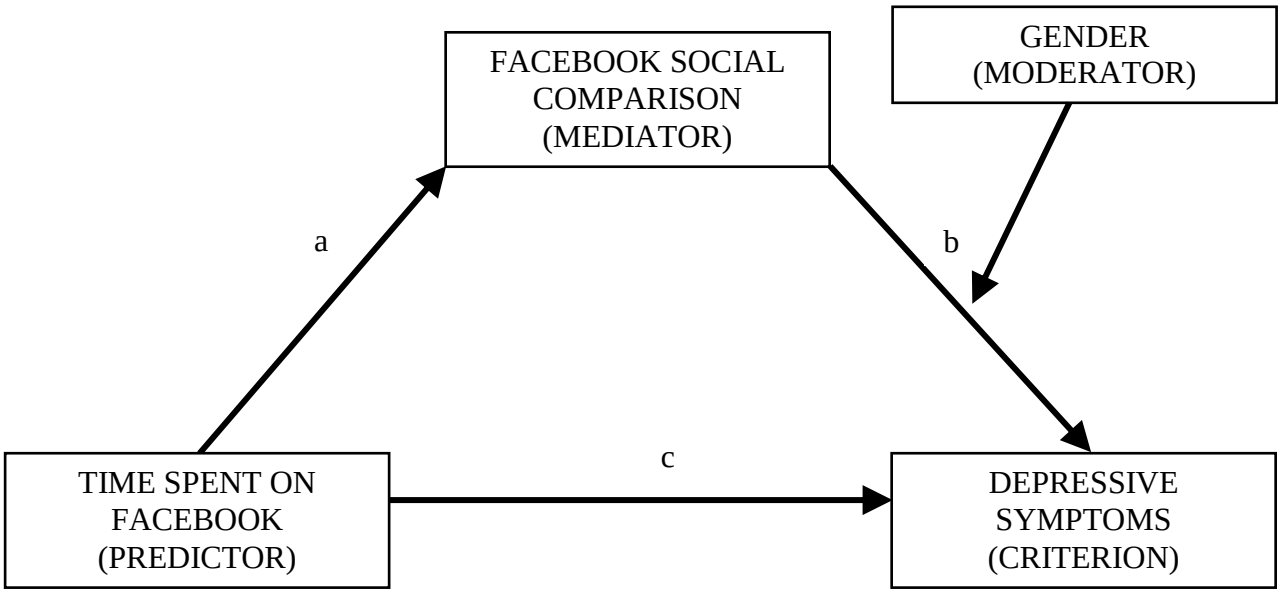
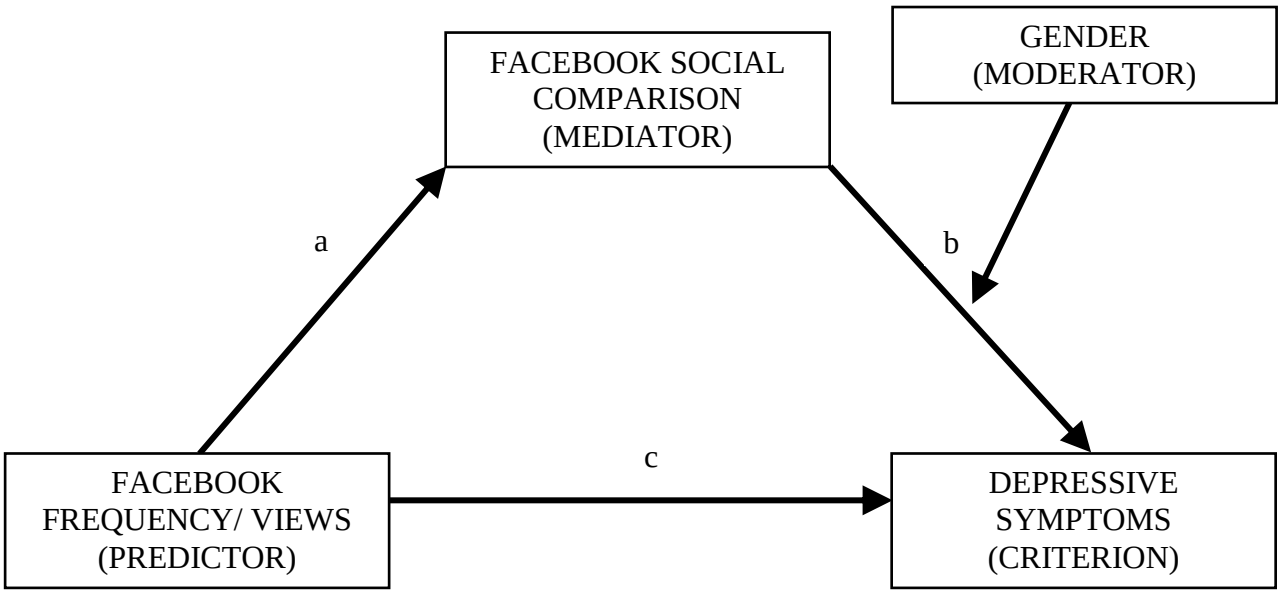


Figure 3b.Conceptual moderated mediation model for hypotheses 5-7 for the present study.



Note. * p < .05. ** p < .01.

Figure 4. Expected association between Facebook social comparisons and depressive symptoms with negative experiences on Facebook as a moderator.

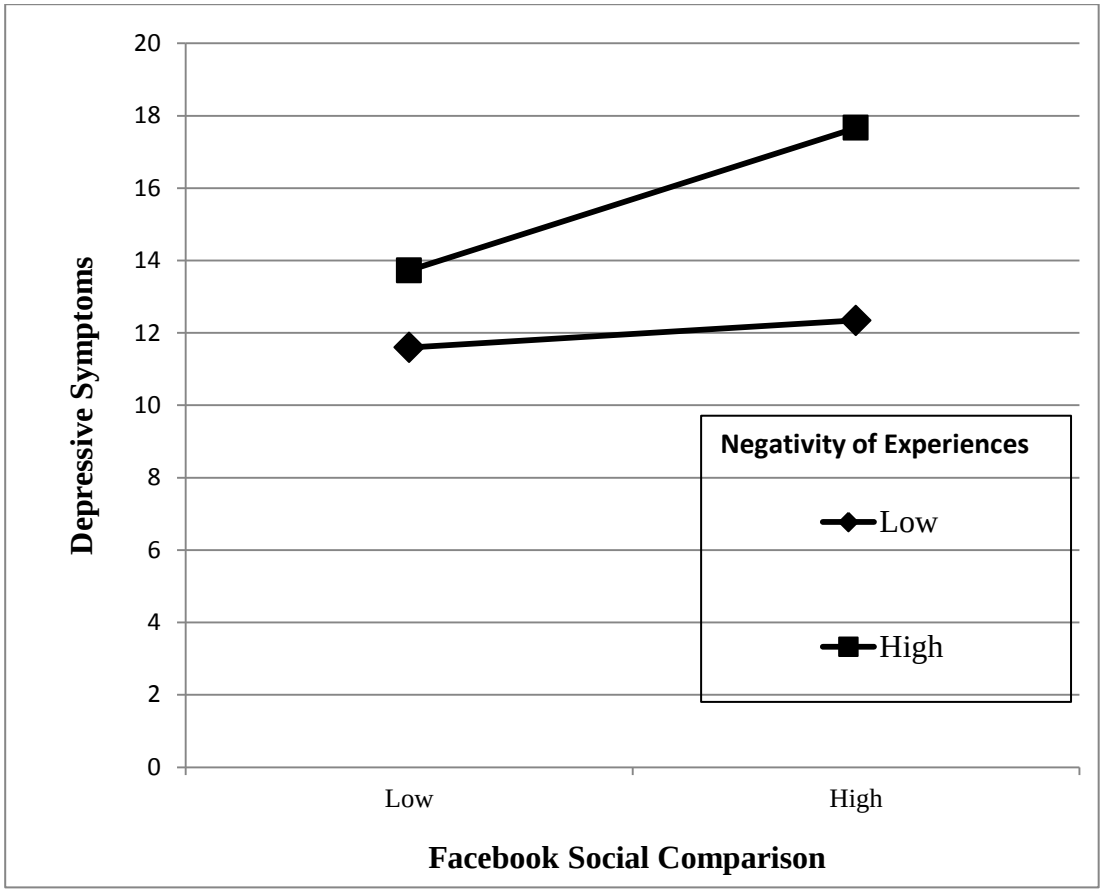


Figure 5a. Results of mediation model for all participants with upward social comparison (COM-F items) as the mediator and depressive symptoms (CES-D) as the criterion. Time on Facebook is the predictor.

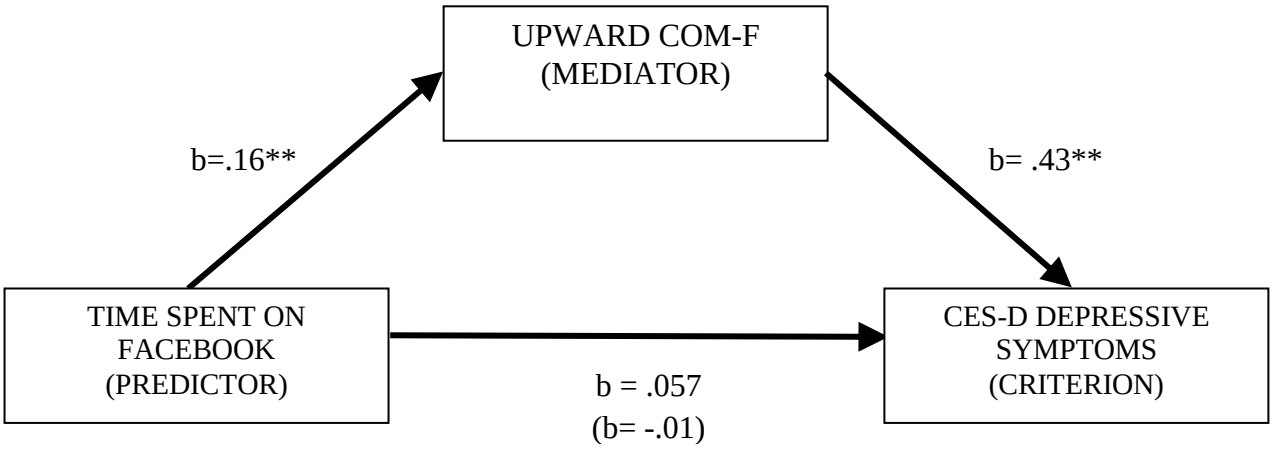


Figure 5b. Results of mediation model for all participants with non-directional social comparison (COM-F items) as the mediator and depressive symptoms (CES-D) as the criterion. Time on Facebook is the predictor.

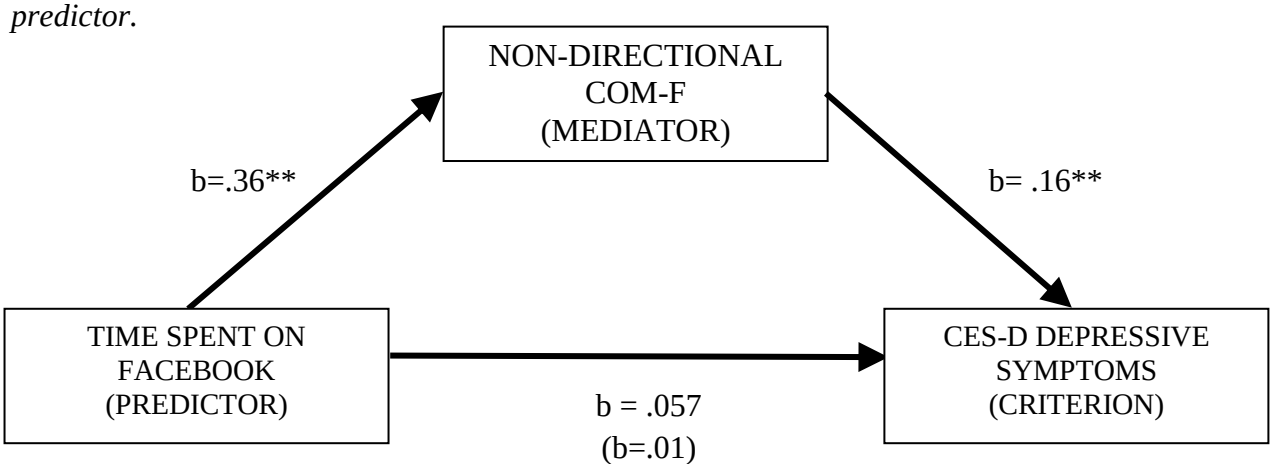
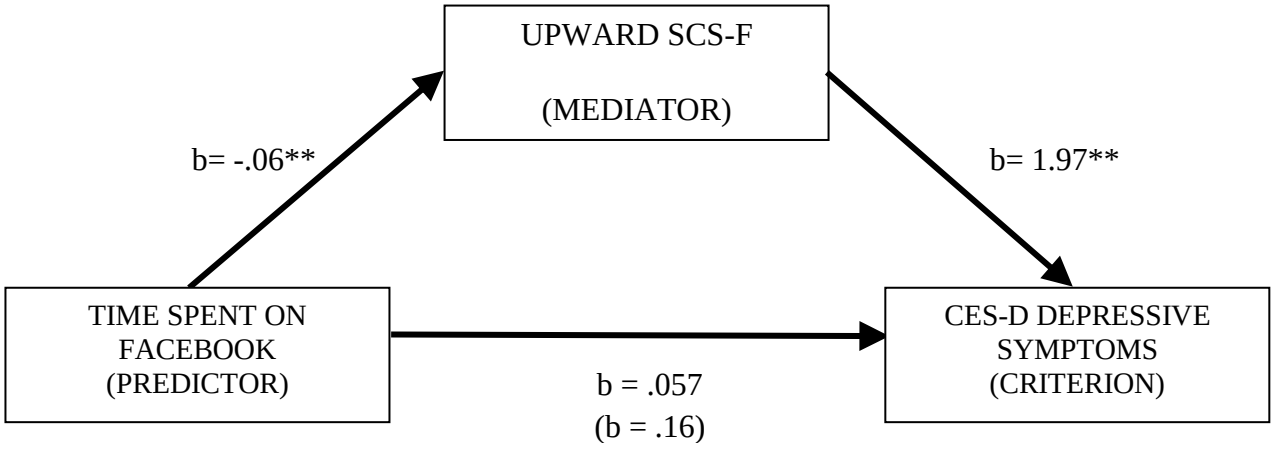


Figure 5c. Results of mediation model for all participants with upward social comparison (SCS-F items) as the mediator and depressive symptoms (CES-D) as the criterion. Time on Facebook is the predictor.



Note. * p < .05. ** p < .01.

Figure 6a. Results of mediation model for all participants with upward social comparison (COM-F items) as the mediator and depressive symptoms (BDI-II) as the criterion. Time on Facebook is the predictor.

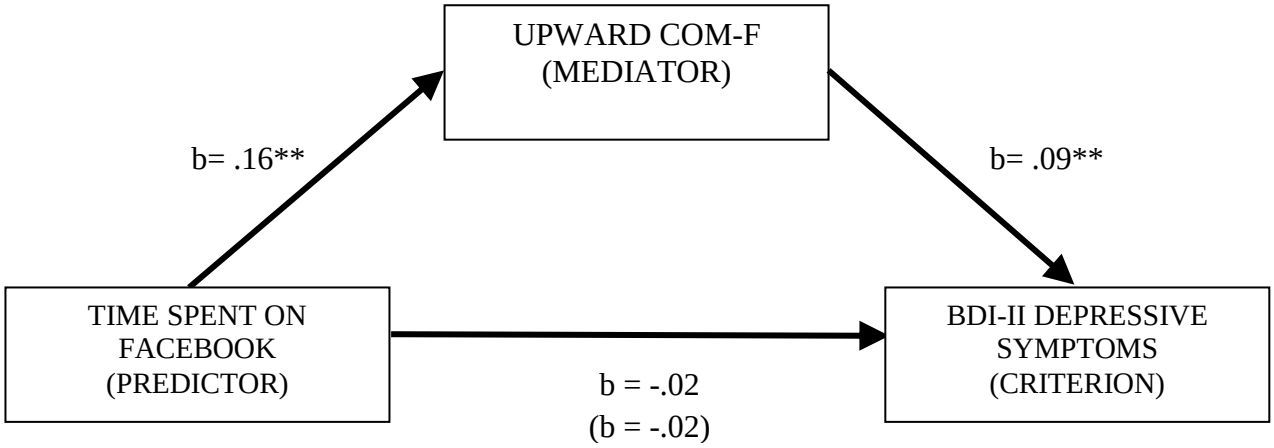


Figure 6b. Results of mediation model for all participants with non-directional social comparison (COM-F items) as the mediator and depressive symptoms (BDI-II) as the criterion. Time on Facebook is the predictor.

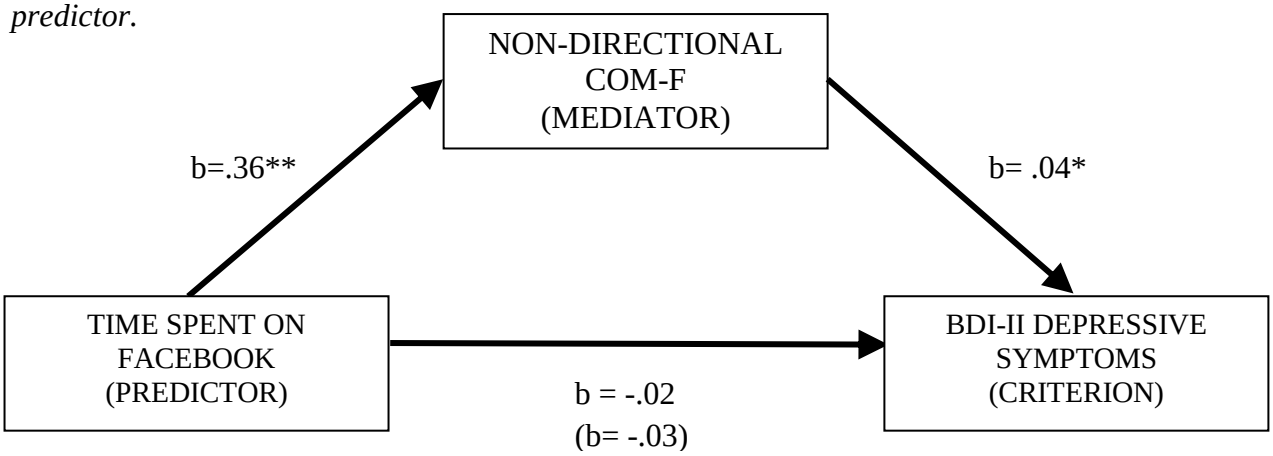
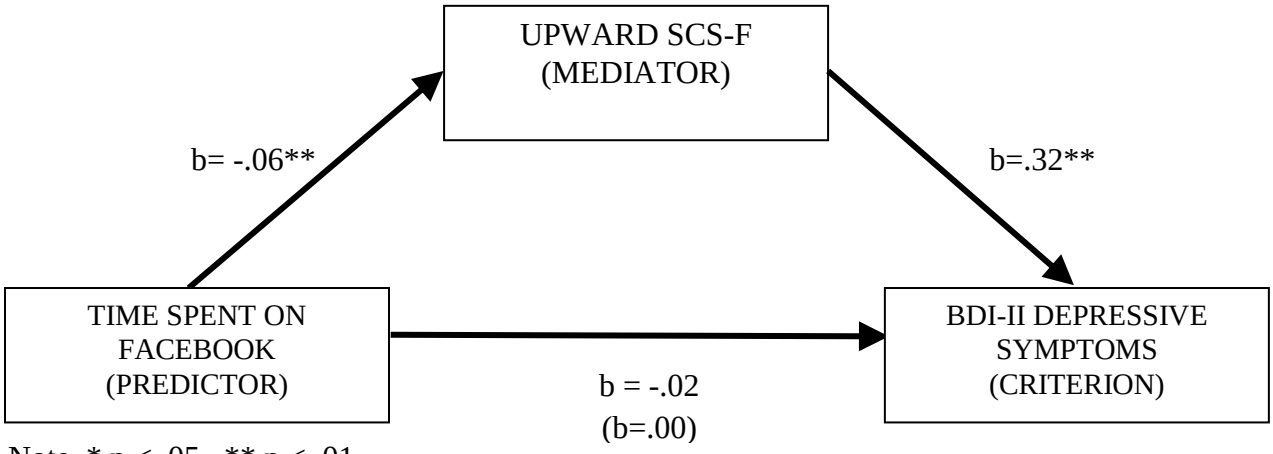


Figure 6c. Results of mediation model for all participants with upward social comparison (SCS-F items) as the mediator and depressive symptoms (BDI-II) as the criterion. Time on Facebook is the predictor.



Note. * p < .05. ** p < .01.

Figure 7a. Results of mediation model for all participants with upward social comparison (COM-F items) as the mediator and depressive symptoms (CES-D) as the criterion. Facebook views/ logins serve as the predictor.

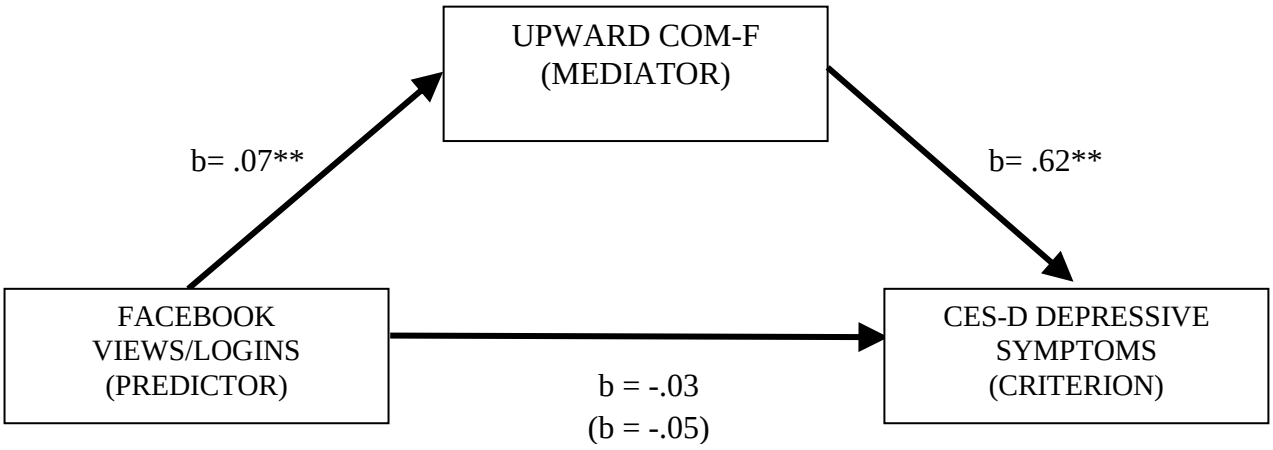
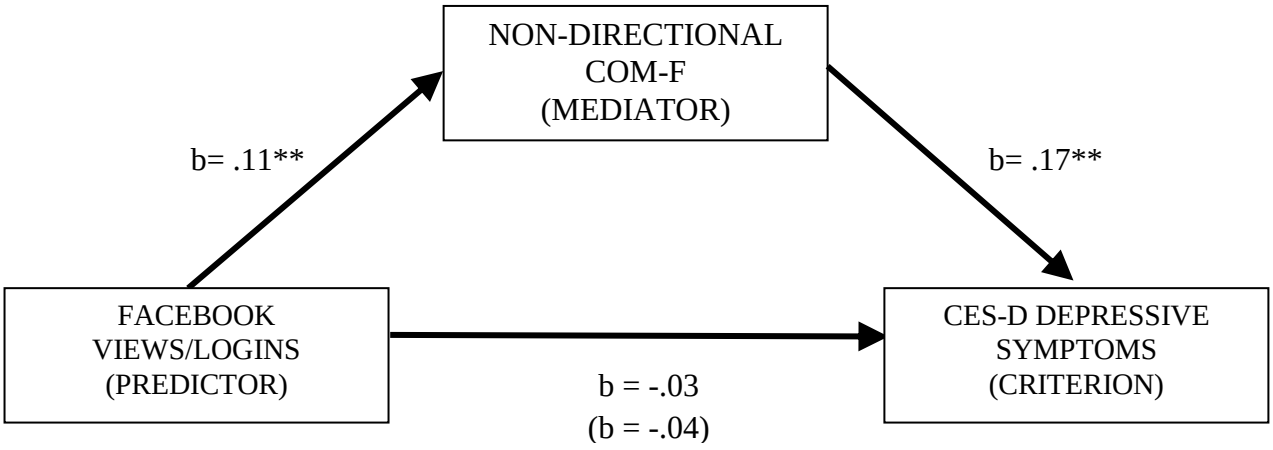
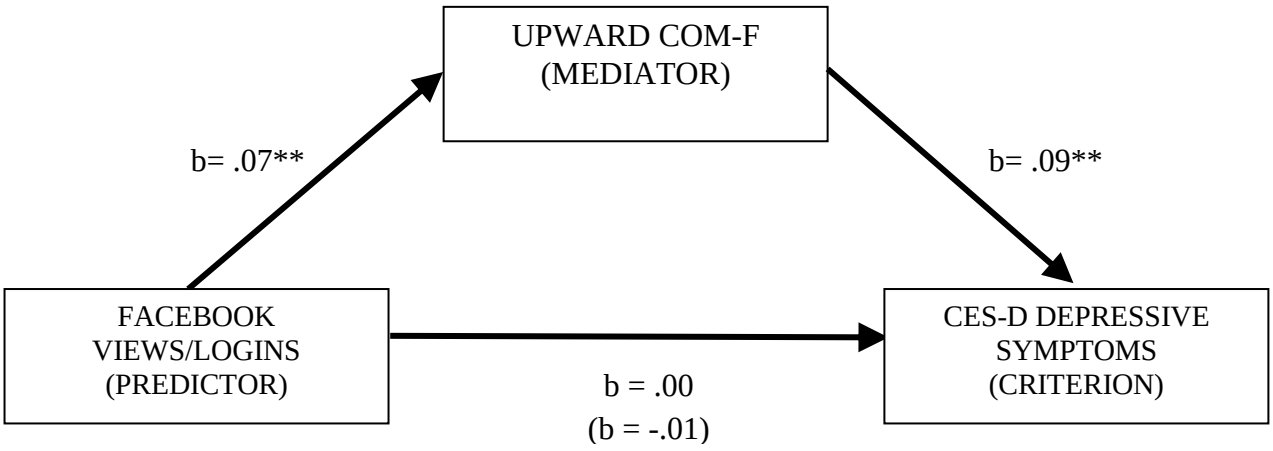


Figure 7b. Results of mediation model for all participants with non-directional social comparison (COM-F items) as the mediator and depressive symptoms (CES-D) as the criterion. Facebook views/ logins serve as the predictor.



Note. * p < .05. ** p < .01.

Figure 8. Results of mediation model for all participants with upward social comparison (COM-F items) and depressive symptoms (BDI-II) as the criterion. Facebook views/ logins serve as the predictor.



Note. * p < .05. ** p < .01.

Figure 9a. The interaction slope of negative experiences on Facebook and upward social comparison (COM-F items) on depressive symptoms (CES-D) at the within-person level.

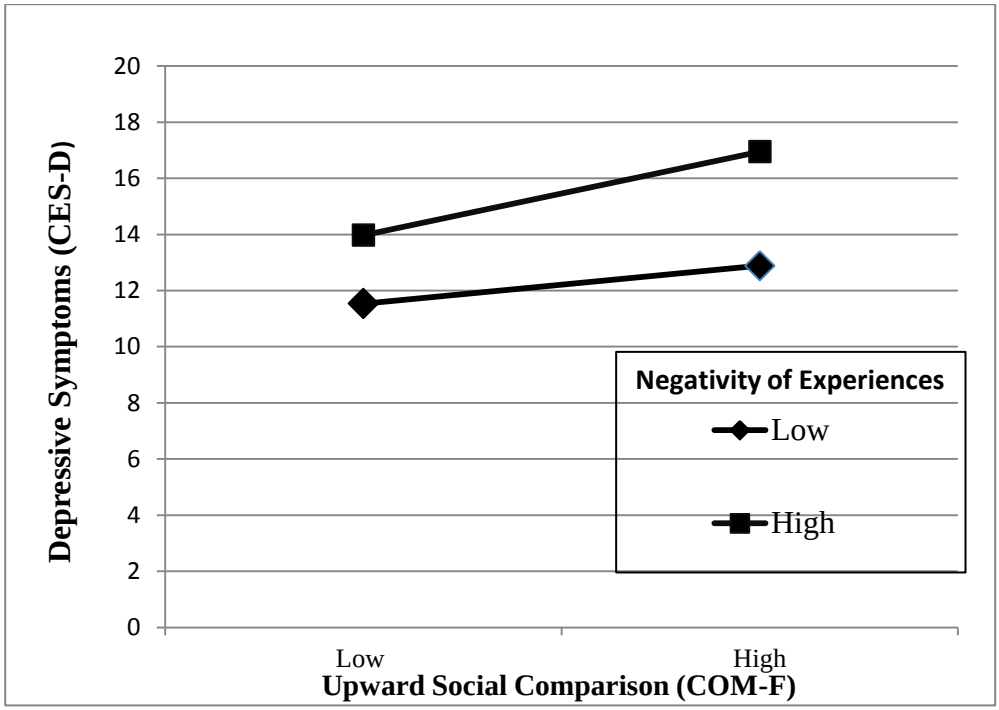


Figure 9b. The interaction slope of negative experiences on Facebook and upward social comparison (COM-F items) on depressive symptoms (CES-D) at the between-persons level.

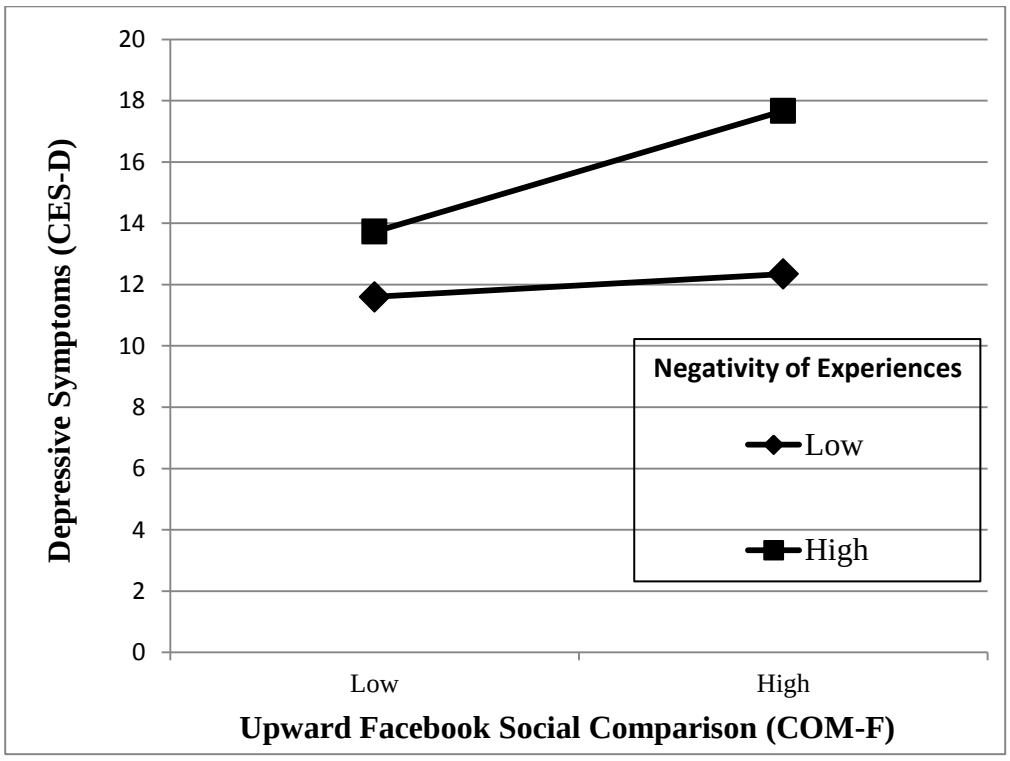


Figure 10a. The interaction slope of negative experiences on Facebook and non-directional social comparison (COM-F items) on CES-D depressive symptoms at the within-person level.

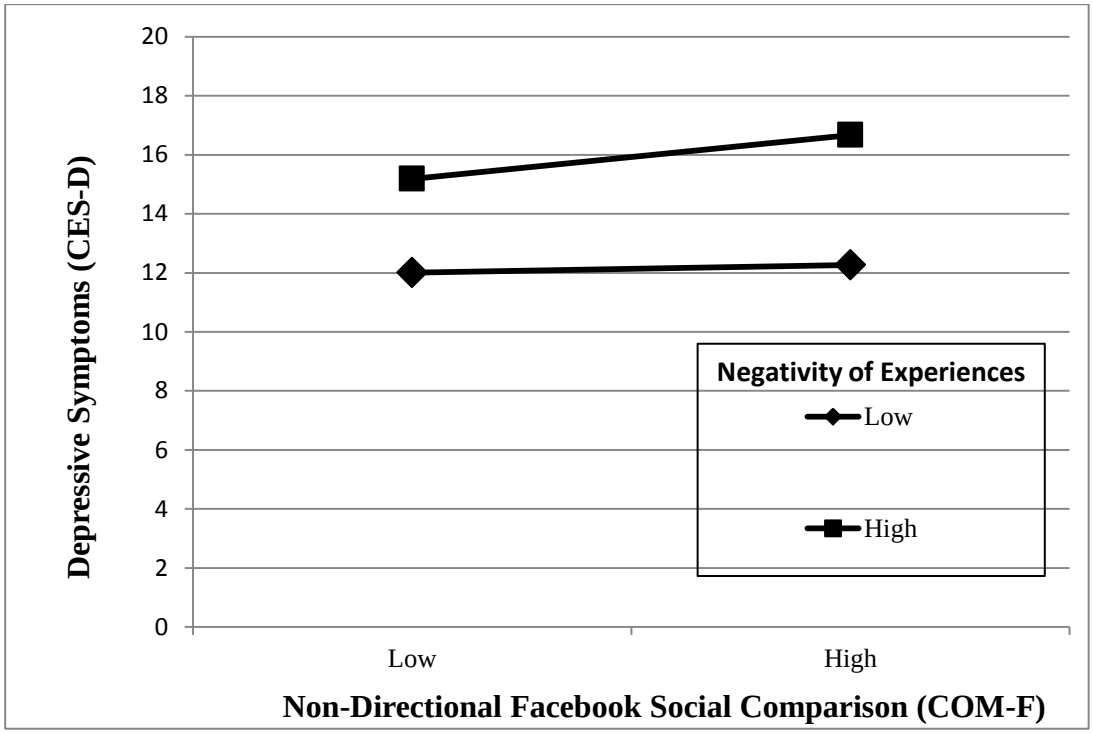
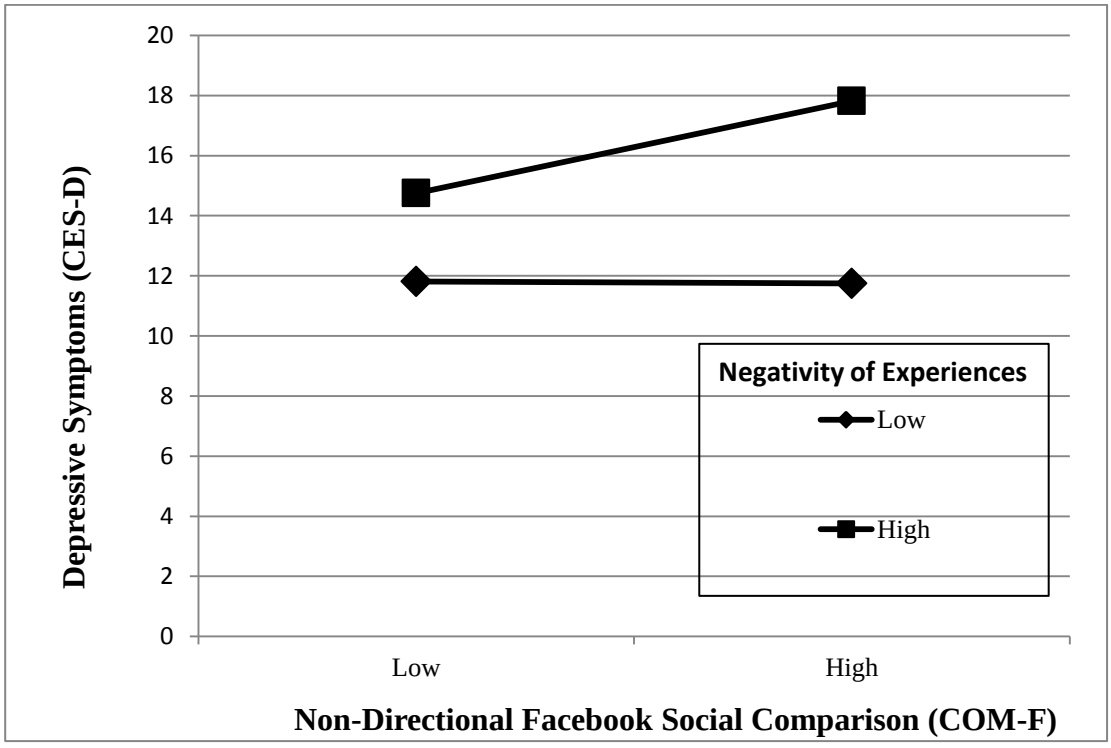


Figure 10b. The interaction slope of negative experiences on Facebook and non-directional social comparison (COM-F items) on depressive symptoms (CES-D) at the between-persons level.



Appendix A: Demographics

1. Please indicate your gender.

   ___Male

   ___Female

2. Age:

3. Which of the best describes your ethnicity?
   ____African-American/Black
   ____Asian/Pacific Islander
   ____Hispanic
   ____Caucasian
   ____Native American
   ____Middle Eastern
   ____Multi-racial
   ____Other (please specify):_____

4. Please indicate your current relationship status:
   ____Single
   ____Casually Dating
   ____Serious Relationship
   ____Engaged
   ____Married
   ____Divorced
   ____Widowed

Appendix B: Facebook Use Questions

1. Do you have a Facebook account?
   ____Yes
   ____No

2. Are you an active member of the website, Facebook.com? An active user of Facebook is defined as someone who checks or her Facebook account on a regular basis. Please select "Yes" if you fall into this category. If your Facebook account is deactivated, you rarely check your account, or do not consider yourself an active member, please select "No".
   ____Yes
   ____No

3. How many times per day would you estimate you log on/view Facebook? (open-ended)_____

4. Approximately, how many Facebook friends do you have? (open-ended)_____

5. What is normally your PRIMARY reason for viewing Facebook?
   ____out of boredom
   ____need a break
   ____received Facebook alert(s) via email or on my phone
   ____want to update my profile
   ____want to know what my friends are doing
   ____for informational purposes (i.e., create groups/events, to find out about groups/events)
   ____want to interact with my friend(s)
   ____want to use the chat function to chat with my friend(s) who are online
   ____want to get advice from my friend(s)
   ____want to get support from my friend(s)
   ____for dating purposes (i.e., to check out the page of a person I am interested in, to communicate with a person I am interested in)
   ____Other (please specify)_____

6. How long on average do you ACTIVEL view Facebook per day?

   ____less than 5 minutes

   ____5-15 minutes

   ____16-29 minutes to an hour

   ____30 minutes to an hour

   ____Between 1-1½ hours

____Between 1½ -2 hours

____Between 2-2½ hours

____Between 2½-3hours

____Between 3-3½ hours

____Between 3½-4 hours

____Between 4-4½ hours

____Between 4½-5 hours

____5+ hours

7. What do you typically do when you are on Facebook? Please check all that apply:

_____Update your status

_____Upload videos/photos

_____View friend(s) photos

_____Tag friend(s) in photos/videos

_____Restrict friend(s) from viewing your photos/videos

_____Read friend(s) status updates

_____Comment on friend(s) status updates

_____Hide friend(s) status updates from your newsfeed

_____Restrict friend(s) from viewing your status update/wall posts

_____Read friend(s) wall

_____Post on a friend(s) wall

_____Check your Facebook inbox

_____Send an inbox message to a friend(s) using Facebook

_____Used the IM feature to chat with a friend(s)

_____Add/Delete/Accept/Ignore friends

_____Poke friend(s)

_____Use other applications

_____Search for people

_____Create events/groups

Other (please specify): _____

Appendix C: The Iowa-Netherlands Comparison Orientation Measure (INCOM)

Instructions**:** Listed below are a number of statements concerning to what extent you compare yourself to others. Please read each statement carefully and consider the extent to which you think it is like you. There are no right or wrong answers, so please answer as honestly as you can. Indicate the extent to which each statement is true of you according to the following scale:

1	2	3	4	5
I disagree strongly				I agree strongly

1. I often compare how my loved ones (boy or girlfriend, family members, etc.) are doing with how others are doing.

_____ 2. I always pay a lot of attention to how well I have done something compared to how others do things.

_____ 3. If I want to find out how well I have done something, I compare what I have done to what others have done.

_____ 4. I often compare how I am doing socially (e.g. social skills, popularity) with other people.

_____ 5. I am not the type of person who compares often with others.

_____ 6. I often compare myself with others with respect to what I have accomplished in life.

_____ 7. I often like to talk with others about mutual opinions and experiences.

_____ 8. I often try to find out what others think who face similar problems as I face.

_____ 9. I always like to know what others in a similar situation would do.

_____ 10. If I want to learn more about something, I try to find out what others think about it.

_____ 11. I never consider my situation in life relative to that of other people.

_____

Appendix D: Friendship Contingent Self Esteem

Instructions**:** Listed below are a number of statements concerning how you feel about friendships. Please read each statement carefully and consider the extent to which you think it is like you. There are no right or wrong answers, so please answer as honestly as you can. Indicate the extent to which each statement is true of you according to the following scale:

1	2	3	4	5
Very little like me				Very much like me

1. I only feel good about myself when things are going well in my friendships.

_____ 2. My overall feelings about myself are heavily influenced by how much my friends like me.

_____ 3. My feelings about myself are affected when my friendships are criticized.

_____ 4. How I feel about myself depends on how well I am getting along with my friends.

_____ 5. I can't feel good about myself if I feel rejected by my friends.

_____ 6. When my friends and I fight, I feel bad about myself in general.

_____ 7. It really affects the way I feel about myself when friendships fall apart.

_____ 8. When my friends and I have disagreements, I feel bad about myself.

_____

Appendix E: Need to Belong Scale

Instructions: For each of the statements below, indicate the degree to which you agree or disagree with the statement using the scale below:

1	2	3	4	5
Strongly Disagree				Strongly Agree

_____ 1. If other people don't seem to accept me, I don't let it bother me. (reverse)

_____ 2. I try hard not to do things that will make other people avoid or reject me.

_____ 3. I seldom worry about whether other people care about me. (reverse)

_____ 4. I need to feel that there are people I can turn to in times of need.

_____ 5. I want other people to accept me.

_____ 6. I do not like being alone.

_____ 7. Being apart from my friends for long periods of time does not bother me. (reverse)

_____ 8. I have a strong need to belong.

_____ 9. It bothers me a great deal when I am not included in other people's plans.

____ 10. My feelings are easily hurt when I feel that others do not accept me.

Appendix F: Positive and Negative Affect Scale (PANAS)

This scale consists of a number of words that describe different feelings and emotions. Read each item and mark the appropriate answer in the space next to the word. Indicate to what extent you have felt this way during the past week. Use the following scale to record your answers.

1	2	3	4	5
Very slightly or not at all				Extremely

_____1. Interested	_____11. Irritable
_____2. Distressed	_____12. Alert
_____3. Excited	_____13. Ashamed
_____4. Upset	_____ 14. Inspired
_____5. Strong	_____ 15. Nervous
_____6. Guilty	_____16. Determined
_____7. Scared	_____17. Attentive
_____8. Hostile	_____18. Jittery
_____9. Enthusiastic	_____19. Active
_____10. Proud	_____20. Afraid

Appendix G: State-Trait Anxiety Inventory Form (STAI)

Directions: A number of statements which people have used to describe themselves are given below. Read each statement and then indicate using the following scale how you generally feel.

1	2	3	4
Almost never			Almost Always

_____1. I feel pleasant

_____2. I feel nervous and restless

_____3. I feel satisfied with myself

_____4. I wish I could be happy as others seem to be

_____5. I feel like a failure

_____6. I feel rested

_____7. I am "calm, cool and collected"

_____8. I feel that difficulties are piling up so that I cannot overcome them

_____9. I worry too much over something that doesn't really matter

_____10. I am happy

_____11. I have disturbing thoughts

_____12. I lack self-confidence

_____13. I feel secure

_____14. I make decisions easily

_____15. I feel inadequate

_____16. I am content

_____17. Some unimportant thought runs through my mind and bothers me

_____18. I take disappointments so keenly that I can't put them out of my mind

_____19. I am a steady person

_____20. I get in a state of tension or turmoil as I think over my recent concerns and interests

Appendix H: Rosenberg Self-Esteem Scale (RSE)

Instructions: Below is a list of statements dealing with your general feelings about yourself. Indicate the extent to which each statement is true of you according to the following scale

1	2	3	4
Strongly Disagree			Strongly Agree

1. I feel that I'm a person of worth, at least on an equal plane with others.

_____ 2. I feel that I have a number of good qualities.

_____ 3. All in all, I am inclined to feel that I am a failure.

_____ 4. I am able to do things as well as most other people.

_____ 5. I feel I do not have much to be proud of.

_____ 6. I take a positive attitude toward myself.

_____ 7. On the whole, I am satisfied with myself.

_____ 8. On I wish I could have more respect for myself.

_____ 9. I certainly feel useless at times.

_____ 10. At times I think I am no good at all.

_____

Appendix I: Big Five Inventory (BFI-44)

Instructions: Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who *likes to spend time with others?* Please indicate to what extent you agree or disagree with the statement.

I See Myself as Someone Who…

1	2	3	4	5
Disagree Strongly				Agree Strongly

1. Is talkative

2. Tends to find fault with others

3. Does a thorough job

4. Is depressed, blue

5. Is original, comes up with new ideas

6. Is reserved

7. Is helpful and unselfish with others

8. Can be somewhat careless

9. Is relaxed, handles stress well

10. Is curious about many different things

11. Is full of energy

12. Starts quarrels with others

13. Is a reliable worker

14. Can be tense

15. Is ingenious, a deep thinker

16. Generates a lot of enthusiasm

17. Has a forgiving nature

18. Tends to be disorganized

19. Worries a lot

20. Has an active imagination

21. Tends to be quiet

22. Is generally trusting

23. Tends to be lazy

24. Is emotionally stable, not easily upset

25. Is inventive

26. Has an assertive personality

27. Can be cold and aloof

28. Perseveres until the task is finished

29. Can be moody

30. Values artistic, aesthetic experiences

31. Is sometimes shy, inhibited

32. Is considerate and kind to almost everyone

33. Does things efficiently

34. Remains calm in tense situations

35. Prefers work that is routine

36. Is outgoing, sociable

37. Is sometimes rude to others

38. Makes plans and follow through with them

39. Gets nervous easily

40. Likes to reflect, play with ideas

41. Has few artistic interests

42. Likes to cooperate with others

43. Is easily distracted

44. Is sophisticated in art, music, or literature

Appendix J: Interpersonal Support Evaluation List (ISEL)

Instructions: This scale is made up of a list of statements each of which may or may not be true about you. For each statement indicate "definitely true" if you are sure it is true about you and "probably true" if you think it is true but are not absolutely certain. Similarly, you should select "definitely false" if you are sure that the statement is false and "probably false" if you think it is false but are not absolutely certain.

Use the following scale to make your ratings:

1	2	3	4
Definitely false			Definitely true

1. If I wanted to go on a trip for a day (for example, to the country or mountains), I would have a hard time finding someone to go with me.

2. I feel that there is no one I can share my most private worries and fears with.

3. If I were sick, I could easily find someone to help me with my daily chores.

4. There is someone I can turn to for advice about handling problems with my family.

5. If I decide one afternoon that I would like to go to a movie that evening, I could easily find someone to go with me.

6. When I need suggestions on how to deal with a personal problem, I know someone I can turn to.

7. I don't often get invited to do things with others.

8. If I had to go out of town for a few weeks, it would be difficult to find someone who would look after my house or apartment (plants, pets, garden, etc.).

9. If I wanted to have lunch with someone, I could easily find someone to join me.

10. If I was stranded 10 miles from home, there is someone I could call who could come and get me.

11. If a family crisis arose, it would be difficult to find someone who could give me good advice about how to handle it.

12. If I needed some help in moving to a new house or apartment, I would have a hard time finding someone to help me.

Appendix K: Contingencies of Self-Worth Scale (CSW)

INSTRUCTIONS: Please respond to each of the following statements by selecting your answer using the scale from "1 = Strongly disagree" to "7 = Strongly agree." If you haven't experienced the situation described in a particular statement, please answer how you think you would feel if that situation occurred.

		Strongly Disagree						Strongly Agree
1.	When I think I look attractive, I feel good about myself.	1	2	3	4	5	6	7
2.	My self-worth is based on God's love.	1	2	3	4	5	6	7
3.	I feel worthwhile when I perform better than others on a task or skill.	1	2	3	4	5	6	7
4.	My self-esteem is unrelated to how I feel about the way my body looks.	1	2	3	4	5	6	7
5.	Doing something I know is wrong makes me lose my self-respect.	1	2	3	4	5	6	7
6.	I don't care if other people have a negative opinion about me.	1	2	3	4	5	6	7
7.	Knowing that my family members love me makes me feel good about myself.	1	2	3	4	5	6	7
8.	I feel worthwhile when I have God's love.	1	2	3	4	5	6	7
9.	I can't respect myself if others don't respect me.	1	2	3	4	5	6	7
10.	My self-worth is not influenced by the quality of my relationships with my family members.	1	2	3	4	5	6	7
11.	Whenever I follow my moral principles, my sense of self-respect gets a boost.	1	2	3	4	5	6	7

12.	Knowing that I am better than others on a task raises my self-esteem.	1	2	3	4	5	6	7
13.	My opinion about myself isn't tied to how well I do in school.	1	2	3	4	5	6	7
14.	I couldn't respect myself if I didn't live up to a moral code.	1	2	3	4	5	6	7
15.	I don't care what other people think of me.	1	2	3	4	5	6	7
16.	When my family members are proud of me, my sense of self-worth increases.	1	2	3	4	5	6	7
17.	My self-esteem is influenced by how attractive I think my face or facial features are.	1	2	3	4	5	6	7
18.	My self-esteem would suffer if I didn't have God's love.	1	2	3	4	5	6	7
19.	Doing well in school gives me a sense of self-respect.	1	2	3	4	5	6	7
20.	Doing better than others gives me a sense of self-respect.	1	2	3	4	5	6	7
21.	My sense of self-worth suffers whenever I think I don't look good.	1	2	3	4	5	6	7
22.	I feel better about myself when I know I'm doing well academically.	1	2	3	4	5	6	7
23.	What others think of me has no effect on what I think about myself.	1	2	3	4	5	6	7
24.	When I don't feel loved by my family, my self-esteem goes down.	1	2	3	4	5	6	7

25.	My self-worth is affected by how well I do when I am competing with others.	1	2	3	4	5	6	7
26.	My self-esteem goes up when I feel that God loves me.	1	2	3	4	5	6	7
27.	My self-esteem is influenced by my academic performance.	1	2	3	4	5	6	7
28.	My self-esteem would suffer if I did something unethical.	1	2	3	4	5	6	7
29.	It is important to my self-respect that I have a family that cares about me.	1	2	3	4	5	6	7
30.	My self-esteem does not depend on whether or not I feel attractive.	1	2	3	4	5	6	7
31.	When I think that I'm disobeying God, I feel bad about myself.	1	2	3	4	5	6	7
32.	My self-worth is influenced by how well I do on competitive tasks.	1	2	3	4	5	6	7
33.	I feel bad about myself whenever my academic performance is lacking.	1	2	3	4	5	6	7
34.	My self-esteem depends on whether or not I follow my moral/ethical principles.	1	2	3	4	5	6	7
35.	My self-esteem depends on the opinions others hold of me.	1	2	3	4	5	6	7

Appendix L: The Center for Epidemiological Studies Depression Scale (CES-D)

Below is a list of the ways you might have felt or behaved. Please tell me how often you have felt this way DURING THE PAST WEEK according to the scale given.

	0	1	2	3
	Rarely or none of the time (less than 1 day)	**Some or a little of the time (1 - 2 days)**	**Occasionally or a moderate amount of time (3-4 days)**	**Most or all of the time (5-7 days)**
1. I was bothered by things that usually don't bother me.				
2. I did not feel like eating; my appetite was poor.				
3. I felt that I could not shake off the blues even with help from my family or friends.				
4. I felt I was just as good as other people.				
5. I had trouble keeping my mind on what I was doing.				
6. I felt depressed.				
7. I felt that everything I did was an effort.				
8. I felt hopeful about the future.				

9. I thought my life had been a failure.

10. I felt fearful.

11. My sleep was restless.

12. I was happy.

13. I talked less than usual.

14. I felt lonely.

15. People were unfriendly.

16. I enjoyed life.

17. I had crying spells.

18. I felt sad.

19. I felt that people dislike me.

20. I could not get "going."

Appendix M: Beck Depression Inventory-II (BDI-II)

Instructions: This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the one statement in each group that best describes the way you **have felt over the past two weeks.** Select the number beside the statement you have picked. **If several statements in the group seem to apply equally well, circle the highest number for that group.** Be sure that you do not choose more than one statement for any group, including Item 16 (Changes in Sleeping Pattern) or Item 18 (Changes in Appetite).

1) Sadness

0 I do not feel sad.

1 I feel sad much of the time.

2 I am sad all the time.

3 I am so sad or unhappy that I can't stand it.

1) Pessimism

0 I am not discouraged about my future.

1 I feel more discouraged about my future than I used to be.

2 I do not expect things to work out for me.

3 I feel that my future is hopeless and will only get worse.

2) Past failure

0 I do not feel like a failure.

1 I have failed more than I should have.

2 As I look back, I see a lot of failures.

3 I feel I am a total failure as a person.

3) Loss of Pleasure

0 I get as much pleasure as I ever did from the things I enjoy.

1 I don't enjoy things as much as I used to.

2 I get very little pleasure from the things I used to enjoy

3 I can't get any pleasure from the things I used to enjoy.

4) Guilty Feelings

0 I don't feel particularly guilty.

1 I feel guilty over many things I have done or should have done.

2 I feel quite guilty most of the time.

3 I feel guilty all of the time.

5) Punishment Feelings

0 I don't feel I am being punished.
1 I feel I may be punished.
2 I expect to be punished.
3 I feel I am being punished.

6) Self-Dislike

0 I feel the same about myself as ever.
1 I have lost confidence in myself.
2 I am disappointed in myself.
3 I dislike myself.

7) Self-Criticalness

0 I don't criticize or blame myself more than usual.
1 I am more critical of myself than I used to be.
2 I criticize myself for all of my faults.
3 I blame myself for everything bad that happens.

8) Suicidal Thoughts or Wishes

0 I don't have any thoughts of killing myself.
1 I have thoughts of killing myself, but I would not carry them out.
2 I would like to kill myself.
3 I would kill myself if I had the chance.

9) Crying

0 I don't cry anymore than I used to.
1 I cry more than I used to.
2 I cry over every little thing.
3 I feel like crying, but I can't.

10) Agitation

0 I am no more restless or wound up than usual.
1 I feel more restless or wound up than usual.
2 I am so restless or agitated that it's hard to stay still.
3 I am so restless or agitated that I have to keep moving or doing something.

11) Loss of Interest

0 I have not lost interest in other people or activities.
1 I am less interested in other people or things than before.
2 I have lost most of my interest in other people or things.
3 It's hard to get interested in anything.

12) Indecisiveness

0 I make decisions about as well as ever.
1 I find it more difficult to make decisions than usual.
2 I have much greater difficulty in making decisions than I used to.
3 I have trouble making decisions.

13) Worthlessness

0 I do not feel I am worthless.
1 I don't consider myself as worthwhile and useful as I used to.
2 I feel more worthless as compared to other people.
3 I feel utterly worthless.

14) Loss of Energy

0 I have as much energy as ever.
1 I have less energy than I used to have.
2 I don't have enough energy to do very much.
3 I don't have enough energy to do anything.

15) Changes in Sleep Pattern

0 I have not experienced any change in my sleeping pattern.

1a I sleep somewhat more than usual.

1b I sleep somewhat less than usual.

2a I sleep a lot more than usual.

2b I sleep a lot less than usual.

3a I sleep most of the day.

3b I wake up 1-2 hours early and can't get back to sleep.

16) Irritability

0 I am not more irritable than usual.
1 I am more irritable than usual.
2 I am much more irritable than usual.
3 I am irritable all the time.

17) Changes in Appetite

0 I have not experienced any change in my appetite.

1a My appetite is somewhat less than usual.

1b My appetite is somewhat greater than usual.

2a My appetite is much less than before.

2b My appetite is much greater than usual.

3a I have no appetite at all.

3b I crave food all the time.

18) Concentration Difficulty

0 I can concentrate as well as ever.
1 I can't concentrate as well as usual.
2 It's hard to keep my mind on anything for very long.
3 I find I can't concentrate on anything.

19) Tiredness or Fatigue

0 I am no more tired or fatigued than usual.
1 I get more tired or fatigued more easily than usual.
2 I am too tired or fatigued to do a lot of the things I used to do.
3 I am too tired or fatigued to do most of the things I used to do.

20) Loss of Interest in Sex

0 I have not noticed any recent change in my interest in sex.
1 I am less interested in sex than I used to be.
2 I am much less interested in sex now.
3 I have lost interest in sex completely

Appendix N: Brief Fear of Negative Evaluation Scale (Adapted for Facebook use)

Read each of the following statements carefully and indicate how characteristic it is of you according to the following scale:

1	2	3	4	5
Not at all characteristic of me				Extremely characteristic of me

_____ 1. I worry about what other people will think of me on Facebook even when I know it doesn't make any difference.

_____ 2. I am unconcerned even if I know people are forming an unfavorable impression of me on Facebook.

_____ 3. I am frequently afraid of other people noticing my shortcomings on Facebook.

_____ 4. I rarely worry about what kind of impression I am making on Facebook.

_____ 5. I am afraid others will not approve of me on Facebook.

_____ 6. I am afraid that people will find fault with me on Facebook.

_____ 7. Other people's opinions of me on Facebook do not bother me.

_____ 8. When I am talking to someone on Facebook, I worry about what they may be thinking about me.

_____ 9. I am usually worried about what kind of impression I make on Facebook.

_____ 10. If I know someone is judging me on Facebook, it has little effect on me.

_____ 11. Sometimes I think I am too concerned with what other people think of me on Facebook.

_____ 12. I often worry that I will say or do the wrong things on Facebook.

Appendix O: The Iowa-Netherlands Comparison Orientation Measure (adapted for Facebook use)

Instructions**:** Listed below are a number of statements concerning to what extent you compare yourself to others. Please read each statement carefully and consider the extent to which you think it is like you. There are no right or wrong answers, so please answer as honestly as you can. Indicate the extent to which each statement is true of you according to the following scale:

1	2	3	4	5
I disagree strongly				I agree strongly

1. When I am on Facebook, I compare how my loved ones (boy or girlfriend, family members, etc.) are doing with how others are doing.

_____ 2. When I am on Facebook, I always pay a lot of attention to how well I have done something compared to how others do things.

_____ 3. When I am on Facebook, if I want to find out how well I have done something, I compare what I have done to what others have done.

_____ 4. When I am on Facebook, I compare how I am doing socially (e.g. social skills, popularity) with other people.

_____ 5. When I am on Facebook, I don't compare myself with others.

_____ 6. When I am on Facebook, I compare myself with others with respect to what I have accomplished in life.

_____ 7. When I am on Facebook, I like to interact (chat, message, post on wall, etc.) with others about mutual opinions and experiences.

_____ 8. When I am on Facebook, I try to find out what others think who face similar problems as I face.

_____ 9. When I am on Facebook, I like to know what others in a similar situation would do.

_____ 10. When I am on Facebook, if I want to learn more about something, I try to find out what others think about it.

_____ 11. When I am on Facebook, I don't compare my situation to other people.

_____

Appendix P: Social Comparison Scale (Allan & Gilbert, 1995)

Please circle a number at a point which best describes the way in which you see yourself in **comparison to others on Facebook**.

In relationship to others on Facebook I feel:

Inferior	1	2	3	4	5	6	7	8	9	10	Superior
Incompetent	1	2	3	4	5	6	7	8	9	10	More competent
Unlikeable	1	2	3	4	5	6	7	8	9	10	More likeable
Left out	1	2	3	4	5	6	7	8	9	10	Accepted
Different	1	2	3	4	5	6	7	8	9	10	Same
Untalented	1	2	3	4	5	6	7	8	9	10	More talented
Weaker	1	2	3	4	5	6	7	8	9	10	Stronger
Unconfident	1	2	3	4	5	6	7	8	9	10	More confident
Undesirable	1	2	3	4	5	6	7	8	9	10	More desirable
Unattractive	1	2	3	4	5	6	7	8	9	10	More attractive
An outsider	1	2	3	4	5	6	7	8	9	10	An insider

Appendix Q: Revised scale: The Iowa-Netherlands Comparison Orientation Measure (adapted for Facebook use) - Upward & Downward Social Comparison

1	2	3	4	5
I disagree				I agree
Strongly				strongly

1. When I am on Facebook, I think my loved ones (boy or girlfriend, family members, etc.) are doing better than how others are doing. (downward)

2. When I am on Facebook, I feel that the way I do things is not as good compared to how others do things. (upward)

3. When I am on Facebook, I feel more confident about what I have achieved. (downward)

4. When I am on Facebook, I conclude I am not as socially skilled as other people. (upward)

5. When I am on Facebook, I believe that I have accomplished more than other people have. (downward)

6. When I am on Facebook, I like to interact (chat, message, post on wall, etc.) with others about mutual opinions and experiences because I feel they are more knowledgeable than me. (upward)

Appendix R: Facebook Interval-Contingent Diary Report

Please fill in your participant ID. Remember this is the last 4 digits of your primary telephone number and the first 2 letters of your mother's first name.

Please rate how you are feeling AT THIS MOMENT.

How do you feel right now?

1	2	3	4	5	6	7	8	9

Not at all Negative **Extremely Negative**

How do you feel right now?

1	2	3	4	5	6	7	8	9

Not at all Positive **Extremely Positive**

(PANAS)

This scale consists of a number of words that describe different feelings and emotions. Read each item and mark the appropriate answer. Indicate to what extent you have felt this way TODAY.

Very slightly or Not at all Extremely

1	2	3	4	5	6	7	8	9

1. _____Enthusiastic
2. _____Afraid
3. _____Determined
4. _____Scared

Please answer all questions related to your time on Facebook TODAY!

How many times did you log on to Facebook today? (open-ended)

What is normally your PRIMARY reason for viewing Facebook?

____out of boredom
____need a break
____received Facebook alert(s) via email or on my phone
____want to update my profile
____want to know what my friends are doing
____for informational purposes (i.e., create groups/events, to find out about groups/events)
____want to interact with my friend(s)
____want to use the chat function to chat with my friend(s) who are online
____want to get advice from my friend(s)
____want to get support from my friend(s)
____for dating purposes (i.e., to check out the page of a person I am interested in, to communicate with a person I am interested in)
____Other (please specify)_____

Please estimate, approximately how long were you ACTIVELY viewing Facebook today.

____less than 5 minutes

____5-15 minutes

____16-29 minutes to an hour

____30 minutes to an hour

____Between 1-1½ hours

____Between 1½ -2 hours

____Between 2-2½ hours

____Between 2½-3hours

____Between 3-3½ hours

____Between 3½-4 hours

____Between 4-4½ hours

____Between 4½-5 hours

____5+ hours

What did you do while you were logged onto Facebook? Please check all that apply:

_____Update your status

_____Upload videos/photos

_____View friend(s) photos

_____Tag friend(s) in photos/videos

_____Restrict friend(s) from viewing your photos/videos

_____Read friend(s) status updates

_____Comment on friend(s) status updates

_____Hide friend(s) status updates from your newsfeed

_____Restrict friend(s) from viewing your status update/wall posts

_____Read friend(s) wall

_____Post on a friend(s) wall

_____Check your Facebook inbox

_____Send an inbox message to a friend(s) using Facebook

_____Used the IM feature to chat with a friend(s)

_____Add/Delete/Accept/Ignore friends

_____Poke friend(s)

_____Use other applications

_____Search for people

_____Create events/groups

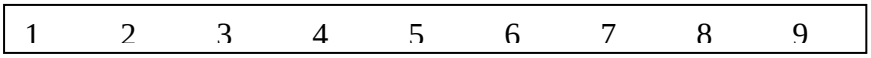
Other (please specify): _____

How positively did you feel about your Facebook experiences TODAY? Please rate your feelings after being on Facebook. 1=Not at all Negative and 7= Extremely Negative (7 point scale)

1	2	3	4	5	6	7	8	9

Not at all Negative | Extremely Negative

How negatively did you feel about your Facebook experiences TODAY? Please rate your feelings after being on Facebook. 1=Not at all Positive and 7= Extremely Positive (7 point scale)

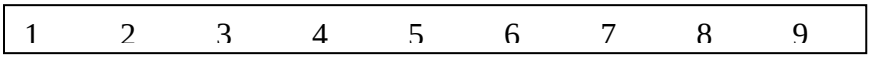


Not at all Positive | Extremely Positive

(Facebook Social Comparison, adapted from Gibbons and Buunk, 1999)

For each of the statements below, indicate the degree to which you agree or disagree with the statement by choosing the appropriate choice.

I disagree strongly. I agree strongly.



_____1. TODAY, when I was on Facebook, I paid a lot of attention to how I do things compared to how others do things. (non-directional)

_____2. TODAY, when I was on Facebook, if I wanted to find out how well I have done something, I compared what I have done with how others have done. (non-directional)

_____3. TODAY, when I was on Facebook, I paid attention to how I do things versus how others do things and felt my way was better. (downward)

_____4. TODAY, when I was on Facebook, I believed that I had accomplished more than other people had. (downward)

_____5. TODAY, when I was on Facebook, I felt less confident about what I have achieved compared to other people. (upward)

_____6. TODAY, when I was on Facebook, I concluded I am not as popular as other people. (upward)

(Rosenberg Self-Esteem)

Instructions: Below is a list of statements dealing with your feelings about yourself. Indicate that extent to which each statement is true of you RIGHT NOW according to the following scale.

Strongly disagree Strongly agree

1	2	3	4	5	6	7	8	9

_____1. I feel I do not have much to be proud of right now.

_____2. Right now, I take a positive attitude toward myself.

_____3. One the whole, I am satisfied with myself right now.

(STAI-State Anxiety Form)

A number of statements which people have used to describe themselves are given below. Read each statement and then indicate using the following scale how you feel RIGHT NOW, that is, AT THIS MOMENT. There is no right or wrong answers. Do no spend too much time on any one statement but give the answer which seems to describe your feelings the best.

Strongly disagree Strongly agree

1	2	3	4	5	6	7	8	9

_____1. I feel secure right now.

_____ 2. Right now, I am presently worrying over possible misfortunes.

_____3. Right now, I wish I could be as happy as others seem to be.

(Facebook Social Comparison, Allan & Gilbert, 1995)

TODAY, in relationship to others on Facebook I feel:

Inferior	1	2	3	4	5	6	7	8	9	10	Superior
Left out	1	2	3	4	5	6	7	8	9	10	Accepted
Unattractive	1	2	3	4	5	6	7	8	9	10	More attractive

(CES-D)

Below is a list of the ways you might have felt or behaved. Please indicate how often you felt this way TODAY.

None of the time today Most of the time today

1 2 3 4

_____1. Today, I felt like I could not shake off the blues even with the help of my family or friends.

_____2. I felt depressed today.

_____3. Today, I felt hopeful about the future.

_____4. I was happy today.

_____5. I felt sad today.

(BDI-II)

Please read each group of statements carefully, and then pick out ONE STATEMENT in each of the five groups that best describes the way that you feel right now. Click the number below the statement you have picked. If several statements in the group seem to apply equally well, select the one that fits you best.

1. Pessimism:

1	2	3	4
I am not discouraged about my future	I feel more discouraged about my future than I used to	I do not expect things to work out for me.	I feel my future is hopeless and will only get worse.

2. Loss of interest:

1	2	3	4
I have not lost interest in other people or activities.	I am less interested in other people or things than before.	I have lost most of my interest in people or other things.	It's hard to get interested in anything.

3. Loss of energy:

1	2	3	4
I have as much energy as ever.	I have less energy than I used to.	I don't have enough energy to do very much.	I don't have enough energy to do anything.

4. Concentration Difficulty

1	2	3	4
I can concentrate as well as ever.	I can't concentrate as well as usual.	Its hard to keep my mind going on anything for very long.	I find I can't concentrate on anything.

5. Tiredness/Fatigue

1	2	3	4
I am no more tired or fatigued than usual.	I get tired or fatigued more easily than usual.	I am too tired or fatigued to do a lot of things I used to.	I am too tired or fatigued to do most of the things I used to.

Thank you for completing your daily Facebook and Personality Diary Survey. We appreciate your conscientiousness and continued participation.

Thank you!

Appendix S Feedback about Diary Study (Exit Survey)

Thank you very much for participating in this study! There are a few more questions we would like for you to answer. Please be as honest as possible. All information will be completely anonymous.

1. Overall, I found completing the daily Facebook event records _____

1	2	3	4	5	6	7	8	9

Very easy Very difficult

2. The number of positive Facebook events experienced in this study was _____ the number I usually experience:

1	2	3	4	5	6	7	8	9

Much less Much more
Than Than

3. The number of negative Facebook events experienced in this study was _____ the number I usually experience:

1	2	3	4	5	6	7	8	9

Much less Much more
Than Than

4. The amount of time spent on Facebook during the study is _____ I normally am on Facebook:

1	2	3	4	5	6	7	8	9

Much less Much more
Than Than

5. How accurate do you feel you were in recording your Facebook events?

1	2	3	4	5	6	7	8	9

Not accurate at all Extremely accurate

Appendix T: Model Equations for Each Hypothesis

1) Hypothesis 1: The amount of time spent daily on Facebook will be positively related to daily depressive symptoms.

   c path:

   Level 1: $\text{Depression}_{ij} = b_{0j} + b_{1j} * \text{FBtime}_{ij} + e_{ij}$

   Level 2: $b_{0_j} = \gamma_{oo} + \gamma_{01} * \overline{\text{FB time}}_{.j} + u_{0j}$

   Level 2: $b_{1j} = \gamma_{10} + u_{1j}$

   Combined equation: $\text{Depression}_{ij} = \gamma_{oo} + (\gamma_{01} * \overline{\text{FB time}}_{.j}) + (\gamma_{10} * \text{FBtime}_{ij}) + (u_{1j} * \text{FBtime}_{ij}) + e_{ij}$

2) Hypothesis 2: The amount of time spent daily on Facebook will be related to daily Facebook social comparisons.

   a path:

   Level 1: $\text{FSC}_{ij} = b_{0j} + b_{1j} * \text{FBtime}_{ij} + e_{ij}$

   Level 2: $b_{0_j} = \gamma_{oo} + \gamma_{01} * \overline{\text{FB time}}_{.j} + u_{0j}$

   Level 2: $b_{1j} = \gamma_{10} + u_{1j}$

   Combined equation: $\text{FBSC}_{ij} = \gamma_{00} + (\gamma_{01} * \overline{\text{FB time}}_{.j}) + (\gamma_{10} * \text{FBtime}_{ij}) + u_{0j} + (u_{1j} * \text{FBtime}_{ij}) + e_{ij}$

3) Hypothesis 3: Daily Facebook social comparisons (specifically upward and non-directional) will mediate the relationship between daily time on Facebook and daily depressive symptoms.

b +c' path:

Level 1: $\text{Depression}_{ij} = b_{0j} + b_{1j} * \text{FBtime}_{ij} + b_{2j} * \text{FSC}_{ij} + e_{ij}$

Level 2: $b_{0_j} = \gamma_{oo} + \gamma_{01} * \overline{\text{FB time}}_{.j} + \gamma_{02} * \overline{\text{FSC}}_{.j} + u_{0j}$

Level 2: $b_{1j} = \gamma_{10} + u_{1j}$

Level 2: $b_{2j} = \gamma_{20} + u_{2j}$

Combined Equation:

$\text{Depression}_{ij} = \gamma_{oo} + (\gamma_{01} * \overline{\text{FB time}}_{.j}) + (\gamma_{02} * \overline{\text{FBSC}}_{.j}) + (\gamma_{10} * \text{FBtime}_{ij}) + (\gamma_{20} * \text{FBSC}_{ij}) + u_{0j} + (u_{1j} * \text{FBtime}_{ij}) + (u_{2j} * \text{FBSC}_{ij}) + e_{ij}$

4) Hypothesis 4: Gender will serve as a moderator between Facebook social comparisons and depressive symptoms. Thus, the possibility that moderated mediation will be investigated.

c path:

Level 1: $\text{Depression}_{ij} = b_{0j} + b_{1j} * \text{FBtime}_{ij} + e_{ij}$

Level 2: $b_{0_j} = \gamma_{oo} + \gamma_{01} * \overline{\text{FB time}}_{.j} + u_{0j}$

Level 2: $b_{1_j} = \gamma_{10} + \gamma_{11} * \text{gender}_{.j} + u_{1j}$

Combined equation: $\text{Depression}_{ij} = \gamma_{oo} + (\gamma_{01} * \overline{\text{FB time}}_{.j}) + (\gamma_{10} * \text{FBtime}_{ij}) + (\gamma_{11} * \text{gender}_{.j} * \text{FBtime}_{ij}) + u_{0j} + (u_{1j} * \text{FBtime}_{ij}) + e_{ij}$

a path:

Level 1: $FBSC_{ij} = b_{0j} + b_{1j} * FBtime_{ij} + e_{ij}$

Level 2: $b_{0_j} = \gamma_{oo} + \gamma_{01} * \overline{FB\ time}_{.j} + u_{0j}$

Level 2: $b_{1j} = \gamma_{10} + \gamma_{11} * gender_{.j} + u_{1j}$

Combined Equation:
$FBSC_{ij} = \gamma_{00} + (\gamma_{01} * \overline{FB\ time}_{.j}) + (\gamma_{10} * FBtime_{ij}) + (\gamma_{11} * gender_{.j} * FBtime_{ij}) + u_{0j} +$

$(u_{1j} * FBtime_{ij}) + e_{ij}$

b+c' path:

Level 1: $Depression_{ij} = b_{0j} + b_{1j} * FBtime_{ij} + b_{2j} * FBSC_{ij} + e_{ij}$

Level 2: $b_{0_j} = \gamma_{oo} + \gamma_{01} * gender_{.j} + \gamma_{02} * \overline{FB\ time}_{.j} + \gamma_{03} * \overline{FBSC}_{.j} + u_{0j}$

Level 2: $b_{1j} = \gamma_{10} + \gamma_{11} * gender_{.j} + u_{1j}$

Level 2: $b_{2j} = \gamma_{20} + \gamma_{21} * gender_{.j} + u_{2j}$

Combined Equation:

$Depression_{ij} = \gamma_{oo} + (\gamma_{01} * gender_j) + (\gamma_{02} * \overline{FB\ time}_{.j}) + (\gamma_{03} * \overline{FBSC}_{.j}) + (\gamma_{10} *$

$FBtime_{ij}) + (\gamma_{11} * FBtime_{ij} * gender_j) + (\gamma_{20} * FBSC_{ij}) + (\gamma_{21} * FBSC_{ij} * gender_j) + u_{0j} +$

$(u_{1j} * FBtime_{ij}) + (u_{2j} * FBSC_{ij}) + e_{ij}$

5) Hypothesis 5: The frequency in which participants view/log onto Facebook per day will predict daily depressive symptoms.

c path:

Level 1: $\text{Depression}_{ij} = b_{0j} + b_{1j} * \text{FBviews}_{ij} + e_{ij}$

Level 2: $b_{0j} = \gamma_{oo} + \gamma_{01} * \overline{\text{FB views}}_{.j} + u_{0j}$

Level 2: $b_{1j} = \gamma_{10} + u_{1j}$

Combined equation: $\text{Depression}_{ij} = \gamma_{oo} + (\gamma_{01} * \overline{\text{FB views}}_{.j}) + (\gamma_{10} * \text{FBviews}_{ij}) + u_{0j} + (u_{1j} * \text{FBviews}_{ij}) + e_{ij}$

6) Hypothesis 6: Daily frequency/views per day will be positively related to daily Facebook social comparisons (upward and non-directional).

a path:

Level 1: $\text{FBSC}_{ij} = b_{0j} + b_{1j} * \text{FBviews}_{ij} + e_{ij}$

Level 2: $b_{0j} = \gamma_{oo} + \gamma_{01} * \overline{\text{FB views}}_{.j} + u_{0j}$

Level 2: $b_{1j} = \gamma_{10} + u_{1j}$

Combined equation: $\text{FBSC}_{ij} = \gamma_{00} + (\gamma_{01} * \overline{\text{FB views}}_{.j}) + (\gamma_{10} * \text{FBviews}_{ij}) + u_{0j} + (u_{1j} * \text{FBviews}_{ij}) + e_{ij}$

7) Hypothesis 7: Daily Facebook social comparisons (upward and non-directional) will mediate the association between the frequency in which participants view/log onto Facebook per day and daily depressive symptoms.

b +c' path:

Level 1: $\text{Depression}_{ij} = b_{0j} + b_{1j} * \text{FBviews}_{ij} + b_{2j} * \text{FBSC}_{ij} + e_{ij}$

Level 2: $b_{0j} = \gamma_{oo} + \gamma_{01} * \overline{\text{FB views}}_{.j} + \gamma_{02} * \overline{\text{FBSC}}_{.j} + u_{0j}$

Level 2: $b_{1j} = \gamma_{10} + u_{1j}$

Level 2: $b_{2j} = \gamma_{20} + u_{2j}$

Combined Equation:
$\text{Depression}_{ij} = \gamma_{oo} + (\gamma_{01} * \overline{\text{FB views}}_{.j}) + (\gamma_{02} * \overline{\text{FBSC}}_{.j}) + (\gamma_{10} * \text{FBviews}_{ij}) + (\gamma_{20} * \text{FBSC}_{ij}) + u_{0j} + (u_{1j} * \text{FBviews}_{ij}) + (u_{2j} * \text{FBSC}_{ij}) + e_{ij}$

8) Hypothesis 8: The association between daily Facebook social comparison (upward and non-directional) and daily depressive symptoms is expected to be moderated by gender.

c path:

Level 1: $\text{Depression}_{ij} = b_{0j} + b_{1j} * \text{FBviews}_{ij} + e_{ij}$

Level 2: $b_{0j} = \gamma_{oo} + \gamma_{01} * \overline{\text{FB views}}_{.j} + u_{0j}$

Level 2: $b_{1j} = \gamma_{10} + \gamma_{11} * \text{gender}_{.j} + u_{1j}$

Combined equation: $\text{Depression}_{ij} = \gamma_{oo} + (\gamma_{01} * \overline{\text{FB views}}_{.j}) + (\gamma_{10} * \text{FBviews}_{ij}) + (\gamma_{11} * \text{gender}_{.j} * \text{FBviews}_{ij}) + u_{0j} + (u_{1j} * \text{FBviews}_{ij}) + e_{ij}$

a path:

Level 1: $\text{FBSC}_{ij} = b_{0j} + b_{1j} * \text{FBviews}_{ij} + e_{ij}$

Level 2: $b_{0j} = \gamma_{oo} + \gamma_{01} * \overline{\text{FB views}}_{.j} + u_{0j}$

Level 2: $b_{1j} = \gamma_{10} + \gamma_{11} * \text{gender}_{.j} + u_{1j}$

Combined Equation:

$FBSC_{ij} = \gamma_{00} + (\gamma_{01} * \overline{FB\ views}_{.j}) + (\gamma_{10} * FBviews_{ij}) + (\gamma_{11} * gender_{.j} * FBviews_{ij}) + u_{0j}$

$+(u_{1j} * FBviews_{ij}) + e_{ij}$

b+c' path:

Level 1: $Depression_{ij} = b_{0j} + b_{1j} * FBviews_{ij} + b_{2j} * FBSC_{ij} + e_{ij}$

Level 2: $b_{0j} = \gamma_{oo} + \gamma_{01} * gender_{.j} + \gamma_{02} * \overline{FB\ views}_{.j} + \gamma_{03} * \overline{FBSC}_{.j} + u_{0j}$

Level 2: $b_{1j} = \gamma_{10} + \gamma_{11} * gender_{.j} + u_{1j}$

Level 2: $b_{2j} = \gamma_{20} + \gamma_{21} * gender_{.j} + u_{2j}$

Combined Equation:

$Depression_{ij} = \gamma_{oo} + (\gamma_{01} * gender_{j}) + (\gamma_{02} * \overline{FB\ views}_{.j}) + (\gamma_{03} * \overline{FBSC}_{.j}) + (\gamma_{10} *$

$FBviews_{ij}) + (\gamma_{11} * FBviews_{ij} * gender_{j}) + (\gamma_{20} * FBSC_{ij}) + (\gamma_{21} * FBSC_{ij} * gender_{j}) +$

$u_{0j} + (u_{1j} * FBviews_{ij}) + (u_{2j} * FBSC_{ij}) + e_{ij}$

9) Hypothesis 9: Participants will experience an increase in depressive symptoms as a function of the interaction between Facebook social comparisons (upward and non-directional) and negative experiences on Facebook. In other words, the extent to which experiences on Facebook are negative is expected to moderate the relationship between Facebook social comparison and depressive symptoms such that for those who report experiences on Facebook as more negative an increase in depressive symptoms is expected.

Level 1: $Depression_{ij} = b_{oj} + b_{1J} * NegFBExp_{ij} + b_{2J} * FBSC_{ij} + b_{3J} * (FBSC_{ij} * NegFBExp_{ij})$

Level 2: $b_{oj} = \gamma_{00} + \gamma_{01} * \overline{FBSC}_{.j} + \gamma_{02} * \overline{NegFBexp}_{.j} + \gamma_{03} * \overline{FBSC}_{.j} * \overline{NegFBexp}_{.j} + u_{ij}$

Level 2: $b_{1J} = \gamma_{10} + u_{1j}$

Level 3: $b_{2J} = \gamma_{20} + u_{2j}$

Level 4: $b_{3j} = \gamma_{30} + u_{3j}$

Combined equation: $\text{Depression}_{ij} = \gamma_{00} + \left(\gamma_{01} * \overline{\text{FBSC}}_{.j}\right) + \left(\gamma_{02} * \overline{NegFBexp}_{.j}\right) + \left(\gamma_{03} * \overline{\text{FBSC}}_{.j} * \overline{NegFBexp}_{.j}\right) + \left(\gamma_{10} * \text{NegFBExp}_{ij}\right) + \left(\gamma_{20} * \text{FBSC}_{ij}\right) + \left(\gamma_{30} * \text{FBSC}_{ij} * \text{NegFBExp}_{ij}\right) + u_{0j} + \left(u_{1j} * \text{NegFBExp}_{ij}\right) + (u_{2j} * FBSC_{ij}) + (u_{3j} * \text{FBSC}_{ij} * \text{NegFBExp}_{ij}) + e_{ij}$