

2012-06-26

Rumination and Emotional Adjustment: The Role of Social Networking Sites

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UNIVERSITY OF MIAMI

RUMINATION AND EMOTIONAL ADJUSTMENT:
THE ROLE OF SOCIAL NETWORKING SITES

By

Tanya B. Tran

A DISSERTATION

Submitted to the Faculty
of the University of Miami
in partial fulfillment of the requirements for
the degree of Doctor of Philosophy

Coral Gables, Florida

August 2012

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RUMINATION AND EMOTIONAL ADJUSTMENT:
THE ROLE OF SOCIAL NETWORKING SITES

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Rumination and Emotional Adjustment:
The Role of Social Networking Sites.

(August 2012)

Abstract of a dissertation at the University of Miami.

Dissertation supervised by Professor Jutta Joormann.
No. of pages in text. (157)

Recent research posits that it is not necessarily the immediate response to stressful life events that is associated with an increased risk for the onset and recurrence of emotional disorders, but the *way* in which people regulate the ensuing emotions. A tendency to respond to negative mood states with perseverative thinking, such as rumination, has been shown to increase the risk for emotional disorders. The use of social networking sites, such as Facebook, may provide new means of triggering and prolonging perseverative thinking, exacerbating negative mood and negatively affecting adjustment following a stressful life event. Results from a pilot study confirmed that Facebook use may indeed provide important triggers for engaging in maladaptive emotion regulation. This study builds on the pilot data and strives to examine how individual differences in emotion regulation, specifically self-report measures and biological correlates of rumination, are related to Facebook use following a relationship breakup. Undergraduate participants completed a four-day experience sampling study assessing their general Facebook use, emotion regulation strategies while using Facebook, and affect levels before and after logging on to Facebook. Long-term adjustment was also assessed by examining changes in depression and anxiety symptoms at a one-month follow-up. Results suggested that Facebook use was related to emotional adjustment, both in the short- and long-term. Interestingly, whereas rumination on Facebook did not mediate the

relation between Facebook use and short-term changes in affect, it did mediate the relation between Facebook use and depression and anxiety levels one-month later. Preliminary findings indicated that differences in Facebook activity were, in fact, related to changes in sympathetic activation, and that variations in biological reactivity were related to long-term emotional adjustment. Explicit self-esteem moderated levels of Facebook rumination, whereas implicit self-esteem and social comparison did not. Results from this study hold important implications for the use of social networking sites on emotion regulation, indicating that rumination on Facebook may impede recovery or prolong symptoms following a stressful life event. Future studies should continue to examine mediators and moderators of Facebook rumination and subsequent effects on emotional adjustment.

This work is dedicated to my parents, with all of my love.

ACKNOWLEDGEMENTS

I would like to express my gratitude to my mentor, Dr. Jutta Joormann. Thank you for always pushing me to think critically and encouraging me to strive for my best.

Many thanks to my dissertation committee: Dr. Jill Ehrenreich May, Dr. Debra Lieberman, Dr. Michael McCullough, and Dr. Edward Rappaport. Thank you for your valuable time, insight, and feedback.

My deepest love and gratitude to my lab “family”: Joelle LeMoult, Cathy D’Avanzato, Kim Arditte, and Dr. Lira Yoon, and my friends in the program, especially Dr. Shira Kolnik, Dr. Michelle Maier, Dr. Janna Fuccillo, Jessica Jacobson, and Jennifer Nam. It is your constant support, friendship, and guidance that have made this journey possible and turned these into years ones I will always treasure.

Finally, thank you to Stuart McNay and my parents, Sinh and Mynga Tran, for your unconditional love and support throughout my academic endeavors.

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Chapter 1: Introduction

Background

It is estimated that approximately 26.2% of adults in the United States will suffer from a diagnosable mental disorder in a given year (Kessler, Chiu, Demler, & Walter, 2005). Whereas many individuals do not meet criteria for a clinical disorder, they may still suffer from symptoms of emotional disorders, particularly following stressful life events. Given that such symptoms can cause significant levels of distress, it is crucial to gain a better understanding of the factors that affect emotional adjustment following a negative life event. Theories investigating factors that affect adjustment have focused on examining either cognitive, biological, or interpersonal risk factors for the development of such disorders. These areas of functioning, however, are not independent, but rather interact to affect the development and maintenance of psychological symptoms. It is therefore important to examine these factors within the same study.

Theories of emotion regulation posit that it may be how people regulate their emotions following a stressor that may be important. Therefore, individuals who experience difficulty managing negative emotions and have a tendency to engage in ineffective regulation strategies, such as rumination, may be more vulnerable to developing emotional disorders. Whereas prior research has focused on examining the nature of interpersonal relationships in the context of in-person interactions, few studies have examined such interactions via the presence of a newer medium - online social networking sites. Given the recent rise in popularity of these sites, it is important to gain insight into how current theories of the development of psychopathology, such as theories of emotion regulation, may play out through these newly available means. This study

aims to examine the psychological and biological consequences of emotion regulation via social networking sites, specifically Facebook.

Emotion Regulation (ER)

Diathesis-stress models posit that whereas stressors play an important role in triggering the onset of emotional disorders, it is the interaction of these stressors with a pre-existing vulnerability that affects an individual's response to the negative life events, thereby increasing risk for the development of disorders (see Abramson et al., 2002, for a review). Thus, current research proposes that *how* people regulate or respond to these emotions may be important, and that this response may be even more important than individual differences in the immediate experience of negative emotions following the event (e.g., Flynn & Rudolph, 2007; Joormann, Yoon, & Siemer, 2009; Nolen-Hoeksema, 1991; Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Consequently, individuals who experience difficulty in regulating emotions may experience prolonged levels of stress, which may lead to the development of more clinical disorders, such as major depressive disorder (MDD) and generalized anxiety disorder (GAD).

Emotion regulation involves using behavioral and cognitive strategies to modulate the intensity, duration, and expression of affect (Thompson, 1994). Whereas emotions function to inform and guide our behaviors, regulating one's emotions may be useful for a number of reasons. These may include bolstering interpersonal communication, maintaining social norms, and enhancing pleasant feelings (Fischer, Manstead, Evers, Timmer, & Valk, 2004). Gross (1998) proposes that regulation may occur throughout the emotion-generation process. Accordingly, *antecedent-focused* strategies, such as attentional deployment and reappraisal (or cognitive change), are implemented prior to

one's emotional, behavioral or physiological response. *Response-focused strategies*, on the other hand, refer to tactics used once the emotion and its associated behavioral and physiological responses have already begun. Examples of these include suppression, distraction, and rumination. Recent theories suggest that the use of effective ER strategies, such as distraction, is characteristic of healthy psychological functioning (Gross, 1998); whereas the use of ineffective ER strategies, such as rumination, is associated with psychological disorders, including depressive and anxiety disorders, schizophrenia, and borderline personality disorder (Kring & Werner, 2004). Researchers, such as Nolen-Hoeksema and colleagues (2008), posit that the tendency to use strategies which fail to down-regulate negative emotions following their initial onset may lead to prolonged negative affect (John & Gross, 2004), thus resulting in the development of psychological disorders. Within the literature on emotional regulation and emotional disorders, distraction and rumination have received much attention.

Distraction. Considered a more adaptive form of emotion regulation, distraction involves engaging in positive or neutral activities to divert one's thoughts away from symptoms of distress (Lyubomirsky, Caldwell, & Nolen-Hoeksema, 1998; Lyubomirsky & Nolen-Hoeksema, 1995). People focus their thoughts on the layout of their local shopping mall, for instance, in order to decrease the level of subjective emotion experienced. As opposed to attentional distraction, which involves shifting one's visual or auditory attention away from an emotion-evoking event in order to avoid the experience of emotion, cognitive distraction involves shifting one's thoughts away from the emotion or emotion-producing event once the emotion has already been generated. Hence, attentional distraction is considered an antecedent-focused strategy, whereas

cognitive distraction is classified as a response-focused strategy. Cognitive distraction (from here on referred to as *distraction*) is examined in the current study and is considered to be an effective form of regulating one's affect. It has been associated with more positive outcomes, such as faster physiological recovery following a stressor (Vickers & Vogeltanz-Holm, 2003), decreased depressed mood (Trask & Simon, 1999) and shorter durations of depressive symptoms (Nolen-Hoeksema, Morrow, & Fredrickson, 1993). Numerous experimental studies have compared the effects of distraction with rumination, a more maladaptive form of affect regulation. These studies have consistently found that distraction decreases dysphoric mood in dysphoric and clinically depressed participants, while rumination increases dysphoric mood (e.g., Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). More recent research, however, suggests it may not be that distraction is necessarily more adaptive, but rather it is flexibility in the use of emotion regulation strategies and differences in the ability to implement effective strategies that is important (Joormann, et al., 2009).

Rumination. Compared to distraction, rumination is thought to be a more maladaptive way of regulating emotion. Rumination has been defined as the process of “repetitively and passively focusing on symptoms of distress and the possible causes and consequences of these symptoms” (Nolen-Hoeksema, 1991). Depressed individuals, in particular, have demonstrated an increased tendency to respond to negative events and mood states with rumination (e.g., Mathews & MacLeod, 2005); therefore, research suggests that depression may be an emotional disorder that develops as a result of the use of maladaptive emotion regulation strategies. According to the Response Styles Theory, rumination may prolong and exacerbate distress in response to negative or stressful

events and increase levels of hopelessness, increasing the likelihood that initial depressive symptoms may turn into episodes of major depression (Nolen-Hoeksema et al., 2008). Roberts and colleagues (1998) found that elevated levels of rumination are not only found in individuals with current dysphoria, but also in individuals with previous depressive episodes, regardless of current depressive symptomatology. These findings suggest that the tendency to ruminate may be a stable risk factor that increases vulnerability to emotional disorders, rather than being merely a symptom of depression.

Rumination may be related to depression through several mechanisms. First, rumination may enhance negative thinking while in a depressed mood, increasing the likelihood that negative thoughts and memories are activated and used to understand and interpret one's current circumstances. As a result, individuals may be more easily able to recall negative memories, be more self-critical, demonstrate decreased self-confidence and self-efficacy in overcoming problems, display negatively-biased interpretations of events, and hold lower expectations for the future (Nolen-Hoeksema et al., 2008).

Rumination may also interfere with effective problem-solving. In experimental studies, individuals induced to ruminate were more likely to appraise problems as overwhelming and unsolvable (Lyubomirsky, Tucker, Caldwell, & Berg, 1999) and were less likely to come up with effective solutions (Lyubomirsky et al., 1999, Lyubomirsky & Nolen-Hoeksema, 1995). This may be due to increased pessimistic thinking and the inability to recall instances of effective problem-solving, as well as decreased confidence in implementing solutions (Lyubomirsky et al., 1999).

Individuals with a tendency to ruminate also demonstrate more difficulty initiating and engaging in instrumental behavior. Despite recognizing that pleasant,

distracting behaviors would help elevate one's mood, rumination often maintains focus on the depressed mood and eliminates motivation and initiative to participate in these activities (Lyubomirsky & Nolen-Hoeksema, 1993). This decreased instrumental behavior may convince individuals that they lack the efficacy to engage in productive, mood-alleviating behaviors, and may oftentimes lead to more stressful circumstances. Finally, high levels of rumination are frequently associated with undesirable personality characteristics, such as dependency, neediness (Spasojevic & Alloy, 2001), sociotropy (Gorski & Young, 2002), and aggressive tendencies following an interpersonal transgression (McCullough et al., 1998). High ruminators often act in counterproductive ways, decreasing the quality of their interpersonal relationships, and hence, perpetuating the cycle of depression.

While most research has focused on the role of rumination in the onset and maintenance of depressive disorders, recent research has also begun to examine the relation among rumination and other psychological disorders, such as binge-eating, alcohol abuse, self-injurious behaviors, and anxiety disorders. Studies in adolescents and adults have found that rumination predicts increases in binge drinking and/or alcohol abuse over time (Nolen-Hoeksema & Harrell, 2002; Nolen-Hoeksema & Larson, 1999; Nolen-Hoeksema, Stice, Wade, & Bohon, 2007). Some propose that escapist behaviors, such as binge-eating and binge-drinking, as well as self-injurious behaviors, may be an effort to reduce or quiet negative self-directed thoughts (Nock & Prinstein, 2004; Hilt, Cha, & Nolen-Hoeksema, 2007; Nolen-Hoeksema et al., 2007). Additionally, individuals prone to rumination tend to exhibit higher levels of generalized anxiety (Fritz, 1999; Nolen-Hoeksema, 2000). For these individuals, however, the repetitive, perseverative

form of thinking appears to be better characterized by worry. Highly correlated with and similar to rumination, worry is also an attempt to engage in mental problem-solving (Barlow, 2002). The focus of worry, however, is “on an issue whose outcome is uncertain,” while rumination is primarily focused on events that have already occurred. As the central defining feature in generalized anxiety disorder (APA, 2000), worry is associated with cognitive inflexibility (Davis & Nolen-Hoeksema, 1999), difficulties in concentration and attention, and poor problem-solving and implementation (Lyubomirsky & Nolen-Hoeksema, 1995).

The current study focuses on emotion regulation following a relationship breakup in an undergraduate student sample because such events appear to be particularly potent stressors for this population (Simpson, 1987). While such an event is a difficult time in most individuals' lives, *how* people cope with the ensuing negative emotions, such as anger and sadness, can strongly impact subsequent adjustment (Kato, 2005). Generally, high levels of brooding, which is considered to be a more maladaptive form of rumination, and regret are associated with more negative adjustment following the end of a romantic relationship (Saffrey & Ehrenberg, 2007). Several factors may act as mediators or moderators of coping and post-breakup adjustment. Gender differences, for instance, may play a role in which affect regulation strategies are utilized following a breakup, such that women are more likely to focus on blaming themselves or their partners and are more likely to engage in rumination, while men are more likely to distract by burying themselves in activities, such as work and/or athletic activities (Choo, Levine, & Hatfield, 1996).

Additionally, characteristics of the relationship and breakup itself may also be related to differences in coping styles and adjustment following the negative event. Collins and Clark (1989) found that individuals who lacked understanding about the breakup, had invested more in the relationship, and were not the one who terminated the relationship were more likely to exhibit increased rumination, higher perceived stress, and greater depressed mood. In another study examining breakups in college students, Kaczmarek and colleagues (1990) found that the suddenness of the breakup, perceived closeness, and duration of the relationship impacted levels of depression following the breakup. Finally, self-esteem appears to moderate distress levels, such that, individuals with lower self-esteem tend to experience increased distress following a rejection, while those with high levels of self-esteem do not report differences in distress, regardless of if they were rejected or were the rejector (Waller, 2008). Collectively, these studies highlight the importance of considering characteristics of the relationship and breakup when examining subsequent levels of emotional adjustment and well-being.

Experience sampling. Experience sampling studies are a “means for collecting information about both the context and content of the daily life of individuals” (Hektner, Schmidt, & Csikszentmihalyi, 2007). The momentary nature of capturing data in such studies allows the opportunity to examine relations between one’s external context and internal state, and have been used to better understand how differences in regulating emotional responses to external stressors may influence subsequent affect. In an earlier study examining the effects of emotion regulation on everyday affect, Nolen-Hoeksema and colleagues (1993) used a Daily Emotion Report (DER) to examine the occurrence, duration, and severity of individual differences in depressed mood for 30 days. Each

participant was provided with a list of ruminative and distracting responses, and asked to indicate which, if any, they engaged in following their negative mood states each day. Examples of ruminative responses included: go to my room alone and think about my feelings, sit at home and think about how I feel, and think “Why can’t I be satisfied with the way things are?” Examples of distracting responses included behaviors such as: do something I enjoy, do something fun with a friend, and think “I’ve got to get up and do something to make myself feel better.” The authors found that 83% of the undergraduate sample demonstrated consistent styles of responding to their depressed mood. Furthermore, the tendency to engage in ruminative responses following a negative mood state prolonged depressed mood state, even after controlling for the initial severity of depressed mood. Wood and colleagues (1990) also conducted a 30-day study of adult males examining the use of various coping strategies on everyday stressors. Similarly, they found that the daily use of self-focused methods of coping, such as rumination, were highly associated with global negative mood and increased negative affect.

More recent studies have continued to examine the effects of various emotion regulation strategies in response to daily stressors using experience sampling methodology. For instance, Silk, Steinberg, and Morris (2003) examined adolescent reports of regulating negative emotions over a one-week period. They found that participants who reported experiencing more intense and labile emotions and engaged in less effective regulation of these emotions (e.g., by responding with disengagement, such as denial, or involuntary engagement strategies, such as rumination) also reported elevated symptoms of depression and problematic behaviors. Moberly and Watkins (2008) examined the relation between momentary ruminative self-focus and negative

affect by randomly signaling participants eight times per day for one week. Their results suggested that momentary ruminative self-focus in the form of brooding was positively associated with increased negative affect. Additionally, there was a reciprocal relation between rumination and negative affect, such that negative affect led to increased rumination and greater rumination increased levels of negative affect.

Using rumination items from the Response Styles Questionnaire (RSQ), as well as suppression items from the Emotion Regulation Questionnaire (ERQ), Hatzenbuehler, Nolen-Hoeksema, and Dovidio (2009) examined whether specific emotion regulation strategies mediated the relation between stigma and subsequent distress. Consistent with previous findings, they found that rumination did, in fact, account for the relation between stigma and distress. In line with findings from experimental studies, experiencing sampling studies suggest that the extent to which a person engages in ruminative self-focus following daily stressors is an important determinant of the degree of distress experienced after a negative event (Moberly & Watkins, 2008).

Biological correlates of emotion regulation. While much research posits that difficulties in emotion regulation may negatively affect adjustment following life stressors, these studies have primarily relied on self-report measures to understand the psychological correlates of emotion regulation, while neglecting examination into the biological aspects of affect regulation. A review by Rottenberg (2007), however, suggests that individuals suffering from emotional disorders do indeed demonstrate differences in biological reactivity, as evidenced by dysregulation of the autonomic nervous system (ANS). These findings highlight the importance of examining biological markers of emotion regulation and their relation to other measures of psychological functioning (e.g.,

self-report). As part of the peripheral nervous system, the ANS involuntarily controls heart rate, respiration rate, digestion, salivation, and perspiration (Brownley, Hurwitz, & Schneiderman, 2000). Changes in mental and emotional states, such as exposure to stress, can result in subsequent changes in the ANS. Consisting of the sympathetic and parasympathetic nervous system, the sympathetic branch of the ANS mediates the neuronal and hormonal stress response that prepares the body for action. Conversely, the parasympathetic system returns the body to homeostasis after stressful events by inhibiting the sympathetic influences to the heart and dampening the hypothalamic-pituitary-adrenal (HPA) axis (Lovallo & Thomas, 2000; Rottenberg, 2007).

Recent research has sought to examine differences in emotional reactivity in specific clinical populations, such as currently depressed individuals, compared to normal controls. In one study, Rottenberg and colleagues (2002) instructed participants to watch neutral, sad, fear, and amusing films, while measuring their experiential, behavioral, and physiological responses. Compared with non-depressed controls, currently depressed participants who reported the least reactivity to the sad film exhibited the greatest concurrent impairment. Furthermore, depressed participants who exhibited the least behavioral and heart rate reactivity were least likely to recover from MDD prospectively. The loss of appropriate modulation of one's subjective and biological reactivity may reflect a core feature of emotion dysregulation and may play a role in the onset and maintenance of emotional disorders, underscoring the importance of examining biological correlates of affect dysregulation.

Of particular importance when examining biological reactivity associated with emotion regulation is the activation of one's autonomic response. Whereas studies on

parasympathetic responding examine recovery following a stressor or use of emotion regulation strategy, psychophysiological studies on sympathetic responding evaluate biological activation following such an event. Assessing the sympathetic branch of the ANS provides a measure of biological responding that is unaffected by demand characteristics, a limitation of self-report measures (see Bradley, 2000, for a review). Key areas of focus in the sympathetic nervous system include the cardiovascular and electrodermal systems; thus, the current study evaluates heart rate and skin conductance response from these two systems during rumination (Rottenberg, Kasch, Gross, & Gotlib, 2002).

In a recent study, Ray, Wilhelm, and Gross (2008) examined patterns of physiological responding for individuals engaging in two different emotion regulation strategies. They instructed participants to either ruminate or reappraise on a personally-relevant anger-eliciting event (i.e., the response manipulation). Subjective anger ratings were obtained prior to and following the response manipulation, and levels of sympathetic activation were continuously assessed throughout the experiment. Results suggested that individuals randomized to ruminate on the anger-eliciting event indicated higher subjective anger ratings, as well as greater sympathetic activation, which continued to increase over time. Participants instructed to reappraise, however, reported a progressive decrease in anger ratings and sympathetic activation. Thus, whereas rumination appeared to increase emotional and physiological arousal over time, reappraisal appeared to make upsetting material less emotionally and physiologically arousing. These findings suggest that how people think about and come to understand negative life events may not only affect their self-reported affect levels, but also their

biological response, which may also have profound consequences for their physical health. Whereas Ray and colleagues (2008) examined physiological responses to regulating anger, future studies should continue to examine biological responses to other salient emotions.

Internet Use on Emotional Well-Being

Current research on emotion regulation primarily focuses on individual differences, as well as the consequences of interpersonal interactions between individuals. With the rise of modern technology and the increasingly prominent role that the Internet plays in people's everyday lives, it is crucial to consider the implications of this newer medium on emotion regulation and psychological well-being. The Internet provides a more accessible means of communicating and obtaining information that was once not as easily attainable. Consequently, processes, such as interpersonal interactions and emotion regulation, for instance, may play out differently through this new means of communication and information pathway, thereby potentially affecting one's subsequent short- and long-term mental health.

Findings on the psychological consequences of Internet use have produced mixed findings. While some studies suggest that general internet use is associated with more positive outcomes, such as decreased loneliness and depression, increased perceived social support, and higher self-esteem (Shaw & Gant, 2002), others identify more negative outcomes, including greater levels of anxiety, unsociability, shyness (Ebeling-Witte, Frank, & Lester, 2007), decreased social support and greater social isolation (Sanders, Field, Diego, & Kaplan, 2000), higher rates of depression (e.g., Kraut et al., 1998; Kielser & Kraut, 1999; Rierdan, 1999; Shapiro, 1999), and greater hostility and

severe psychological symptoms (Yen et al., 2008). Furthermore, while the tendency to develop an internet addiction disorder (IAD), or excessive computer use that interferes with one's everyday life, is related to negative psychological adjustment, such as higher levels of depression, anxiety, social anxiety, and lower life satisfaction (e.g., Chak & Leung, 2004; Shaw & Black, 2008; Zhu & Wu, 2004), the direction of this association is unclear. Despite the fact that much research has been conducted to examine the effects of Internet use on psychological well-being, the majority of these studies have been correlational, making it difficult to clearly delineate the relationship between Internet use and emotional well-being.

More recent research has begun to examine possible mediators in the relation between Internet use and psychological adjustment. These mediators can be categorized into two main areas: specific online behaviors and reasons for use. Some literature suggests that it may not be the frequency or duration of time spent online that leads to negative outcomes, but rather specific behaviors or way in which one uses the Internet that results in detrimental consequences. For instance, activities such as self-disclosing to strangers and using the Internet mainly for chat rooms rather than to acquire scientific and technical knowledge are associated with more negative outcomes (Ybarra, Alexander, & Mitchell, 2005). To date, no studies have examined how online activity may influence the use of emotion regulation strategies and its relation to subsequent psychological outcomes.

Additionally, the reasons for use may also determine if increased Internet use is associated with positive or negative outcomes. Several studies (Weiser, 2001; Feng, Mowei, Mei, Haiyan, & Ning, 2006), for example, have found that individuals who use

the Internet to manage or regulate their social connections or affect (i.e., social-affective motive) experience more negative effects on their well-being, including decreased social integration, increased negative affect, pathological internet use patterns, and less overall social and psychological health. In contrast, individuals who primarily use the Internet to obtain knowledge (i.e., information-acquisition motive) experience more positive effects on their well-being, including increased social integration and better social health. Other researchers, however, present more mixed findings. For instance, whereas LaRose and colleagues (2001) found that using the Internet to obtain social support may decrease levels of depression, increased feelings of loneliness and depression may result for individuals who felt that their online connections were their only source of social support. Another study found that if online social interactions were driven by psychological distress and that the primary motive of internet use was to cope with one's emotions (rather than for information-seeking, email, etc.), negative outcomes were more likely to occur (Gordon, Juang, & Syed, 2007). Beyond types of use and motives for use, it is important to examine how individual differences may affect psychological outcomes.

Online communication. The use of the Internet for interpersonal communication may be particularly important to examine when considering effects on emotional well-being. This includes activities such as chatting, social networking sites, and instant messaging. The majority of research in this area has focused on impression management and identity construction (Kramer & Winter, 2008; Walther, Van Der Heide, Kim, Westerman, & Tong, 2008; Zhao, Grasmuck, & Martin, 2008), functions of online communication, particularly in college students (Raacke & Bonds-Raacke, 2008), and the

consequences of using the Internet for communication (e.g., Kang, 2007; Morgan & Cotton, 2003; Xiaoming, 2005; Valkenburg & Peter, 2009). While some studies have found that the use of instant messaging and chat rooms is related to increased levels of depression and compulsive internet use six months later (Xiaoming, 2005), others have found that the use of chat, email, and instant messaging may decrease levels of depression and increase overall happiness (Kang, 2007; Morgan & Cotton, 2003). Windham (2008), for example, found that while instant messaging was associated with positive adjustment, the use of social networking sites was associated with negative adjustment. While this body of research appears to present mixed findings, the bulk of research appears to support the *rich-get-richer hypothesis* rather than the *social compensation hypothesis* (e.g., Valkenburg & Peter, 2009). Accordingly, rather than allowing those with less positive “offline” relationships to form fulfilling relationships online, online communication tools may benefit more extraverted individuals who are also more willing to communicate in “real-life” and result in more negative consequences for individuals who have less fulfilling relationships offline (e.g., socially anxious individuals) (Sheldon, 2008).

In a recent study of adolescents, Valkenburg and Peter (2009) found that online communication and self-disclosure enhanced the quality of one’s relationships and was related to increased friendship formation in real-life. They also found that these high quality friendships in adolescence led to increased levels of emotional well-being. These effects, however, were moderated by gender (i.e., boys benefited more than girls) and type of use, such that positive effects were found only when adolescents were communicating with existing friends rather than strangers. Accordingly, adolescents who

used online communication to build on and increase the quality of their current friendships benefitted more from such interactions, providing support for the rich-get-richer hypothesis.

Overall, the body of literature on the effects of Internet use on well-being is mixed. While the rich-get-richer hypothesis proposes benefits from social networking sites, another prominent theory (i.e., social compensation hypothesis) suggests that online social networking may replace in-person social activities, thus reducing face-to-face socialization and resulting in negative mental health consequences (Kraut et al., 1998). Therefore, a preference for online social interaction rather than face-to-face interactions following psychological distress may play an important role in the development of negative consequences associated with problematic Internet use (Caplan, 2003). These outcomes, however, appear to be ultimately influenced by factors such as types of Internet use and reasons for use. Collectively, these discrepant findings highlight the importance of more clearly examining *how* (i.e., specific activities) and *why* (i.e., functions of internet communication) individuals use the Internet and differences in the subsequent outcomes. The current study strives to bring together the literature on emotion regulation and the effects of the Internet on emotional adjustment by examining how Facebook use may influence or trigger the use of emotion regulation strategies while online, and how the use of these strategies may, in turn, influence one's subsequent psychological well-being. To do so, this study examines emotion regulation in individuals while on a prominent social networking site, Facebook.

Facebook. Facebook.com, launched in March 1997, is currently the 2nd most popular website in the world and in the United States, following Google

(Alexa: The Web Information Company, 2011). According to Alexa.com, the average user views about 15 pages and spends about 35 minutes per day on the site (Alexa: The Web Information Company, 2011). Facebook has about 500 million active users worldwide, with the average user having 130 friends on the site (Facebook, 2011). Currently, the largest demographic of Facebook users are college students, aged 18 to 24, comprising 41% of current users, and Miami is the fastest growing metropolitan area with a growth rate of 88.5% (IstrategyLabs, 2009). Facebook was voted the number one website among college students in the US, over Google, MySpace, and YouTube, with most logging onto the site at least once per day (Anderson Analytics, 2009).

Despite the prevalence of Facebook in our society and its rapidly growing popularity, little research has examined its effects on mental health, particularly on its largest demographic – college students. Most research to date has used correlational methods to examine its relation to identity, self-esteem, relationships, and popularity (e.g., Ellison, Steinfield, & Lampe, 2008; Sheldon, 2008). Similar to findings for general online communication, Sheldon (2008) found support for the rich-get-richer hypothesis in that those who were most involved and benefitted the most from online relationships were also those more willing to communicate in real life. Ellison and colleagues (2007), however, found that students who reported low life satisfaction and low self-esteem could utilize Facebook to form social capital linked to “weak ties,” furthering bolstering these relationships and positively impacting their emotional well-being. Again, findings in this area appear mixed. This scarce body of literature emphasizes the need to further explore the role of Facebook use on psychological adjustment. The current study strives to fill this gap by examining how Facebook may influence the way in which one regulates their

emotions and subsequent short- and long-term psychological adjustment. Additionally, this study examines how factors, such as levels of social comparison and self-esteem, may moderate the use of maladaptive emotion regulation strategies (i.e., rumination).

Potential Moderators of the Relation Between Facebook Use and Rumination

Whereas the manner in which people respond to and regulate initial symptoms of distress plays an important role in vulnerability to emotional disorders, other factors may act to moderate the relation between Internet use, specifically Facebook activity, and level of rumination while on the site. Although numerous factors may exist, this study focuses on self-esteem and the tendency to make social comparisons because prior research suggests that these factors may play a role in the motivation and ability to effectively manage one's affective state (e.g., Brown & Mankowski, 1993; Heimpel et al., 2002; Smith & Petty, 1995). Also, the social nature of Facebook may enhance the importance of these processes on mood and the capacity to regulate negative mood states.

Social comparison. Social comparison is the process by which people strive to understand themselves by comparing themselves with others around them (Suls & Wheeler, 2000). Recent research posits several underlying functions for social comparison, including self-evaluation, self-improvement, and self-enhancement (e.g., Taylor, Wayment, & Carillo, 1995; Wood, 1989). In a study conducted by Schwinghammer and Stapel (2006), participants who were instructed to write brief essays focusing on positive self-aspects demonstrated a decreased need for social comparison, while participants directed to focus on negative aspects of themselves exhibited the opposite effect. Thus, a focus on positive self-cognitions and positive affect appeared to decrease the need for comparison, whereas a focus on negative self-cognitions and

negative feelings increased this need. Given that rumination is conceptualized as a focus on symptoms of one's distress, as well as potential causes and consequences of these symptoms, it is expected that high ruminators would have an increased tendency to focus on negative self-aspects, and thus display higher levels of social comparison.

Whereas little research has explored the association between the use of emotion regulation strategies and social comparison, a study by Cheung and colleagues (2004) found that the tendency to make social comparisons was positively correlated with rumination. Thus, high ruminators exhibited higher levels of social comparison than low ruminators. Bazner and colleagues (2006) also found that individuals with MDD engaged in greater social comparison than healthy controls, suggesting that social comparison may interact with other stable cognitive vulnerabilities, resulting in negative affect and stronger negative reactions. Furthermore, Festinger (1954) posited that uncertainty may cause increases in social comparison; hence, individuals with low self-esteem may demonstrate an increased tendency to engage in social comparison. This study proposes that an increased tendency to make social comparisons would be positively related to the use of ineffective emotion regulation strategies, such as rumination, while on Facebook.

Self-Esteem. Self-esteem may also play a role in the motivation or ability to effectively regulate one's emotions, thus affecting adjustment and emotional well-being. Several studies examining whether self-esteem motivates individuals to improve sad moods have found that individuals with low self-esteem feel less deserving of positive outcomes and positive moods than those with high self-esteem, resulting in decreased motivation to repair or change sad mood (Heimpel, Wood, Marshall, & Brown, 2002; Wood, Heimpel, Manwell, & Whittington, 2009). Furthermore, these differences in

desire to improve mood did not appear to be due to disparities in knowledge of mood repair strategies, but rather in motivation level. Similarly, Brown and Mankowski (1993) suggested that self-esteem may moderate the relation between mood and self-evaluation, such that when individuals with low self-esteem were in a negative mood state, they were more likely to lower their self-evaluations, further contributing to psychological distress. Smith and Petty (1995) also interestingly found that that after a negative mood induction, participants with low self-esteem exhibited mood congruent recall, while those with high self-esteem did not. In fact, for individuals with high self-esteem, the more negative they reported feeling, the more positive their cognitions were. Collectively, these studies suggest a role of self-esteem in the potential mediation and moderation of mood regulation and memory biases. Accordingly, this study proposes that individuals with low self-esteem may be less effective at regulating negative mood states, and thus may be more likely to engage in maladaptive emotion regulation strategies, such as rumination, when on Facebook.

While most earlier studies assumed that all self-attitudes were explicit or directly measurable via self-report, more recent studies have demonstrated that some self-relevant attitudes are implicit and indirectly measurable using methods other than self-report (e.g., Greenwald & Banaji, 1995). These indirectly-assessed attitudes about oneself, often referred to as implicit self-esteem, are thought to reflect early experiences that eventually guide an individual to automatically learn to associate his/her self-concept with positive or negative meanings (Banaji, 2001; Olson & Fazio, 2001; 2002). Much like other implicit information processing, these implicit self-attitudes become activated in self-relevant situations to influence less controllable outcomes (Greenwald & Banaji, 1995).

Prior research indicates mixed findings for levels of implicit self-esteem in clinical populations. One study by Franck and colleagues (2008) found that while formerly depressed individuals demonstrated a significant drop in implicit self-esteem after a negative mood induction, this was due to higher baseline levels of implicit self-esteem when compared to currently and never depressed individuals prior to the mood induction. In another study, Franck and colleagues (2007) found that while currently depressed individuals reported lower levels of explicit self-esteem as compared to formerly depressed individuals and never depressed controls, all groups showed positive levels of implicit self-esteem that were not significantly different from each other.

While more research is needed to further elucidate levels of implicit self-esteem in depressed compared to never depressed individuals, other studies have begun to examine the predictive validity of implicit self-esteem on measures of well-being. Some research suggests that these implicit self-attitudes may be more important in predicting levels of affect in one's everyday life than ones measured explicitly. Franck and colleagues (2007) found that after controlling for baseline depression, levels of implicit, but not explicit, self-esteem significantly predicted depression levels six months later, suggesting that implicit self-esteem may be an important factor to study when examining overall emotional adjustment. Conner and Barrett (2005) also examined the degree to which implicit self-attitudes, as measured by the Implicit Attitudes Test (IAT), predicted spontaneous affect experiences in daily life, and found that individual differences on the IAT, but not a measure of explicit self-esteem, were related to changes in negative emotional states. These findings suggest that one's implicit self-attitudes may be a better marker of change for negative affect than explicit attitudes. However, given evidence

suggesting that measures of explicit and implicit self-esteem do not necessarily converge (e.g., Greenwald & Farnham, 2000; Rudolph, Schroder-Abe, Schutz, Gregg, & Sedikides, 2008), this study examines how both explicit and implicit self-esteem may moderate the rumination while on Facebook, proposing that individuals with lower self-esteem may be more likely to engage in rumination while on the site.

Current Study

Recent research posits that it is not so much the *initial* response to stressors that is important for adjustment to stressful life events, but rather difficulties in the ability to regulate the ensuing emotions (e.g., Gross, 1998). This study examined the impact of Facebook use on emotion regulation and adjustment to life events. Specifically, we investigated whether using Facebook triggers the use of rumination and the consequences of this maladaptive strategy on emotional adjustment following a stressor. Whereas distraction frequently represents an adaptive means of regulating one's emotions (e.g., Gross & John, 2002; Gross, 2007), the Response Styles Theory (Nolen-Hoeksema, 1991) suggests that the tendency to ruminate in response to negative events and mood states may prolong and exacerbate distress. We proposed that the increased prevalence and growing popularity of online social networking sites, such as Facebook, would provide a means for interpersonal communication and interaction that did not previously exist and that may affect emotion regulation and adjustment. To examine the proposition that rumination mediates the relation between Facebook use and emotional adjustment, we recruited college students who experienced a recent relationship breakup because such an experience has been shown to be a particularly prevalent and potent stressor for this specific population (Kato, 2005; Saffrey & Ehrenberg, 2007). We expected that the

tendency to ruminate while on Facebook would be associated with an increase in negative affect and decrease in positive affect immediately following Facebook use and greater levels of depression and anxiety symptoms one-month later (see Figure 1). We used an experience sampling method to best examine the role of Facebook use in prompting the use of rumination in everyday life. The real-time nature of the data collection helped to decrease recall biases, increase ecological validity, and create temporal associations enabling an examination into the relation between internal (e.g., affect, emotion regulation) and external (e.g., logging on and off of Facebook) events over time (Stone, Shiffman, Atienza, & Nebeling, 2007).

Whereas a large body of research suggests that difficulty in regulating one's affect is implicated in emotional adjustment to stressful experiences, these studies have relied primarily on self-report measures, making the assessment of emotion regulation is especially difficult. We, therefore, chose a multi-method approach to study emotion regulation and Facebook use by examining self-report measures, as well as psychophysiological measures of affect. This study may therefore help to identify individual differences in biological reactivity when engaging in various emotion regulation strategies, while also providing more information on the relation between physiological reactivity and emotional adjustment to stressors.

While the main goal of this study was to examine the role of Facebook use in triggering the use of maladaptive emotion regulation strategies, it is also important to investigate potential moderators of the relation between Facebook use and the tendency for Facebook use to elicit rumination. Prior research suggests that when in a negative mood state, individuals with low self-esteem exhibit decreased motivation to repair their

mood, lower levels of self-evaluation, and mood congruent recall (e.g., Brown & Mankowski, 1993; Heimpel et al., 2002; Smith & Petty, 1995). These findings indicate that self-esteem may play a role in the motivation and ability to effectively regulate one's mood state; thus, individual differences in self-esteem may moderate the relation between Facebook use and use of rumination while on the site. Given that measures of explicit and self-esteem do not always correlate (Greenwald & Farnham, 2000), this study examined the impact that explicit self-esteem, as measured by the Rosenberg Self-Esteem Scale (RSE), as well as implicit self-esteem, as measured by the Implicit Association Test (IAT), would have on Facebook rumination. We expected that low levels of implicit and/or explicit self-esteem would be related to greater rumination on Facebook.

Additionally, recent findings suggest that the tendency to make social comparisons may be positively related to rumination (Cheung et al., 2004). Given the amount of social information readily available on Facebook, social comparison may be a particularly important activity that individuals engage in while on the site. We proposed that levels of trait social comparison would also moderate the relation between Facebook use and rumination, such that people with an increased tendency to make social comparisons would engage in greater rumination while on Facebook.

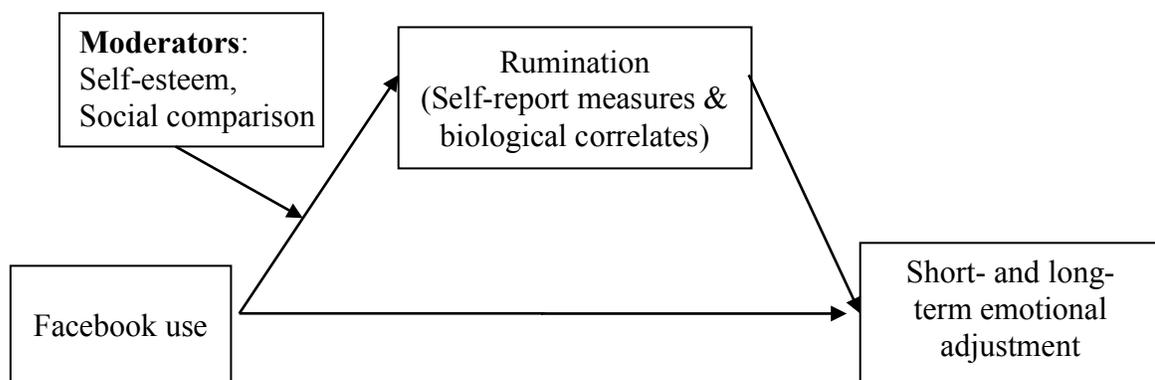


Figure 1. Hypothesized model

Hypotheses

The proposed hypotheses are as follows:

- 1) Facebook activity is related to emotional adjustment following a relationship breakup.
 - a. Greater time spent on Facebook following a breakup will be related to levels of positive and negative affect immediately following Facebook use.
 - b. Greater time and more frequent daily Facebook activity following a relationship breakup will be related to levels of depression and anxiety symptoms at the one-month follow-up.
- 2) Rumination fully mediates the relation between Facebook use and subsequent emotional adjustment.
 - a. Greater levels of rumination on Facebook after a breakup will be associated with a decrease in positive affect and increase in negative affect immediately following Facebook use.
 - b. Greater levels of rumination on Facebook after a breakup will be positively associated with levels of depression and anxiety symptoms at the one-month follow-up.
- 3) Participants will demonstrate differences in physiological reactivity, a biological correlate of rumination, when examining their ex-significant other's profile as opposed to an acquaintance's profile on Facebook. Individual differences in biological reactivity will be associated with long-term emotional adjustment.
 - a. High levels of trait rumination will be positively associated with greater biological reactivity, as exhibited by increased heart rate and skin conductance

- level, when viewing their ex-significant other's profile compared to when viewing an acquaintance's profile.
- b. All participants will demonstrate greater biological reactivity when given explicit instructions to ruminate while viewing their ex-significant other's profile.
 - c. Greater biological reactivity when instructed to view their ex-significant other's profile compared to when viewing an acquaintance's profile will be positively associated with levels of depression and anxiety symptoms during the one-month follow-up.
- 4) Levels of social comparison and self-esteem will moderate the relation between Facebook use and level of rumination while on Facebook.
- a. Participants with a higher tendency to make social comparisons will demonstrate higher levels of rumination while on Facebook.
 - b. Participants with lower levels of explicit and/or implicit self-esteem will demonstrate higher levels of rumination while on Facebook.
- 5) Exploratory analyses will be conducted to examine if individual differences in habitual use of emotion regulation strategies, such as reappraisal and suppression, general Facebook use patterns, perceived interpersonal support, trait rumination, and characteristics of the former romantic relationship and recent breakup would mediate and/or moderate the relation between Facebook use and short- and long-term emotional adjustment. These factors will be examined in relation to changes in positive and negative affect immediately following Facebook use and changes in symptoms of depression and anxiety during the one-month follow-up.

Chapter 2: Method

Participants

Participants for this study were recruited from the University of Miami undergraduate research participant pool and were compensated with 1 credit per half hour for their participation in the study. 60 participants were recruited for the study, which is the frequently used guideline in similar research and the number of participants needed for an accurate estimation of variance components in the multilevel model (with 30 participants as the lower limit) (Hox & Maas, 2002; Kreft & De Leeuw, 1998). Inclusion criteria included females who have experienced the recent dissolution of a romantic relationship, possession of an active Facebook account, and having an ex-significant other with an active Facebook account.

Questionnaires

Breakup Questionnaire. This questionnaire was created to assess participant's current feelings about her ex-significant other (see Appendix A) and consisted of a series of questions to assess couple identity, commitment/dedication, trust, stability, and willingness to sacrifice taken from Rempel, Holmes, and Zanna's Trust Scale (1985). Subjects rated "whether the following statements apply to you and the romantic partner who hurt you" on a 7-point Likert-type scale (1 = *strongly disagree*, 7 = *strongly agree*). This ten-item scale has excellent reliability (Chronbach's alpha = .93). Statements were adapted to begin with, "Since the breakup..."

Demographics. Participants completed a form concerning personal background, which included information on racial and ethnic background, age, gender, marital status, children, occupation, education, and income (see Appendix B).

Facebook Activity Measure (FAMe). This self-report measure assessed various aspects of participants' general Facebook use patterns (see Appendix C). To do so, respondents indicated their general Facebook usage, including average frequency and duration of logins, importance of the site in their social world, and frequency of engaging in various Facebook activities, including updating one's status, chatting, receiving/sending messages, writing on others' walls, and checking others' profiles.

Differences in Facebook activity during various mood states were also assessed. Using a five-point scale, respondents indicated variations in activity level and types of Facebook activity when feeling sad, happy, lonely, angry, and good/bad about themselves. For each mood state, there were nine mood-specific questions. Two of these mood-related items measured changes in general Facebook use (e.g., duration and frequency of Facebook use), three items assessed ruminative activity while on Facebook (e.g., time spent understanding why you feel the way you do, comparing yourself to others and thinking about your own shortcomings or faults, and comparing your own mood to others' perceived level of happiness on Facebook), three items examined the use of Facebook for social support and/or distraction, and one item assessed change in mood state after spending time on Facebook. Questions in each group were summed to create scores on these specific subscales. All items were tested in a separate pilot study.

Interpersonal Support Evaluation List – College Version (ISEL; Cohen & Hoberman, 1983; Cohen, Mermelstein, Kamarck, & Hoberman, 1985). The ISEL-college version consisted of 48 statements, which assessed the perceived availability of potential social resources (see Appendix D). Half of the items were positive statements about social relationships and half were negative. Respondents were asked to indicate answers

on a four-point scale ranging from 1(definitely true) to 4(definitely false). Items were developed to cover the domains of supportive elements of relationships relevant to college students. The four subscales were: tangible (i.e., material aid), belonging (i.e., people one can do things with), self-esteem (i.e., positive comparison when comparing self to others), and appraisal (i.e., somebody to talk about problems with). Internal reliability ranges from .60 to .92, and test-retest reliability ranges from .63 to .70 (Cohen, et al., 1985). Scores on the ISEL have been found to interact with measures of stress by providing protective effects against negative health consequences related to stressful events (Cohen, et al., 1985).

Iowa Netherlands Comparison Orientation Measure (INCOM; Gibbons & Buunk, 1999). This 11-item self-report measure assessed individual differences in the tendency to make social comparisons (see Appendix E). Respondents rated how much they agreed with each statement on a five-point scale, ranging from “I disagree strongly” to “I agree strongly.” Two items were reverse-scored. Internal consistency ranges from .75 to .85, and test-retest reliability ranges from .60 to .72, depending on the time interval (Gibbons & Buunk, 1999).

Relationship Questionnaire. This self-report measure was created to assess characteristics of participants’ former relationship and recent breakup. Participants indicated the duration and seriousness of the relationship, time since the breakup, current distress level due to the breakup, and other characteristics of the relationship and dissolution (see Appendix F).

Depression and Anxiety Measures

Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977, 1991). Severity of current depressive symptoms was assessed using this 20-item self-report measure (see Appendix G). This measure was administered at the start of the study, as well as one month later, to assess change in depressive symptoms over an extended period of time. It was scored by summing the severity of participants' symptoms rated from 0 to 3. Overall scores range from 0 to 63, with higher scores suggesting greater depressive symptoms. The CES-D demonstrates high internal consistency, ranging from .85 to .90, acceptable test-retest stability, ranging from .45 to .70, excellent concurrent validity by clinical and self-report criteria, and substantial evidence of construct validity (Radloff, 1977). Analyses conducted using a young adult population (ages 18 to 25) indicated that the CES-D is an acceptable and reliable scale for use in a college population (Radloff, 1991).

Mood and Anxiety Symptom Questionnaire – Short Version (MASQ-Short Version; Watson & Clark, 1991; Watson et al., 1995a, 1995b). This abbreviated 62-item self-report questionnaire assessed depressive and anxious symptomatology using a five-point Likert scale, ranging from “not at all” to “extremely.” (see Appendix H; Watson & Clark, 1991; Watson et al., 1995a, 1995b). Participants rated the extent to which they experienced each symptom “in the past week, including today.” Subscales included: a) general distress: anxiety symptoms, b) general distress: depressive symptoms, c) anhedonic depression, and d) anxious arousal. The internal consistency of each scale ranges from .78 to .92. Depression and anxiety levels one-month following initial study participant served as a marker of long-term emotional adjustment.

Emotion Regulation Measures

Emotion Regulation Questionnaire (ERQ; Gross & John, 2003). This 10-item self-report measure assessed individual differences in the habitual use of two emotion regulation strategies: cognitive reappraisal and expressive suppression (see Appendix I). Items concerned two aspects of one's emotional life: emotional experience (i.e., what one feels like inside) and emotional expression (i.e., how one shows his/her emotions in the way he/she talks, gestures, or behaves). Each response was scored on a seven-point scale ranging from 1 (strongly agree) to 7 (strongly disagree), with an overall score range from 10 to 70. Findings indicate a relation among the use of reappraisal and the expression of greater positive emotion, lesser negative emotion, better interpersonal functioning, and positive well-being; whereas the opposite pattern has been found for suppression (Gross & John, 2003). Internal reliability averages .79 for the reappraisal scale and .73 for the suppression scale, and test-retest reliability across three months is .69 for both scales (Gross & John, 2003).

Ruminative Response Scale (RRS; Nolen-Hoeksema & Morrow, 1993). This 22-item self-report questionnaire is a subscale of the longer Response Styles Questionnaire (RSQ) (Nolen-Hoeksema & Morrow, 1993). It measured the tendency to respond to negative moods and negative life events with a ruminative coping style (see Appendix J). Participants rated each item on a Likert scale ranging from 1 (almost never) to 4 (almost always), depending on the extent to which they tend to respond to dysphoric mood in a way that is self-focused, symptom-focused, or focused on the possible causes and consequences of the depressed mood. Conway and colleagues (2000) found good internal consistency ($\alpha=.91$) and adequate test-retest reliability over a two- to three-week period

($r=.70$). The convergent and discriminant validity of the scale was supported using a large battery of questionnaires.

Biological Measure of Rumination. To examine psychophysiological correlates of rumination, participants were instructed to examine various Facebook profiles while measures of heart rate and skin conductance were collected as indicators of sympathetic functioning. Electrodes were attached to participants while seated in front of a computer monitor in order to collect continuous measures of autonomic physiological responding beginning at baseline and continuing through the response manipulation. Data was collected using Biopac bioamplifiers. Measures were A/D converted, sampled at 1000 Hz, and processed using BioLab 2.5. These measures were selected to sample broadly from major organ systems known to be important to emotional responding (cardiac, vascular, electrodermal, and respiratory). After attaching the appropriate psychophysiological sensors, participants were shown a five-minute nature video to gather baseline ratings of sympathetic functioning. They then completed an affect rating form on which they were asked to indicate the degree to which they were currently experiencing nine different emotions (e.g., angry, sad, amused, anxious; see Appendix K for complete list) on an 11-point Likert scale ranging from 0 (not at all) to 10 (very much). Participants completed this affect rating form at several points throughout the procedure (see Figure 2 for schedule of data collection; R's indicate affect ratings).

Next, they were instructed to: "Please go to your ex-significant other's Facebook profile and browse around the information available on the site. This may include areas such as his/her wall, pictures, and information." They were given three minutes to browse their ex-significant other's Facebook profile. Following a three-minute delay (Rest A),

participants were then given similar instructions to examine an acquaintance's Facebook profile for three minutes. After another three-minute delay (Rest B), they viewed their ex-significant other's profile again. This time, however, they were guided to ruminate on the profile material for five minutes. These prompts were based on the standard induction procedure developed by Nolen-Hoeksema and Morrow (1993) and were intended to focus participants' attention on thoughts that are emotion-focused, symptom-focused, and self-focused by requiring them to "think about" a series of prompts. The seven prompts used in this study included statements guiding participants to think about "trying to understand your feelings" and "why things turn out the way that they do for you" (see Appendix L for a complete list of instructions and prompts). Physiological responding, as indicated by heart rate and skin conductance, was assessed throughout the experiment.

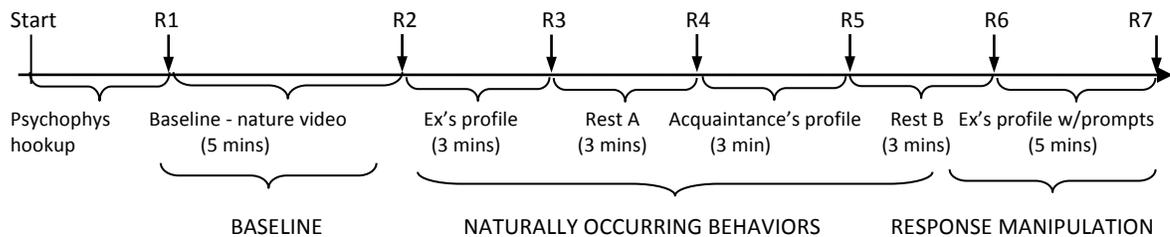


Figure 2. Procedure of physiological and affect ratings data collection

Self-Esteem Measures

Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998;

Greenwald & Farnham, 2000). The Implicit Association Test (IAT) assessed individual differences in levels of implicit self-esteem by measuring strengths of automatic associations between concepts. Confirmatory factor analysis (CFA) indicates that measures of implicit self-esteem appear to measure a different construct from explicit self-esteem (Greenwald & Farnham, 2000) and may be predictive of variations in daily affect (Conner & Barrett, 2005). The IAT was chosen over other measures due to its high

test-retest reliability ($r = .69$) and adequate predictive validity relative to other implicit self-attitude measures (Bosson, Swann, & Pennebaker, 2000).

The IAT used in this current study assessed implicit self-esteem using six self-descriptive (*self*) and six not-self-descriptive (*other*) items, as well as *positive* and *negative* trait items (representing positive and negative evaluative concepts) used in prior studies (Conner & Barrett, 2005; Greenwald & Farnham, 2000). Self-descriptive/self words included: I, me, my, mine, and myself, and non-self descriptive/other words included: they, them, their, it, and themselves. Examples of positive trait items included: smart, success, and valued, and negative trait items included: stupid, ugly, and failure (see Appendix M for full list of IAT items). Initially, participants completed two practice blocks, consisting of 20 trials each. In the first practice block, self and other words appeared one at a time in the center of the screen. Participants were instructed to indicate if each word as belonged to the *self* or *other* category, using pre-assigned response keys (i.e., “E” and “I”). The word “SELF” appeared on the top left side of the computer screen and the word “OTHER” appeared on the top right side of the screen, reminding participants which corresponding key to press (i.e., for self: “E”/left side of screen; for other: “I”/right side of screen). Similarly, in the second practice block, participants were instead asked to categorize words as being either a *positive* or *negative* trait word, using the “E” and “I” keys respectively.

Next, participants completed two trials of test blocks. In the first two test blocks (with 20 and 40 trials respectively), a word belonging to one of the four categories (self, other, positive, negative) appeared on the center of the screen until the participant categorized it as either a *self* or *positive* word (paired on same response key, i.e. “E”) or

as an *other* or *negative* word (paired on another same-response key, i.e., “I”). Again, the words “SELF” and “POSITIVE” appeared on the top left side of the computer screen and the words “OTHER” and “NEGATIVE” appeared on the top right side of the screen, reminding participants which corresponding key to press. Participants then completed another practice block. In contrast to the original practice block using evaluative trait words, participants were instructed to press the opposite key from the one they were originally instructed to use (i.e., “E” for negative words and “I” for positive words).

For the final two test blocks (with 20 and 40 trials), participants followed the same procedure except that “SELF” and “NEGATIVE” were paired on the same response key and “OTHER” and “POSITIVE” were paired together on the other response key. Trials were counterbalanced. The more closely associated the concepts were, the faster participants should respond when they were paired on the same response key. Final scores were calculated by subtracting peoples' average response latencies during *self-positive* trials from their latencies during *self-negative* trials. Thus, scores reflect the accessibility of positive versus negative words following activation of the self-attitude (Bosson, et al, 2000). Order was counterbalanced such that half the participants completed an IAT with *self* and *positive* sharing a key in the first combined block, and half the participants completed an IAT with *other* and *positive* sharing a key in the first combined block.

Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1989). This ten-item self-report inventory assessed levels of explicit self-esteem, which is an overall evaluation of one’s worth or value (see Appendix N). Self-esteem, in addition to self-efficacy and self-identities, is an important part of one’s self-concept and how one perceives oneself in

relation to others. Items were scored on a four-point Likert scale ranging from “strongly agree” to “strongly disagree,” and five of the items were reverse-scored. Overall scores range from 0 to 30. Test-retest correlations are in the range of .82 to .88, and Cronbach’s alpha for various samples range from .77 to .88 (Rosenberg, 1986). Previous studies indicate a unidimensional as well as a two-factor (self-deprecation and self-confidence) structure to the scale.

Experience Sampling

Experience sampling studies are a “set of empirical methods that are designed to allow respondents to document their thoughts, feelings, and actions outside the walls of a laboratory and within the context of everyday life.” (Christensen, Barrett, Bliss-Moureau, Lebo, & Kaschub, 2003). In order to most effectively study to impact of Facebook use on adjustment and well-being, examining how people interact with the website in their everyday lives creates the most accurate depiction of how it may affect their life. Several main advantages exist to using experience sampling studies. First, aggregating data over multiple time points and various situations increases the reliability of data and enables the examination of within person processes (Scollon, Kim-Prieto, & Diener, 2003; Shiffman, 2007). Next, the momentary aspect of the data collection decreases recall biases and enhances the ecological validity of the data. When asked to recall events or feeling states retrospectively, memories are often fraught with systematic errors, such as forgetting or combining incidents, or relying on inferences or approximations of which memories are most easily available, salient, have occurred most recently, or are most congruent with the current state (Bradburn, Rips, & Shevell, 1987; Shiffman, Stone, & Hufford, 2008; Tversky & Kahneman, 1973). These biases operate involuntarily and unconsciously, as

individuals attempt to organize their memories to make a coherent story (Shiffman et al., 2008). Finally, the real-world nature of the data collection enables researchers to examine contextual associations between internal (e.g., emotions, cognitions, etc.) and external events, as well as temporal sequences involving the antecedents or consequences of events or behaviors (Hektner et al., 2007; Shiffman et al., 2008).

Despite the many benefits of experience sampling studies, it is also important to acknowledge the limitations of such studies. These include a sample self-selection bias, attrition, limits in the motivation of the sample, self-report and social desirability biases, and difficulties with non-compliance (Schwarz, 2007). Hufford (2007), however, suggest that issues with non-compliance may not be random, but may be due to issues such as systematic forgetting, high burden, inadequate feedback or incentives, and a desire to please, and that these issues may be preemptively addressed in the structure and design of the study.

First, one must determine how to best structure the timing of the data collection. This decision should be largely guided by the research question at hand, in addition to balancing the base rate of events with the burden of data collection (Christensen et al., 2003; Shiffman, 2007). Because this study strives to examine the effects of emotion regulation during each Facebook use, event-contingent sampling appeared to best capture the targeted behaviors, while minimizing recall biases. As opposed to an interval-contingent design, in which assessments are gathered at regular time intervals, and a signal-contingent design, in which participants are signaled at random times over the course of a given time period (Shiffman, 2007), in event-contingent sampling, participants are asked to complete assessments before and/or after a specified type of

event (Wheeler & Reis, 1991), Because the event acts as the cue signaling participants to complete assessments, it is important to clearly define the event. In the current study, the event was defined as any time the participant logged onto Facebook during the four-day data collection period. While some critics express concern that event-contingent sampling increases reactivity and attention to participants' own internal states, biasing reported data, there is little data to support the validity of this concern (e.g., Bradburn et al., 1987; Cruise, Broderick, Porter, et al., 1996; Litt, Cooney, & Morse, 1998).

The most important consideration is to ensure a balance between a representative sampling of experiences and overburdening participants by ensuring that the base rate of events is not so high as to overburden participants, and as a result, increase levels of non-compliance (Shiffman, 2007). One study, which sampled 75 undergraduates eight times per day for five days indicated that participants completed 81% of questions, on average, and only four were excluded for completing less than 50% of questions (Conti, 2001). A similar study in which 70 undergraduates completed questionnaires every hour for four consecutive days found that only four participants were excluded due to high levels of non-compliance (O'Connor & Rosenblood, 1996). Given data from a recent pilot study we conducted on general Facebook use, 50% of undergraduates sampled indicated that they logged onto Facebook less than five times per day and 94% indicated logging on less than 10 times per day, indicating that the burden of entries should not be so high as to overburden participants. To further ensure a balance between representative data collection and overburdening participants, the more times a participant is asked to complete forms per day, the shorter than form should be (Scollon et al., 2003), with

questionnaires generally taking no more than two to three minutes to complete (Hektner et al., 2007). These guidelines were applied to the event-based questionnaires participants completed in this study. This current study also utilized daily assessments to capture information not gathered through momentary assessments, such as external events that may have occurred throughout the day but not necessarily at the time of the event, which may have influenced mood (Shiffman, 2007).

Additional factors to keep in mind prior to running an experience sampling study include implementing a piloting and revision process to anticipate and address any potential issues, creating a complex remuneration system to enhance motivation throughout the study, and determining which method of data collection (e.g., paper and pencil, online, etc.) is best (Christensen et al., 2003). Given these considerations, a pilot study using undergraduates was conducted to gather a sense for frequency and duration of Facebook use, as well as the accessibility and ease of comprehension of study materials. Revisions were made to address ambiguities in the measures, as well as to assess participant burden and ensure feasibility of the data collection requirements. A feedback system was set in place, in the form of daily emails to remind participants to complete event-based questionnaires, as well as nightly email reminders to complete the nightly questionnaires. To enhance compliance, a remuneration system for the experience sampling study was constructed to award research credit for participation in the study only when students had completed all of the required nightly assessments. Additionally, total participation credit was prorated, such that credit was awarded only after each portion of the study was completed (i.e., experimental session, experience sampling study, and one-month online follow-up). Given the online nature of the event (i.e.,

logging onto Facebook), event-based and daily questionnaires were available online to increase ease of accessibility and decrease burden.

An initial comprehensive training prior to participation in the experience sampling study was conducted to create a “viable research alliance.” Objectives of this training included strengthening trust (Csikszentmihalyi & Larson, 1987), setting a positive and cooperative tone, explaining study goals, ensuring understanding regarding the importance of continued participation (Scollon et al., 2003), completing practice items, addressing questions, and setting limits of when is acceptable to complete forms (Christensen et al., 200; Hufford, 2007; Shiffman, 2007). Lastly, participants were debriefed at the end of data collection to assess incompliance and truthfulness of the data submitted (Shiffman, 2007). In a study by Csikszentmihalyi and Larson (1987), 80 to 90% of participants reported that data collected through an experience sampling study captured their week well, and 78% reported “never” lying on their forms.

Experience sampling studies examining changes in affect as a result of internal (e.g., thoughts, motivations, etc.) or external events have primarily used mood rating scales examining current positive and negative affect, such as the Multiple Affect Adjective Checklist or Profile of Mood Symptoms (POMS) (e.g., Butler, Whalen, & Jamner, 2009; Conner and Barrett, 2005, Cutler, Larsen, & Bunce, 1996; Flory et al., 2000). The most popular measure used, however, is the Positive and Negative Affect Schedule (PANAS) (e.g., Barrett & Russell, 1998; Kashdan & Steger, 2006; Watson, Clark, & Tellegen, 1989). While the lowest option on the PANAS scale combines the absence of the emotion with very mild feelings, the current study separated those options taking into consideration that it may be important to know whether repeated

endorsements of the lowest category reflects the absence of or chronically low levels of that emotion (Schimmack, 2003). Schimmack (2003) recommended that adjectives used from the PANAS scale should be guided the theoretical question at hand and that levels of positive and negative affect should be examined as independent constructs rather than as opposite ends of a bipolar construct (Clark & Watson, 1998; Diener & Emmons, 1984). Accordingly, we chose the PANAS adjectives most appropriate to the aims of this study to independently measure levels of both positive and negative affect.

During the initial lab session of the current study, participants received a set of written instructions (see Appendix O) and completed practice questionnaires to address any potential questions or concerns. They were asked to participate in an experience sampling study to assess the effects of Facebook use in one's daily life following a relationship breakup. Prior to and following each Facebook login for four consecutive days (two weekdays and one weekend), they completed brief online questionnaires concerning their current mood and Facebook activity. On the Pre-Login Questionnaire (see Appendix P), participants rated current levels of positive (e.g., happy, excited, relaxed) and negative affect (e.g., sad, distressed, anxious, upset, bored, lonely, guilty), as well as how good they felt about themselves by indicating on a five-point Likert scale "how you are feeling right now." These positive and negative affect adjectives were selected from the PANAS rating scale, and the question pertaining to self-esteem was adapted from an experience sampling study by Conner and Barrett (2005). Composite scores of positive ($POS_{AFF_{pre}}$) and negative affect ($NEG_{AFF_{pre}}$) were obtained by creating a sum score of adjective ratings. Participants completed this questionnaire prior to each Facebook login during the four days of the study.

On the Post-Login Questionnaire, participants re-rated their current levels of positive (POSAFF_{post}) and negative (NEGAFF_{post}) affect and self-esteem, as a measure of short-term emotional adjustment (see Appendix Q). Using a five-point Likert scale, participants also rated their tendency to engage in various emotion regulation strategies (i.e., rumination and distraction) while on Facebook in general, as well as while viewing content related to their breakup or ex-significant other, during that particular login. Rumination and distraction scores for both types of questions (i.e., emotion regulation on Facebook in general and related to the breakup/ex-significant other) were combined to create independent scales indicating levels of rumination and distraction during that particular login. Additionally, questions assessing duration of Facebook activity, specific content viewed (particularly in relation to the ex-significant other), and external context (e.g., location during login, alone vs. with others) were included. Participants completed this questionnaire immediately following each Facebook login. Each morning of the study, participants received an email with reminders to complete the Pre- and Post-Login Questionnaires and links to both questionnaires.

During these four days, participants also received an email with a link instructing them to complete Daily Questionnaires (see Appendix R) at the end of each study day. These questions assessed the duration and frequency of their Facebook use, content viewed while on Facebook relating to the ex-significant other, and any external events that may have affected their mood (e.g., contact with ex-significant other, any particularly positive or negative events) pertaining to the current day. To assess non-compliance, participants indicated how many times they did not complete an event-based

questionnaire or how often they completed a questionnaire out of the allowed time frame. These event-based and daily questionnaires each took two minutes or less to complete.

To examine emotional adjustment over a longer time frame, participants were emailed with a link to the Follow-up Questionnaire one-month after their completion in the experience sampling study (Appendix S). This questionnaire contained questions pertaining to the past month regarding the frequency and duration of Facebook use, content viewed while on Facebook pertaining to the ex-significant other, external positive and negative events that may have occurred, and contact with the ex-significant other on and off of Facebook. Participants also rated their tendency to engage in distraction and rumination while on Facebook in general and when viewing content related to the ex-significant other or breakup. Similar to the Post-Login Questionnaire, scores on these two items were summed to indicate overall levels of rumination and distraction on Facebook in the past one-month. In addition, participants again completed the CES-D and MASQ-S to assess changes in levels of depression and anxiety symptoms over the past month (i.e., long-term emotional adjustment). Finally, they indicated how many times they did not tell the truth during the course of the study as a compliance check.

Study Overview

At the beginning of the session, we informed participants that the goal of the current study was to examine the influence of Facebook on everyday mood and well-being following a relationship breakup. After answering any questions, they signed an informed consent form. Next, participants were instructed to log onto Facebook and examine their ex-significant other's profile as well as the profile of an acquaintance. After doing so, they were given prompts to ruminate while viewing their ex-significant

other's profile. Biological correlates of rumination, specifically the sympathetic nervous system indicators of heart rate and skin conductance level, were assessed throughout. Participants then completed the Implicit Association Test (IAT), as a measure of implicit self-esteem. Following this task, participants completed questionnaires assessing characteristics of the former relationship and breakup, individual differences in rumination, social comparison, explicit self-esteem, general Facebook use and activity, use of various emotion regulation strategies, social support, and current levels of depression and anxiety symptoms. Finally, participants were provided with instructions for the experience sampling study, completed sample questionnaires, and were given the opportunity to ask questions. The entire study session lasted approximately 1.5 hours.

The experience sampling study lasted for four consecutive days (two weekdays and one weekend). During this time, participants completed brief online questionnaires before and after each Facebook login about their current affect, Facebook use and activity, and use of online emotion regulation strategies. Additionally, they completed nightly online questionnaires about their daily Facebook use. One month later, they completed online questionnaires regarding their Facebook activity and use of online emotion regulation strategies on Facebook over the past month. Measures of current emotional well-being (i.e., depressive and anxiety symptomatology) were also assessed. Participants were instructed to contact the researcher in case of any questions or concerns. See Figure 3 for an overview of the study procedure and measures administered.

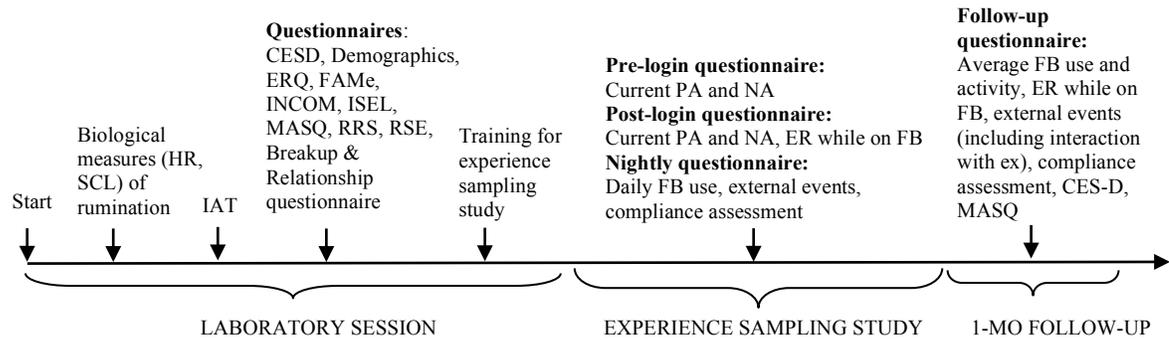


Figure 3. Overview of study procedures and measures administered

Chapter 3: Results

Participants

Participants were 60 female undergraduate students who recently experienced a relationship breakup. 59 were enrolled in an Introductory Psychology class (PSY110) and received research credit in exchange for their participation, and 1 received monetary reimbursement. Participants were college-aged ($M=18.93$, $SD=1.61$). Demographics and questionnaire statistics are presented in Table 1, and characteristics of the prior relationship are detailed in Table 2.

Of the 59 individuals who completed the diary study, there were 350 Pre/Post-Login Questionnaire combinations, with an average of 5.93 paired-login measures completed for each person over the four-day course of the diary study. Descriptive statistics for the Pre- and Post-Login Questionnaires can be found in Table 3. Participants spent an average of 11-15 minutes on Facebook during each login. Two participants were lost to follow-up; thus, 58 participants completed the one-month follow-up measures. Table 4 lists descriptive statistics for the one-month Follow-up Questionnaire.

Results from the Facebook Activity Measure (FAMe) indicated that 61.7% of people ranked Facebook as the number one site they use on the Internet, with 98.3% ranking it among their top three. 71.7% reported that they spend at least 1 hour per day on Facebook, and 96.7% report that they log onto more than once per day.

Hypothesis 1: Relation Between Facebook Use and Emotional Adjustment

Short-term emotional adjustment (changes in positive and negative affect).

Short-term emotional adjustment was examined using a sum of positive and negative affect items on the Pre- and Post-Login Questionnaires completed before and after each

Facebook login during the four-day experience sampling period. Given the hierarchical or nested structure of the data (i.e., repeated measurements within participants), multilevel random coefficient modeling (MRCM) was conducted to examine the hypotheses (Nezlek, 2001; 2008). Multilevel analytic techniques have several advantages. First, MRCM takes into account the interdependence of observations when examining multiple measurements within the same individual. This technique is able to simultaneously examine the effects of variables at both day- and person-levels, as well as possible cross-level interaction effects (Bryk & Raudenbush, 1992). By relying on maximum likelihood procedures, MRCM is also able to model random error at all levels of analysis simultaneously (Nezlek, 2001). Additionally, such techniques are able to account for irregular data structures within studies, such as varying numbers of observations within participants, that other methods such as repeated measures analyses of variance (ANOVAs) are not able to adequately control for (Nezlek, 2001; 2008).

MRCM allows for a partitioning of variance into intra-individual (level 1) and inter-individual (level 2) differences. Full information maximum likelihood (FIML) estimation was used in all prediction models because this method uses all available data to reduce potential bias caused by missing data at level 1. All variables at level 1 and level 2 were grand-mean centered; thus, predictors were deviated around the grand mean for all participants. The statistical significant level was set at .05 for all analyses (unless otherwise indicated).

We proposed that Facebook activity would be related to emotional adjustment following a relationship breakup, both in the short- and long-term (i.e., one-month from baseline). For the first hypothesis, short-term emotional adjustment was defined by

changes in positive and negative affect scores immediately following a given Facebook login, which was obtained by calculating the difference between sum positive and negative affect scores on the Pre- and Post-Login Questionnaires [e.g., $POS\text{AFF}_{ij} = POS\text{AFF}_{\text{post}} - POS\text{AFF}_{\text{pre}}$]. Separate models were constructed for positive and negative affect. Facebook use ($FBUSE_{ij}$) was defined by the length of time spent on Facebook during that specific login.

First, unconditional baseline models were run for each outcome variable (i.e., change in positive/negative affect) to assess the degree of variability at each level (i.e., levels 1 and 2). These analyses are referred to as “totally unconditional” (Singer & Willett, 2003) because changes in positive and negative affect are not modeled as a function of any other day- or person-level predictors. The basic level 1 (within-person) model for change in positive affect was:

$$POS\text{AFF}_{ij} = \beta_{0j} + r_{ij} .$$

The first parameter, which was an estimate of the mean of the coefficient, was a fixed effect. The second parameter was the random error term associated with the coefficient. In this particular model, β_{0j} was a coefficient representing the mean of change in positive affect (POS\text{AFF}) for each person j (across the i days for which each person provided data), r_{ij} was the error associated with each measure of change in positive affect, and the variance of r_{ij} was the level 1 (within-person) error variance. Level 1 coefficients were then modeled at level 2. The basic level 2 (between-person) model was:

$$\beta_{0j} = \gamma_{00} + u_{0j} .$$

In this model, γ_{00} represented the grand mean of the person-level means (β_{0j} s), u_{0j} represented the error of β_{0j} , and the variance of u_{0j} was the person-level error variance.

While these unconditional, or null models, did not test the hypotheses at hand, they provided estimates of the variances at level 1 (i.e., r_{ij}) and level 2 (i.e., u_{0j}). Similar models were created to examine change in negative affect (NEGAF $_{ij}$). Descriptive statistics for these unconditional models are presented in Table 5.

When examining the unconditional model with change in positive affect (POSAF $_{ij}$) as the outcome, the estimated mean level of change in positive affect was -.24, representing an average decrease in positive affect. The estimated within-person variance of change in positive affect (the variance of r_{ij}) was 3.38, and the estimated between-person variance (the variance of u_{0j}) was .05. The estimated within-person reliability (defined as the ratio of true to total variance) of change in positive affect was .09. The intraclass correlation (ICC) between persons can be defined as the mean correlation between affect ratings (i.e., level-1 units) at two randomly chosen times for a particular person or the proportion of change in positive affect score variation across individuals (i.e., level-2 units) (Peugh, 2009). For our data, this provides an index of the level of consistency of change in positive affect within persons. The ICC was .015, indicating that 1.5% of the total variance occurs between persons.

Similar analyses on the unconditional model with change in negative affect (NEGAF $_{ij}$) as the outcome found that the estimated mean level of change in negative affect was .04, representing an average increase in negative affect. The estimated within-person variance of change in negative affect was 6.05, and the estimated between-person variance was .85. The estimated within-person reliability of change in negative affect was .43. These results indicated that the daily ratings of change in negative affect were reliable and that there was sufficient variability at the day-level to allow for the

possibility of modeling within-person relationships. The ICC for change in negative affect was .12, suggesting that 12% of the total variance occurs between persons.

Hypotheses were then tested by adding relevant variables at one or both levels of analyses. To test the hypothesis that duration of time spent on Facebook was related to change in positive and negative affect, duration of time on Facebook during a login (i.e., FBUSE_{ij}) was entered into the unconditional model. Thus, conditional models, which examine an effect modeled as a function of another variable, were used to estimate the proportion of variance for each outcome variable. The following level 1 model was used to analyze change in positive affect following Facebook login as a function of Facebook use (i.e., time spent on Facebook during a login):

$$\text{POSAFF}_{ij} = \beta_{0j} + \beta_{1j}(\text{FBUSE}_{ij}) + r_{ij}$$

In this model, POSAFF_{ij} represented the change in positive affect ratings for each Facebook login *i* for participant *j*, β_{0j} was a random coefficient representing the intercept of mean positive affect levels for participant *j* (across the *i* days for which each person provided data), β_{1j} was a slope reflecting the within-person relationship between Facebook use and change in positive affect for person *j*, and r_{ij} represented the residual change in positive affect for each Facebook login *i* for participant *j*.

For each of *j* individuals, a coefficient representing the relation between Facebook use and change in positive affect after login was estimated (β_{1j}). The statistical significance of the relation between Facebook use and change in positive affect was examined at level 2 with an extension of the basic level 2 model:

$$\text{Intercept: } \beta_{0j} = \gamma_{00} + u_{0j}$$

$$\text{FBUSE: } \beta_{1j} = \gamma_{10} + u_{1j}$$

In this model, γ_{00} represented the grand mean levels of positive affect and u_{0j} was a residual term that reflected participants' level of positive affect around the grand mean. γ_{10} represented the mean slope in Facebook use, and u_{1j} was the deviation in the slope of Facebook use around the grand mean. The significance of γ_{10} indicated if, on average, the within-person relation between Facebook use and change in positive affect differed from zero. The results of these analyses are summarized in Table 6. Across all participants, the longer time spent on Facebook during a login, the greater change (or increase) in positive affect, $\gamma_{10} = .14$, $t(57) = 1.96$, $p \leq .05$. Specifically, for every unit increase in time spent on Facebook, mean changes in positive affect increased .14 units. Examination of the random parameter estimates indicated that the inclusion of Facebook use resulted in a 2.3% reduction of within-person variance in change in positive affect. This corresponds to a correlation of .15 (the square root of .023) between Facebook use and change in positive affect.

To further examine the relation between Facebook use and short-term emotional adjustment, similar level 1 and level 2 models were constructed to examine the relation between Facebook use and change in negative affect following a login. Results from these analyses are also presented in Table 6. Across all participants, change in negative affect tended to decrease the longer the time spent on Facebook during a login, $\gamma_{10} = -.19$, $t(57) = -1.75$, $p = .085$. For every unit increase in time spent on Facebook, mean changes in negative affect decreased .19 units, suggesting less of an increase in negative affect (or an actual decrease in negative affect) corresponding to time spent on Facebook during a login. Examination of the random parameter estimates indicated that the inclusion of Facebook use resulted in a 1.9% reduction of within-person variance in change in

negative affect. This corresponds to a correlation of .14 (the square root of .019) between Facebook use and change in negative affect.¹

Long-term emotional adjustment (changes in depression and anxiety levels).

To examine the long-term hypothesis that Facebook use following a relationship breakup was related to levels of depression and anxiety one-month later, participants' responses on the Follow-up Questionnaire regarding the average number of times they logged onto Facebook each day and the average amount of time they spent on Facebook each day (during the one-month follow-up period) were examined as two separate indicators of Facebook activity. Long-term emotional adjustment was defined by changes in depression and anxiety symptoms over the past one-month, as measured by the CES-D and MASQ. Changes in CES-D and MASQ scores were calculated from baseline (i.e., initial study session) to the one-month follow-up [e.g., $CES-D_{ij} = CES-D_{post} - CES-D_{pre}$]. Linear regression analyses were conducted to examine the relation between the past month's Facebook activity and pre- and post- depression and anxiety symptoms. Results are presented in Table 7. Whereas no significant relations were found between Facebook use over the one-month follow-up period and changes in CES-D or MASQ scores, additional analyses indicated significant relations between long-term Facebook use (e.g., average number of daily logins and average daily time spent on Facebook during the one-month follow-up period) and post-CES-D and MASQ scores.

Time spent on Facebook was a significant predictor of post-MASQ anxious arousal scores, $b = -2.09$, $SE = 1.02$, $t(56) = 2.05$, $p < .05$, accounting for 7.1% of variance. This regression, presented in Figure 4, captured the total effect of time spent on

¹ When examining factors related to change in positive affect, scores on the MASQ general distress: depression scale and the ERQ-suppression scale were both significantly related to changes in positive

Facebook on post-MASQ anxious arousal. It should be noted that there was no significant relation between time spent on Facebook during the follow-up period and pre-MASQ anxious arousal scores.² Additionally, average number of daily Facebook logins was a significant predictor of post-MASQ general distress: anxious symptoms, $b = 2.65$, $SE = 1.28$, $t(56) = 2.06$, $p < .05$, accounting for 7.2% of variance. This regression, presented in Figure 5 captured the total effect of number of Facebook logins on post-MASQ general distress: anxious symptoms. It is important to note that there was no significant relation between Facebook logins over the one-month period and pre-MASQ general distress: anxiety scores. Further analyses revealed an interesting finding suggesting that how often participants viewed content related to their ex during the past month was related to post-CES-D scores, $b = 3.26$, $SE = 1.54$, $t(56) = 2.12$, $p < .05$, accounting for 7.5% of variance (see Figure 7). There was no significant relation between frequency of viewing ex-related content and pre-CESD scores.

Hypothesis 2: Rumination as a Mediator of the Relation Between Facebook Use and Emotional Adjustment

Short-term emotional adjustment (changes in positive and negative affect).

To examine the hypothesis that rumination mediated the relation between Facebook use and change in positive and negative affect, three single-level mediational equations were used because all variables were measured at the individual level. These models were constructed to examine the hypothesis that rumination on Facebook (RUM_{ij}) fully mediated the relation between the duration of Facebook use during a given login ($FBUSE_{ij}$) and subsequent change in positive and negative affect ($POS AFF_{ij}/NEG AFF_{ij}$)

² There were no significant relations between average time spent on Facebook and pre-MASQ anxious arousal scores, $r(58) = -.11$, $p = .42$, average number of daily Facebook logins and pre-MASQ general distress: anxiety scores, $r(58) = .16$, $p = .24$, and frequency of viewing ex-related content on Facebook and pre-CES-D scores, $r(58) = .24$, $p = .07$.

following the login. Rumination level during the login was obtained from the rumination scale on the Post-Login Questionnaire (e.g., sum of rumination items), changes in positive/negative affect were obtained by calculating the change in positive/negative affect ratings from the Pre- to Post-Login Questionnaires, and Facebook use was indicated by the duration of time spent on Facebook during that particular login. Separate models were constructed to examine changes in both positive and negative affect following rumination on Facebook, and individual paths were tested to determine significance and test for mediation.

$$\begin{aligned} \text{Step 1: Level 1: } \text{POSAFF}_{ij} &= \beta_{0j} + \beta_c (\text{FBUSE}_{ij}) + r_{ij} \\ \text{Level 2: } \beta_{0j} &= \beta_{00} + u_{0j} \\ \beta_c &= \gamma_{10} + u_{1j} \end{aligned}$$

$$\begin{aligned} \text{Step 2: Level 1: } \text{RUM}_{ij} &= \beta_{0j} + \beta_a (\text{FBUSE}_{ij}) + r_{ij} \\ \text{Level 2: } \beta_{0j} &= \beta_{00} + u_{0j} \\ \beta_a &= \gamma_{10} + u_{1j} \end{aligned}$$

$$\begin{aligned} \text{Step 3: Level 1: } \text{POSAFF}_{ij} &= \beta_{0j} + \beta_{c'} (\text{FBUSE}_{ij}) + \beta_b (\text{RUM}_{ij}) + r_{ij} \\ \text{Level 2: } \beta_{0j} &= \beta_{00} + u_{0j} \\ \beta_{c'} &= \gamma_{10} + u_{1j} \\ \beta_b &= \gamma_{10} + u_{1j} \end{aligned}$$

Results for the first model (Step 1) examining the relation between Facebook use and change in positive affect were discussed in Hypothesis 1. Because Facebook use was significantly related to change in positive affect, we continued to examine the role of rumination as a mediator. To examine the relation between Facebook use and rumination (Step 2), the second model was examined. Results from this analysis indicated that rumination on Facebook was not significantly related to time spent on Facebook during a login, $\gamma_{10} = .32$, $t(57) = .73$, $p = .46$. Therefore, because Step 2 of the mediation model was not significant, we did not proceed to Step 3 of the mediational analysis to examine if a model predicting change in positive affect from Facebook use and rumination would be

significant. For the same reason, these analyses were not conducted with change in negative affect as the outcome measure.

Long-term emotional adjustment (changes in depression and anxiety levels).

To test the hypothesis that rumination on Facebook mediated the relation between Facebook use and depression and anxiety symptoms at the one-month follow-up, the Baron and Kenny approach to testing mediational models was used (Baron & Kenny, 1986). In this model, individual reports of frequency and duration of Facebook logins over the past month (i.e., Facebook use) on the Follow-up Questionnaire were used as two separate initial variables, rumination level as indicated by a sum of the rumination items on the Follow-up Questionnaire was the mediator, and change scores on the CES-D and MASQ (i.e., long-term emotional adjustment) from the initial study session to the one-month follow-up assessment were the outcome variables. Because results from Hypothesis 1 indicated a significant relation between long-term Facebook use and post-CES-D and MASQ scores (rather than change CES-D and MASQ scores), these scores were instead examined as the outcome variables.

Four steps were necessary to test each mediational model. First, linear regression analysis were conducted with Facebook use (i.e., average time spent on Facebook and average number of daily logins) as the independent variable and post-MASQ/CES-D score as the outcome variable, thus establishing that there was an effect to be mediated. (This step was discussed in Hypothesis 1). Secondly, rumination level was entered as the outcome variable and Facebook use as the predictor, treating the mediator as though it were an outcome variable. (Figures 6 and 8, path “a”). Thirdly, to show that the mediator affected the outcome variable, post-MASQ/CES-D score was used as the outcome

variable in a regression equation with Facebook use and rumination level as predictors (Figures 6 and 8, path “b”). Finally, to establish that rumination completely mediated the relation between Facebook use and post-MASQ/CES-D score, the effect of Facebook use on post-MASQ/CES-D score when controlling for rumination should be zero. The Sobel test was used to test for complete mediation.

Total effect of Facebook use on Post-MASQ scores (Step 1). As indicated in Hypothesis 1, while Facebook use over the one-month period was not related to change in MASQ or CES-D levels, it was significantly related to anxiety (i.e., post-MASQ) and depression (i.e., post-CES-D) levels at the follow-up assessment. Average amount of daily time spent on Facebook was related to post-MASQ anxious arousal level (Figure 4, path “c”), and average number of daily logins was related to post-MASQ general distress: anxious symptoms (Figure 5, path “c”). Additional analyses also indicated that how often participants viewed Facebook content related to their ex over the past month was related to post-CES-D scores (Figure 7, path “c”).

Rumination as mediator (Steps 2 to 4). To explore if rumination mediated the relations between long-term Facebook use and changes in depression and anxiety symptoms over the one-month period, rumination level was entered as the outcome variable and Facebook use variables as the predictors. First, rumination was examined as a mediator between time spent on Facebook and post-MASQ anxious arousal scores. Average amount of daily time spent on Facebook was not a significant predictor of rumination on Facebook, $b = .20$, $SE = 1.13$, $t(52) = .18$, $p = .86$. The non-significance of this relation indicated a failure to meet the requirement of Step 2, thus further mediation analyses were not conducted.

Next, regression analyses were conducted to examine if rumination was a mediator between average number of Facebook logins and post-MASQ general distress: anxious symptom levels. When regressing total Facebook rumination scores on the average number of daily logins, number of logins was not a significant predictor, $b = 2.67$, $SE = 1.93$, $t(57) = .18$, $p = .17$. However, when examining the rumination subscale which assessed rumination on Facebook material in general (not solely on material pertaining to one's ex), average number of daily logins was a significant predictor of Facebook rumination, $b = 1.72$, $SE = .81$, $t(57) = 2.12$, $p < .05$, accounting for 7.4% of the variance. The significance of this relationship indicated that this model met the requirement of Step 2 (see Figure 6, path "a"). For Step 3, post-MASQ general distress: anxious symptoms scores were regressed onto both average number of logins and Facebook rumination level. As indicated in Figure 6 (path "b"), rumination on Facebook was a significant predictor post-MASQ general distress: anxious symptoms scores when controlling for number of logins, $b = .89$, $SE = .18$, $t(56) = 4.96$, $p < .001$. Number of logins, however, was no longer a significant predictor of post-MASQ general distress: anxious symptoms scores when controlling for Facebook rumination, $b = 1.18$, $SE = 1.11$, $t(56) = 1.06$, $p = .30$ (see Figure 6, path "c"). Average number of daily logins and Facebook rumination accounted for 36.2% of the variance in post-MASQ general distress: anxious symptoms scores, $F(56) = 15.35$, $p < .001$. The significance of Facebook rumination, but not number of logins, in predicting post-MASQ general distress: anxious symptoms indicated that this model met the requirements of both Steps 3 and 4 for full mediation. The Sobel test was used to determine the significance of the indirect effect of the average number of daily logins on post-MASQ general distress:

anxious symptoms through Facebook rumination, which confirmed Facebook rumination as a significant mediator, $z = 1.95(.79)$, $p \leq .05$.

Although not in our initial hypothesis, we also conducted mediational analyses to further explore the significant relation between how often one examined Facebook content related to her ex and post-CES-D scores. To examine if rumination significantly mediated this association, similar analyses were conducted. Frequency of viewing content related to one's ex was a significant predictor of Facebook rumination, $b = 4.36$, $SE = 1.36$, $t(57) = 3.22$, $p < .01$, accounting for 15.6% of variance, thus meeting requirement of Step 2 for significant mediation (see Figure 8, path "a"). Post-CES-D scores were then regressed onto the frequency of viewing ex-related content and Facebook rumination scores. As indicated in Figure 8 (path "b"), rumination on Facebook was a significant predictor of post-CES-D when controlling for frequency of viewing ex-related content, $b = .55$, $SE = .14$, $t(56) = 3.91$, $p < .001$. However, frequency of viewing content related to one's ex was no longer a significant predictor of post-CES-D scores when controlling for Facebook rumination, $b = .75$, $SE = 1.52$, $t(56) = .49$, $p = .63$ (see Figure 8, path "c"). Frequency of viewing content related to one's ex and Facebook rumination accounted for 27.9% of the variance in post-CES-D scores, $F(56) = 10.46$, $p < .001$. The significance of Facebook rumination, but not frequency of viewing ex-related material, in predicting post-CES-D scores indicated that this model met the requirements of both Steps 3 and 4 for full mediation. Additionally, the Sobel test was used to determine the significance of the indirect effect of frequency of examining ex-related content on post-CES-D scores through Facebook rumination, indeed confirming Facebook rumination as a significant mediator, $z = 1.93(.84)$, $p \leq .05$.

Hypothesis 3: Facebook Rumination and Biological Reactivity

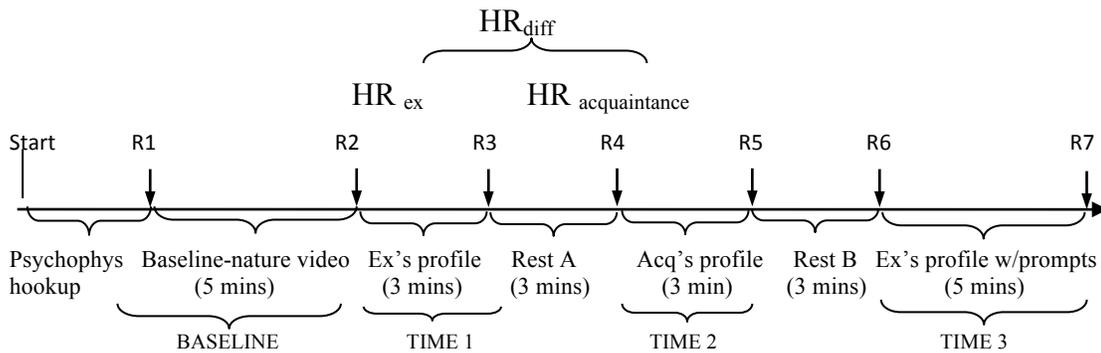


Figure 9. Procedure of biological measures linked to hypotheses.

Association between trait rumination and biological reactivity. We proposed that high levels of trait rumination would be positively associated with greater biological reactivity, as exhibited by increased heart rate (HR), when viewing an ex-significant other's profile compared to when viewing an acquaintance's profile. To test this hypothesis, differences between mean levels of HR across the time period when participants examined their ex's profile (Time 1: R2 to R3) and when they examined an acquaintance's profile (Time 2: R4 to R5) were examined. See Figure 9 for time points of biological measures linked to hypotheses and analyses. This difference in heart rate [$HR_{diff} = HR_{ex} - HR_{acquaintance}$] represented a marker of biological reactivity, with positive scores indicating an increase in HR when viewing an ex compared to an acquaintance's profile and negative scores indicating a decrease in HR when viewing an ex compared to an acquaintance's profile. Correlations between HR_{diff} and trait rumination scores, as indicated by scores on the Ruminative Response Scale (RRS), were examined to see if trait rumination was associated with biological reactivity. As seen in Table 8, there were no significant associations between scales of the RRS and differences in HR when examining an ex versus an acquaintance's profile.

Additional analyses, however, indicated a trend between the a sum of the RRS brooding and depression scales and the average difference in HR from the baseline period to when viewing the ex's profile, such that participants with higher levels of trait rumination also demonstrated a decrease in HR when viewing an ex's profile (compared to baseline), $r(58) = -.23, p = .07$. Analyses using skin conductance levels were not conducted due to technical difficulties. Due to the use of defective skin conductance electrodes, adequate skin conductance measurements were not obtained on a sufficient number of participants to conduct data analysis.

Differences in biological reactivity when ruminating versus not ruminating on an ex-significant other's profile. We hypothesized that all participants would show greater biological reactivity, as indicated by increased HR, when given instructions to ruminate while viewing their ex's profile. Such findings would suggest that rumination is associated with increased biological reactivity. To test this hypothesis, we examined mean levels of HR during three different time periods: (1) when participants were instructed to examine their ex's profile (Time 1: R2 to R3), (2) when participants were instructed to examine an acquaintance's profile (Time 2: R4 to R5), and (3) when participants were instructed to examine their ex's profile while also given explicit instructions to ruminate on the profile material (Time 3: R6 to R7) (see Figure 9). A repeated-measures ANOVA was conducted with Time (Time 1, 2, and 3) as the within-subjects factor and biological reactivity, as indicated by mean levels of HR, as the dependent variable. Analysis produced a significant main effect of Time, $F(2,59) = 3.69, p < .05$. Follow-up *t*-tests were conducted to explore the nature of the expected main effect of Time on HR levels. Surprisingly, Figure 10 illustrates that HR while ruminating

on an ex's profile was significantly lower than when simply viewing the ex's profile, $t(59) = 2.50, p < .05$.

Additional analyses were conducted to include all time periods, including baseline and rest periods. These analyses also produced a significant main effect of Time, $F(5,59) = 4.91, p < .001$. Follow-up t -tests indicated a significant decrease in HR from the rest period prior to viewing an acquaintance's profile (Rest A) to when viewing an acquaintance's profile, $t(59) = 3.55, p < .01$, as well as a significant decrease in HR from the rest period prior to ruminating on an ex's profile (Rest B) to when actually instructed to ruminate on the ex's profile, $t(59) = 5.05, p < .001$ (see Figure 10). Finally, there was a significant increase in HR from when viewing an acquaintance's profile to the subsequent rest period (Rest B), $t(59) = 4.33, p < .001$.

Association between biological reactivity and depression and anxiety scores at the 1-month follow-up. We proposed that greater biological reactivity when instructed to view an ex's profile compared to when viewing an acquaintance's profile would be positively associated with levels of depression and anxiety at the one-month follow-up. To examine this, we calculated HR_{diff} scores [$HR_{diff} = HR_{ex} - HR_{acquaintance}$], and then regressed post-CES-D and post-MASQ scores on the HR_{diff} scores. Linear regression analyses revealed several trends between differences in HR and post-scores on the MASQ anxious arousal and MASQ anhedonic depression scales. As shown in Table 9, when controlling for baseline-MASQ anxious arousal scores and differences in HR when viewing an acquaintance versus ruminating on an ex's profile, there was a trend between HR differences when viewing an ex versus an acquaintance's profile and post-MASQ anxious arousal scores, $b = .42, SE = .23, t(56) = 1.82, p = .075$, accounting for

20.1% of the variance in post-MASQ anxious arousal scores, $R^2 = 43.9$, $F(3, 56) = 13.81$, $p < .001$. Thus, greater HR when viewing an ex's profile (compared to an acquaintance's profile) was related to greater scores on post-MASQ anxious arousal scale.

When controlling for baseline-MASQ anhedonic depression and differences in ruminating on an ex's profile versus simply viewing an ex's profile, the difference in HR between viewing an ex and an acquaintance's profile significantly predicted post-MASQ anhedonic depression scores, $b = 1.05$, $SE = .59$, $t(56) = 1.78$, $p = .08$, accounting for 24% of the variance. As seen in Table 10, higher HR when viewing an ex's profile (compared to an acquaintance's profile) was related to higher post-MASQ anhedonic depression scores, $R^2 = 24.0$, $F(3, 56) = 5.57$, $p < .01$.

Similarly, also seen in Table 10, when controlling for levels of baseline-MASQ anhedonic depression, as well as the difference between ruminating on an ex's profile versus simply viewing it, the difference in HR between ruminating on an ex's profile versus an acquaintance's profile significantly predicted post-MASQ anhedonic depression scores, $b = 1.05$, $SE = .59$, $t(56) = 1.78$, $p = .08$, accounting for 24% of the variance. Thus, greater HR when ruminating on an ex's profile (compared to viewing an acquaintance's profile) was related to greater post-MASQ anhedonic depression scores, $R^2 = 24.0$, $F(3, 56) = 5.57$, $p < .01$.

Hypothesis 4: Self-Esteem and Social Comparison as Moderators of Facebook Rumination

Explicit self-esteem as a moderator of rumination. We proposed that explicit self-esteem, implicit self-esteem, and social comparison would moderate the relation between Facebook use, as indicated by duration of a Facebook login, and level of rumination during a Facebook use. To test the hypothesis that self-esteem would

moderate rumination while on Facebook, we examined the effect of explicit self-esteem, as indicated by scores on the Rosenberg Self-Esteem Scale (RSE) (RSE_j), on individual rumination levels during a Facebook login (RUM_{ij}). To examine this hypothesis, the level 1 model was:

$$RUM_{ij} = \beta_{0j} + \beta_{1j}(FBUSE_{ij}) + r_{ij}$$

where RUM_{ij} represented the rumination level for each Facebook login i for participant j , β_{0j} represented mean rumination levels for participant j , β_{1j} reflected the slope associated with amount of Facebook use (i.e., the impact of Facebook use on rumination), $FBUSE_{ij}$ represented the length of time spent on Facebook during that specific login, and r_{ij} represented the residual rumination level for each Facebook login i for participant j .

Difference in explicit self-esteem was an inter-individual, or level 2, difference. Thus, the level 2 predictor of explicit self-esteem was added to both the intercept and slope equations to examine the cross-level interaction. The level 2 models were:

$$\text{Intercept: } \beta_{0j} = \gamma_{00} + \gamma_{01}(RSE_j) + u_{0j}$$

$$\text{FBUSE: } \beta_{1j} = \gamma_{10} + \gamma_{11}(RSE_j) + u_{1j}$$

where γ_{00} represented the grand mean levels of rumination levels, γ_{01} represented the main effect of explicit self-esteem on rumination (controlling for Facebook use), u_{0j} was a residual term that reflected participants' levels of rumination around the grand mean, γ_{10} represented the main effect of Facebook use on rumination (controlling for explicit self-esteem), and u_{1j} was the deviation reflecting individual differences in change in Facebook use around the grand mean. Significance of the γ_{11} coefficient indicated if explicit self-esteem was related to rumination on Facebook. The main effects for both Facebook use and self-esteem, as well as the cross-level interaction term, were

substituted into the level 1 model to yield the combined model:

$$RUM_{ij} = \gamma_{00} + \gamma_{01} (RSE_j) + \gamma_{10} (FBUSE_{ij}) + \gamma_{11}(RSE_j * FBUSE_{ij}) + u_{1j}(FBUSE_{ij}) + u_{0j} + r_{ij}$$

Analyses revealed a significant interaction between Facebook use and explicit self-esteem, $\gamma_{11} = .13$, $t(56) = 3.08$, $p < .01$, suggesting that explicit self-esteem moderated the relationship between Facebook use and rumination on Facebook. Thus, every unit increase in explicit self-esteem was associated with an average of .13 unit increase in the Facebook use-rumination slope. Results in Table 11 also indicated a significantly non-zero grand-mean rumination estimate ($\gamma_{00} = 27.25$, $t(56) = 23.27$, $p < .001$) for average Facebook use and average explicit self-esteem. Figure 11 illustrates that the positive relationship between Facebook use and rumination was stronger for individuals with higher explicit self-esteem (i.e., those scoring in the 75th percentile of the RSE), than it was for individuals with lower explicit self-esteem (i.e., those scoring in the 25th percentile of the RSE).

Implicit self-esteem as a moderator of rumination. To test the hypothesis that implicit self-esteem, as indicated by *d* scores on the Implicit Association Test (IAT), would moderate rumination while on Facebook, similar models were constructed. Analyses indicated that implicit self-esteem did not moderate the relationship between Facebook use and rumination on Facebook, $\gamma_{11} = .28$, $t(56) = .19$, $p = .85$. Results in Table 12, however, showed a significantly non-zero grand-mean rumination estimate ($\gamma_{00} = 27.13$, $t(56) = 22.64$, $p < .001$) for average Facebook use and average implicit self-esteem levels.³

³ Explicit and implicit levels of self-esteem were not significantly correlated ($r(60) = .06$, $p = .61$).

Social comparison as a moderator of rumination. Finally, to test the hypothesis that the tendency to make social comparisons would moderate Facebook rumination, we used similar models to examine the effect of trait social comparison as indicated by the Iowa-Netherlands Comparison Orientation Scale (INCOM) on individual rumination levels during each login. Analyses indicated that social comparison did not moderate the relationship between Facebook use and rumination on Facebook, $\gamma_{11} = -.06$, $t(56) = -.77$, $p = .44$. However, there was a significantly non-zero grand-mean rumination estimate ($\gamma_{00} = 27.13$, $t(56) = 23.62$, $p < .001$) for average Facebook use and average social comparison levels as seen in Table 13. Also, significant results for the main effect of social comparison ($\gamma_{01} = .41$, $t(56) = 2.17$, $p < .05$) indicated that, on average, the mean rumination level for a participant increased .41 units for every unit increase in social comparison when controlling for Facebook use. Accordingly, social comparison was positively related to Facebook rumination levels.

Hypotheses 5: Exploratory Analyses – Mediators and Moderators of Emotional Adjustment

We proposed to examine if individual differences in the habitual use of emotion regulation strategies, such as reappraisal and suppression, general Facebook use patterns, perceived interpersonal support, trait rumination, and characteristics of the former romantic relationship and recent breakup would mediate and/or moderate the relation between Facebook use and short- and long-term emotional adjustment. Using the following measures indicated in Table 14, these potential mediators and moderators were examined in relation to changes in positive and negative affect following Facebook use (i.e., short-term emotional adjustment) and changes in symptoms of depression and

anxiety as indicated by the CES-D and MASQ at the one-month follow-up (i.e., long-term emotional adjustment).

Table 14

Measures of Potential Mediators and Moderators of Emotional Adjustment

Potential mediator/moderator	Measure
Habitual emotion regulation strategies	Emotion Regulation Questionnaire (ERQ)
General Facebook use patterns	Facebook Activity Measure (FAMe)
Interpersonal support	Interpersonal Support Evaluation List (ISEL-college)
Trait rumination	Ruminative Response Scale (RRS)
Characteristics of breakup	Breakup Questionnaire
Characteristics of former relationship	Relationship Questionnaire

Mediators and moderators of short-term emotional adjustment (changes in positive and negative affect). Analyses in Hypothesis 1 revealed a significant relation between time spent on Facebook during a given login and subsequent changes in positive and negative affect following a login; thus, exploratory analyses were conducted to examine moderators of change in affect. Mediators of change in affect could not be examined due to the structure of the data (i.e., the inability to examine a level 2 mediator with level 1 predictor and outcomes). When examining changes in positive affect, there was a significant interaction between scores on the ERQ-suppression scale and change in positive affect, $\gamma_{11} = .03$, $t(54) = 2.33$, $p < .05$, suggesting that ERQ-suppression scores moderated changes in positive affect. Thus, every unit increase in ERQ-suppression scores was associated with an average of .03 unit increase in the Facebook use-change in positive affect slope. Similarly, scores on the RRS-brooding scale moderated changes in positive affect, $\gamma_{11} = .04$, $t(55) = 2.01$, $p < .05$. Accordingly, every unit increase in RRS-

brooding scores was associated with an average of .04 unit increase in the Facebook use-change in positive affect slope.

When examining change in negative affect, there were also significant interactions between change in negative affect and scores on the ERQ-suppression scale, $\gamma_{11} = -.04$, $t(55) = -2.26$, $p < .05$, and RRS-brooding scale, $\gamma_{11} = -.05$, $t(55) = -2.00$, $p < .05$. These results suggest that scores on the ERQ-suppression and RRS-brooding scales significantly moderated the relation between Facebook use and changes in *both* positive and negative affect following a login, but in differing directions. Accordingly, every unit increase in ERQ-suppression was associated with an average of .04 decrease in the Facebook use-change in negative affect slope, while every unit increase in RRS-brooding scores was associated with a .05 unit decrease in the Facebook use-change in negative affect slope. Additionally, analyses revealed significant interactions between change in negative affect and: RRS-total scores, $\gamma_{11} = -.16$, $t(55) = -2.27$, $p < .05$, ISEL-self esteem scores, $\gamma_{11} = -.05$, $t(55) = -2.21$, $p < .05$, ISEL-total scores, $\gamma_{11} = -.01$, $t(55) = -2.17$, $p < .05$, and how long ago the breakup was, $\gamma_{11} = -.27$, $t(55) = -2.66$, $p < .05$. These factors appeared to moderate the amount of change in negative affect, such that increases on the RRS-total score, ISEL-self esteem score, ISEL-total score, and how long ago the breakup were related to decreases in the Facebook use-change in negative affect slope.

Mediators and moderators of long-term emotional adjustment (changes in depression and anxiety levels). Whereas analyses in Hypothesis 1 did not find significant relations between long-term Facebook use and changes in CES-D and MASQ scores over the one-month period, there were significant associations between long-term Facebook use and post-CES-D and MASQ scores. Specifically, there was a significant

relation between the average number of logins per day during the one-month follow-up and post-MASQ general distress: anxiety symptom scores. Exploratory analyses using the FAME indicated that the frequency of using Facebook to think about and understand one's feelings when angry mediated the relation between average number of logins and post-MASQ general distress: anxiety symptoms scores. Number of daily average Facebook logins significantly predicted how often one thought about and tried to understand feelings on Facebook when angry, $b = -.41$, $SE = .17$, $t(56) = -2.56$, $p < .05$, accounting for 9.9% of variance. When post-MASQ general distress: anxiety symptoms were regressed onto number of average logins and how often one thinks about and tries to understand feelings on Facebook when angry, the frequency of using Facebook to understand feelings when angry was a significant predictor of post-MASQ general distress: anxiety symptoms when controlling for number of average logins, $b = -2.20$, $SE = 1.02$, $t(55) = -2.17$, $p < .05$. Number of logins, however, was no longer a significant predictor of post-MASQ general distress: anxiety symptoms, $b = 1.67$, $SE = 1.02$, $t(55) = .49$, $p = .21$, suggesting full mediation. Together, number of logins and frequency of using Facebook to understand one's feelings when angry accounted for 27.9% of the variance in post-MASQ general distress: anxiety symptoms, $F(55) = 14.5\%$, $p < .05$. Results of the Sobel test, however, were not yet significant, $z = 1.63(.55)$, $p = .10$.

Finally, when examining the relation between long-term Facebook use and long-term emotional adjustment in Hypothesis 1, there was also a significant association between average length of time spent on Facebook during the one-month follow-up period and post-MASQ anxious arousal scores. However, analyses did not reveal any significant mediators or moderators of post-MASQ anxious arousal scores.

Chapter 4: Discussion

Facebook provides a new means for interpersonal communication and interaction, which may have important implications for emotion regulation and adjustment following a stressful life event. Despite the prevalence and popularity of social networking sites, there are currently few conclusive findings regarding the effects of the use of such sites on mental health. Most prior research has produced mixed findings, and no studies to date have examined the role of Facebook use on psychological adjustment following a negative life event. The goal of this study was to examine whether Facebook use triggers rumination and to examine the consequences of this process on emotional adjustment following a relationship breakup.

Our primary aim was to examine the hypothesis that the tendency to ruminate while on Facebook mediates the relation between Facebook use and immediate changes in affect, as well as depression and anxiety symptoms one-month later. The use of an experience sampling method allowed us to study the role of Facebook use in prompting rumination in everyday life, while decreasing recall biases and increasing ecological validity. Additionally, whereas most prior research examining differences in emotion regulation has relied primarily on self-report measures, the current study gathered psychophysiological measures of affect and emotion regulation. These measures allowed an investigation into individual differences in biological reactivity when engaging in various emotion regulation strategies, while also providing more information on the relation between physiological reactivity and emotional adjustment to stressors. Finally, it is important to investigate variables that may potentially moderate the relation between Facebook use and the tendency for Facebook use to trigger rumination. Thus, implicit

and explicit measures of self-esteem and social comparison were examined as moderators of Facebook rumination.

Summary of Findings and Implications

Hypothesis 1: Facebook and emotional adjustment. Our first hypothesis was that Facebook use would be related to emotional adjustment following a relationship breakup, both in the short- and long-term. When examining the relation between Facebook use and emotional adjustment in the short-term, analyses suggested that the more time a person spent on Facebook during a login, the greater increase in positive affect and the greater decrease in negative affect they experience.

When examining the relation between Facebook use and emotional adjustment in the long-term, results showed a significant positive association between average number of Facebook logins each day and anxiety at follow-up (as indicated by the MASQ general distress: anxious symptom scores), such that the more daily logins, the greater anxiety levels at follow-up. Surprisingly, the amount of daily time spent on Facebook during the one-month period and anxiety levels at follow-up (as indicated by the MASQ anxious arousal score) were negatively related, such that more time spent on Facebook was related to lower anxiety levels. One explanation for these conflicting findings is that increased frequency of logins and anxiety act in a reciprocal manner. A recent study (Charles, 2011) using focus groups and surveys found that 12% of users in their sample reported experiencing Facebook-related anxiety about a multitude of concerns. Users with more friends, in particular, worried about etiquette for interacting with different types of friends, how to de-friend unwanted contacts, if their online persona was entertaining enough, and fears about missing important social information or offending

contacts. These findings suggest that individuals who tend to experience Facebook-related anxiety may log on more frequently to alleviate these worries, but that this increased frequency of use may instead continue to perpetuate the anxiety. On the other hand, perhaps users who spend greater time on Facebook (rather than logging on frequently for short periods of time) are able to habituate to the anxiety, and thus, experience less somatic symptoms (as demonstrated by our differential findings on the MASQ anxious arousal scale).

Additional analyses indicated that how often participants viewed content specifically related to their ex over the follow-up period was positively related to depression levels (as indicated by the CES-D) at the follow-up. As would be expected, participants who reported viewing content related to their ex more frequently also had higher depression levels one-month later. Overall, Facebook use appears to be related to emotional adjustment in both the short- and long-term. These results are in line with prior work indicating that the use of online social networking sites is related to differences in mental health outcomes (e.g., Kang, 2007; Morgan & Cotton, 2003; Windham, 2008; Xiaoming, 2005). Mixed findings on the direction of these effects, however, highlight the importance of examining potential mediators to more clearly delineate factors leading to positive and/or negative consequences. This study adds to the literature by examining short-term fluctuations in affect using an experience sampling methodology, rather than relying on retrospective reports. Additionally, by gathering data on immediate changes in affect and longer-term effects on symptoms of psychopathology, we were able to compare the impact of Facebook use on immediate mood as well as the lasting effects it may have on emotional health.

Hypothesis 2: Rumination on Facebook as a mediator. To build on our findings that Facebook use was, in fact, related to differences in emotional outcomes, we hypothesized that rumination on Facebook would fully mediate the relation between Facebook use and short- and long-term emotional adjustment. When examining if rumination mediated the relation between Facebook use and short-term emotional adjustment (i.e., changes in affect), analyses indicated that Facebook use was not significantly related to rumination levels, thus rumination did not mediate the relation between length of time spent on Facebook during a particular login and change in affect following that login.

The experience sampling methodology used in the current study allowed a more detailed examination of the effects of Facebook activity on immediate changes in affect. While no studies to date have examined the relation between Facebook use, rumination, and short-term emotional adjustment, several studies have looked at daily use of rumination using experience sampling studies and have found that increased rumination is related to higher mean levels of negative affect (Moberly & Watkins, 2008), longer periods of depressed mood, even after controlling for initial severity of mood (Nolen-Hoeksema et al., 1993), and higher depressive symptoms and problematic behavior in adolescents (Silk et al., 2003). Hatzenbueler and colleagues (2009) also found that rumination mediated the relation between stigma-related stress and psychological distress, such that participants who ruminated after the recall of a self-relevant discrimination event exhibited prolonged distress (relative to those who distracted themselves). Together, these studies suggest that rumination may play a critical role in the intensity and duration of fluctuations in affect. While the current study did not find

evidence for the role of rumination as a mediator for short-term changes in affect, more work is needed to examine the relation between Facebook use and Facebook rumination.

When examining if average Facebook rumination over a one-month period mediated the relation between Facebook use over the month and subsequent depression and anxiety levels, analyses revealed that ruminating on Facebook material in general (not solely on material related to one's ex) fully mediated the relation between average number of daily logins and anxiety levels at follow-up (as indicated by the MASQ general distress: anxious symptoms scale). Additionally, rumination on Facebook fully mediated the relation between viewing content specifically related to one's ex and depression scores at follow-up. However, Facebook rumination did not mediate the relation between time spent on Facebook and post-MASQ anxious arousal levels. These discrepant findings may be due to the difference in scales examined. In line with prior work, Facebook rumination appears to be more strongly related to depressed and anxious mood (i.e., MASQ general distress: anxious symptoms and CES-D), rather than the somatic symptoms of anxiety assessed by the MASQ anxious arousal scale (e.g., feeling dizzy/lightheaded, short of breath, dry mouth, etc.)

Interestingly, our findings suggest that whereas Facebook rumination did not have immediate effects on affect, it did have consequences for longer-term adjustment. One explanation for these findings is that whereas Facebook rumination may not *immediately* affect mood, it may trigger the ruminative thought process and increase the tendency to engage in rumination while offline (following Facebook use). Therefore, the tendency to use maladaptive emotion regulation strategies while on Facebook may serve to also increase offline rumination levels and prolong symptoms of distress. By interfering with

the normal recovery process and maintaining a focus on the negative event, Facebook rumination appears to have important effects on depressed and anxious mood after a stressful life event. These findings are in line with the Nolen-Hoeksema's Response Styles Theory (1991), which posits that rumination exacerbates and prolongs distress through several mechanisms. For instance, rumination may enhance the effects of depressed mood on thinking, thus biasing the lens through which individuals process information, interfere with effective problem-solving and instrumental behavior, and lead to decreased social support. As a result, the use of rumination to manage affect often exacerbates and prolongs negative affect, consequently impacting the onset and maintenance of depressive and anxiety-related disorders.

Findings from this study have important implications for the use of social networking sites as a medium for emotion regulation. Unique characteristics, such as accessibility, anonymity, multi-mediation, and availability of archived information, make it a prime medium by which to access a multitude of information (Valkenburg, 2011). While no studies to date have examined the use of Facebook for affect regulation following a stressful life event, recent findings suggest that how one processes online material may have important consequences for emotional adjustment. Pempek and colleagues (2009) found that users spend more time observing than posting information on Facebook, thus, not surprisingly, social surveillance is the second most commonly reported motive for using Facebook (Joinson, 2008). Furthermore, 60% of college students reported using Facebook to check up on their significant other or to see what others were doing (Stern & Taylor, 2007). Given the high reported use of surveillance, how one interprets the information viewed may play an important role in its effects.

Several recent studies have begun to examine how cognitive biases and emotion might play a role in perpetuating mistrust and jealousy in couples through online mediums (Muisse, Christofides, & Desmarais, 2010; Phillips, 2009). For instance, Muise and colleagues (2010) found that increased Facebook use significantly predicted Facebook-related jealousy in romantic relationships. They hypothesized a cycle whereby Facebook use exposes people to ambiguous information about their partners that they might not otherwise have access to. As a result, this perceived threatening information incites further Facebook use and increased partner surveillance, which further increases exposure to ambiguous information. Thus, the tendency to regard ambiguous Facebook information as threatening to one's relationship and the tendency to ruminate on this material may play an important role in perpetuating a destructive cycle of increased Facebook use and jealousy. This line of work highlights the importance of examining how the interpretation of online material and emotion regulation of the resultant emotions may impact subsequent psychological outcomes.

Hypothesis 3: Facebook rumination and biological reactivity. To examine psychophysiological correlates of rumination, we hypothesized that high levels of trait rumination would be positively associated with greater biological reactivity, as exhibited by increased heart rate, when viewing an ex's profile compared to when viewing an acquaintance's profile. However, results from this study indicated that there were no significant relations between trait rumination and biological reactivity. Further analyses indicated a trend in which individuals who demonstrated a greater *decrease* in heart rate from baseline to when initially viewing their ex's profile also scored higher on a measure of trait rumination (as indicated by a sum of the brooding and depression subscales of the

RRS). These findings suggest that rumination may be associated with a decrease, rather than an increase, in heart rate when viewing emotionally salient material.

As an additional examination into the psychophysiological correlates of rumination, we hypothesized that participants would demonstrate greater biological reactivity when explicitly instructed to ruminate on Facebook. Contrary to our expected findings, heart rate while simply viewing an ex's profile was significantly higher than while ruminating on the ex's profile. Additional analyses also found a decrease in heart rate from the rest period prior to viewing an acquaintance's profile to when viewing an acquaintance's profile, and from the rest period prior to ruminating on an ex's profile to when actually instructed to ruminate on the ex's profile. There was also an increase in heart rate from when viewing an acquaintance's profile to the subsequent rest period. These findings appear to indicate *decreased* biological reactivity during "active" viewing periods compared to rest periods when Facebook material was not viewed.

These results were unexpected, given prior findings indicating that rumination is related to increased emotional and physiological arousal over time (Ray et al., 2008). While differing from our original hypotheses, other research suggests several possible explanations. First, these results are in line with our finding that individuals higher in trait rumination exhibited a greater decrease in heart rate from baseline to when viewing their ex's profile (i.e., more emotionally salient material). Similarly, Wise and colleagues (2010) recently measured sympathetic activation in Facebook users and found that searching and browsing online were related to diminished sympathetic activation, as indicated by decreased skin conductance levels. In further support, Lacey (1967) proposed that cardiac deceleration may be related to the active perceptual processing of

aversive sensory stimuli, indicating heightened attention and sensitivity to new information. Therefore, it is possible that the lowered heart rate seen during the induced rumination period was due to increased attention to the emotionally laden (and likely negatively-valenced) visual material viewed. Together, these findings suggest that active processing of Facebook material may be related to decreased sympathetic activation. Accordingly, a decrease (rather than just an increase) in heart rate may be a marker of biological reactivity, and rumination may be associated with decreased heart rate when viewing emotionally salient material. These differences in biological reactivity may reflect a core feature of emotion dysregulation and may play a role in the onset and maintenance of emotional disorders, underscoring the importance of continuing to examine biological correlates of affect dysregulation.

We further hypothesized that individual differences in biological reactivity would be associated with long-term emotional adjustment, as indicated by levels of depression and anxiety at follow-up. Analyses revealed several trends. First, greater heart rate when viewing an ex compared to an acquaintance's profile was related to higher levels of anxiety and anhedonic depression at follow-up. Similarly, greater heart rate when *ruminating* on an ex's profile compared to when viewing an acquaintance's profile was also related to greater levels of anhedonic depression. Contrary to our initial findings that active processing of Facebook material is related to decreased heart rate, these results suggest that greater heart rate when simply viewing or ruminating on an ex's profile (compared to an acquaintance's) is related to worse long-term mental health outcomes.

This study builds on the current body of emotion regulation literature by examining psychophysiological correlates of emotion regulation. Assessing the

sympathetic branch of the autonomic nervous system provides a measure of biological responding that is unaffected by demand characteristics, a limitation of self-report measures (see Bradley, 2000, for a review). Despite the importance of these integrative methodologies, few studies have examined biological correlates of rumination. Whereas findings from the current study present inconsistent results on the relation between trait rumination and biological reactivity when examining Facebook material, efforts should be continued to examine biological markers of emotion regulation. Preliminary findings suggest that increased biological reactivity is related to sustained, elevated symptoms of depression and anxiety, such that those who are more reactive to emotionally salient material on Facebook (e.g., ex's profile) demonstrate more negative outcomes in the long-term. However, other findings suggest that active processing of Facebook material is related to decreased heart rate. Although it is currently difficult to delineate a clear pattern, these results suggest that Facebook use is significantly related to biological measures and that these individual differences in reactivity are related to subsequent mental health outcomes. Importantly, how people think about and come to understand negative life events may have profound consequences for their biological response and physical health. Disturbances in biological reactivity may also interact with psychological responding to impede or inhibit recovery from stressful life events.

Hypothesis 4: Moderators of rumination. In addition to examining the role of Facebook rumination on emotional adjustment, a goal of the study was to examine potential moderators of the relation between Facebook use and Facebook rumination. These included implicit and explicit self-esteem and social comparison. We hypothesized that lower explicit and implicit self-esteem and higher social comparison would be

related to greater Facebook rumination. Analyses suggested that explicit self-esteem moderated the relation between time spent on Facebook and Facebook rumination, such that individuals with higher self-esteem tended to engage in greater rumination the more time they spent on Facebook. Social comparison and implicit self-esteem, however, were not significant moderators of Facebook rumination.

These findings are contrary to prior studies indicating that individuals with low self-esteem feel less deserving of positive outcomes and positive moods, and consequently demonstrate decreased motivation to repair or change their sad mood (Heimpel et al., 2002; Wood et al., 2009). One possible explanation is that individuals with low self-esteem are more likely to engage in Facebook rumination initially, regardless of time spent on the site, thus creating a ceiling effect. On the other hand, perhaps those with high self-esteem, when given more time, begin to engage in these maladaptive thought processes. The discrepant findings for explicit and implicit self-esteem are in line with prior research, indicating that measures of explicit and implicit self-esteem may be assessing different constructs (Greenwald & Farnham, 2000). More work, however, is needed to examine the relation between implicit self-esteem and trait rumination.

In line with prior findings by Cheung and colleagues (2004), we found that social comparison was positively related to trait rumination. Haferkamp and Kramer (2010) also found that when instructing participants to examine profiles of more physically attractive and successful people, self-esteem moderated the effects of social comparison, such that those with high self-esteem were less likely to experience negative emotions as a result of upward social comparison. Conversely, perhaps individuals with low self-esteem

experience more deleterious effects as a result of social comparison to idealized online portrayals. Together, these findings suggest that social comparison and rumination on these negative thoughts are related to lower self-esteem. Low self-esteem may *affect* the ability or motivation to effectively regulate one's emotions, or it may also be a *result* of social comparison and rumination. While the direction is still unclear, current research implicates that these factors may interact to perpetuate a negative cycle of prolonged negative affect (Heimpel et al., 2002; Wood et al., 2009). Future work should continue to examine the complex relations between social comparison, self-esteem, and rumination, all of which hold important repercussions for the onset and maintenance of emotional disorders.

Hypothesis 5: Exploratory analyses – mediators and moderators of emotional adjustment. Exploratory analyses were conducted to examine if individual differences in general Facebook use patterns, habitual use of emotion regulation strategies, such as reappraisal and suppression, trait rumination levels, perceived social support, and characteristics of the former romantic relationship and recent breakup mediated and/or moderated the relation between Facebook use and emotional adjustment. These factors were examined in relation to changes in positive and negative affect immediately following Facebook use, as well as changes in symptoms of depression and anxiety at the one-month follow-up.

When examining short-term emotional adjustment, the use of suppression and brooding as habitual emotion regulation strategies moderated changes in both positive and negative affect, such that greater trait suppression and brooding were associated with increases in positive affect and decreases in negative affect, the more time spent on

Facebook. Additionally, trait rumination, social support, and how long ago the breakup was moderated change in negative affect, such that increases in these measures were related to decreases in negative affect with longer Facebook use. Finally, when examining potential mediators and/or moderators of long-term emotional adjustment, the frequency of using Facebook to understand feelings when angry fully mediated the relation between average number of daily logins and post anxiety levels. Upon closer examination, it appears that daily average Facebook logins negatively predicted the extent to which one tries to understand her feelings when angry, and together, both variables negatively predicted anxiety symptoms at follow-up. These findings highlight the importance of examining the many individual differences that may act as potential mediators and moderators of short- and long-term adjustment following a stressful life event.

Limitations and Future Directions

Using a multi-method approach, this study strived to examine a new area of work. It is important, however, to acknowledge limitations of the study and provide suggestions for future work. First, while extensive pilot testing of the experience sampling study was conducted to determine an appropriate balance between a representative sampling of experiences and decreasing burden, more in-study incentives may have helped to bolster the number of participant responses. Each participant completed an average of six (paired) Pre- and Post-Login Questionnaires over the four-day period. Increased rewards and fewer questions may have decreased burden and increased motivation for greater participation. The demands set forth by the study design, however, were similar to experience sampling studies using undergraduate samples and

followed evidenced-based guidelines as to the appropriate frequency and length of measures to ensure a balance between gathering ecologically valid data and minimizing burden (e.g., Hektner et al., 2007; Scollon et al., 2003; Shiffman, 2007). Additionally, as recommended by Csikszentmihalyi and Larson (1987), we conducted an initial training to explain study goals, ensure understanding of questionnaires, address questions or concerns, and to create a positive and cooperative tone. Compliance was assessed at the end of data collection to assess non-compliance and truthfulness of the data submitted. Only 13.7% of the sample indicated having lied more than once throughout the course of the study. Also, whereas some critics argue that event-contingent sampling increases reactivity and attention to internal states, thus biasing reported data, there has been little data to support the validity of this concern (e.g., Bradburn et al., 1987; Cruise, Broderick, Porter, et al., 1996; Litt, Cooney, & Morse, 1998).

By examining depression and anxiety levels one-month later, we were able to examine the impact of Facebook rumination on longer-term adjustment. Our results suggested while Facebook rumination did not have immediate effects on mood, it may trigger ruminative thinking and increase offline rumination, thus prolonging distress. However, more work is needed to examine this hypothesis. For instance, future work should study mood and rumination following Facebook use to more clearly evaluate the role of Facebook as a trigger for subsequent (offline) rumination. Additionally, due to the correlational nature of the data, we are currently not able to make causal claims. Future work should employ the use of controlled, experimental study designs to better examine the causal relations between Facebook use, rumination, and psychological outcomes. Finally, the multiple comparisons conducted within the same dataset increased the

probably of Type I error. Statistical techniques, such as the Bonferroni correction, should be used to correct for such errors by applying a more stringent α for each comparison. Because this was the first study of its kind, prior guidelines for an appropriate sample size to obtain adequate power were not available. Future studies, however, should be sure to recruit adequate sample sizes to obtain significant power and effect sizes.

While this study has begun to explore Facebook's role in the onset of emotional disorders, more examination is needed to understand what vulnerability factors may place individuals at increased risk for the development of such disorders. Given that users spend more time observing than posting, this has important implications for the effects of interpretation, current and resultant mood state, emotion regulation, social comparison, and self-esteem (Pempek et al., 2010). As previously mentioned, it would be interesting to further explore the interaction between differences in social comparison, self-esteem, and rumination on Facebook material. Because information presented on Facebook is often carefully chosen, this may lead to idealistic portrayals lacking context, which have important repercussions for upward social comparison (Haferkamp & Kramer, 2010). While decreased self-esteem may result from social comparison, high levels of self-esteem may also act as a potential buffer to these negative effects.

Other factors that have been examined in relation to Facebook use outcomes include individual differences in offline social networks (e.g., Kraut et al., 1998; Sheldon, 2008; Valkenburg & Peter, 2009), gender (Valkenburg & Peter, 2009), and personality factors (e.g., Gosling, Augustine, Vazire, Holtzman, & Gaddis, 2011; Ross et al., 2009; Wilson, Fornasier, & White, 2009). One recent study examined the notion of "Facebook depression," suggesting that the intensity of the online world may trigger depression in

individuals already at risk, particularly those with low self-esteem, a high tendency to engage in social comparison, and those with little offline social support (O’Keeffe, Clark-Peterson, & Council on Communications and Media, 2011). Additionally, Wilson and colleagues (2009) found that individuals scoring higher on extraversion and lower on conscientiousness reported higher levels of Facebook use, but were also more likely to report addictive tendencies. Because this study was the first of its kind and rumination is an emotion regulation strategy more commonly used by females (e.g., Choo et al., 1996), we chose to exclusively recruit female participants in order to control for gender effects. However, the effects of gender on Facebook use and its relation to subsequent psychological outcomes is crucial to examine. This study provides a starting ground for examining the impact of social networking sites on mental health, but it is clear that there are still many factors and complex relationships to explore.

This study provides preliminary evidence suggesting that Facebook use is related to biological reactivity and that these individual differences in biological reactivity are related to longer-term mental health outcomes. However, there are several limitations to the current study that future studies could build upon. First, the order of profiles viewed on Facebook was not counterbalanced. Heart rate was significantly higher when examining the ex’s profile than ruminating on it. This increased heart rate when viewing the ex’s profile may be attributed to the novel presentation of stimuli (i.e., viewing the ex’s profile for the first time), while the decreased heart rate when ruminating may be due to habituation to the previously viewed profile. Counterbalancing the order of profiles viewed (i.e., ex and acquaintance), as well as the sequence of simply viewing versus ruminating on the ex’s profile, would allow a way to control for order effects. Providing

more specific criteria for the acquaintance chosen and assessing factors about one's relationship with the acquaintance may have also helped to account for differences in biological reactivity when examining that particular profile.

Additionally, because participants were not given explicit instructions on how to process their ex's profile (when viewing the first time) and the acquaintance's profile, it is unclear how individual differences in cognitive processing during these periods may have affected biological reactivity. Having a spoken or written account of participants' thought processes would help provide a better understanding of the relation between their internal states (e.g., cognitive processing, emotion regulation strategies employed) and biological measures. It is possible that participants high in trait rumination may have already been engaging in rumination when viewing their ex's profile the first time, contributing to the increased heart rate. Similarly, while participants were explicitly instructed to ruminate, it would have been informative to conduct a manipulation check to examine if they were, in fact, ruminating on the material. Gathering more information on the emotion regulation processes used throughout the biological data collection phase would provide a more detailed examination into the relation between the processing of Facebook material and biological correlates.

Conclusions

Facebook's unique characteristics of accessibility, prevalence, and controllability of self-presentation and disclosure lend itself to many risks and opportunities, particularly to adolescents and young adult who are in a crucial stage of identity formation and development (Valkenburg, 2011). Findings from the current study hold important implications for the role of Facebook use in triggering and prolonging rumination

following a stressful life event. By using varied methodology, this study was able to examine the impact of Facebook rumination on short- and long-term emotional adjustment, as well as biological correlates of maladaptive emotion regulation and its subsequent effects.

Results from the current study present several significant findings. First, this study builds on evidence from prior studies suggesting that Facebook use is related to emotional outcomes – both immediate and long-term. The experience sampling methodology importantly allowed a closer examination into immediate fluctuations in affect directly following use. Furthermore, Facebook use was related to long-term emotional outcomes, indicating that habitual use patterns were related to differences in depression and anxiety levels. Interestingly, while maladaptive emotion regulation strategies did not mediate effects on immediate changes in affect, the tendency to engage in Facebook rumination did, in fact, have negative consequences on mental health over time. These findings suggest that Facebook may provide important triggers for engaging in both on- and offline rumination, resulting in prolonged elevated symptoms of depression and anxiety and perhaps impeding recovery following a stressful life event. Whereas the data examining biological markers of Facebook rumination and its relation to emotional outcomes is less clear, this study provides preliminary evidence that there are, indeed, differences in biological reactivity when engaging in various online activities and cognitive processes, and that these differences are related to mental health outcomes. These findings provide a strong foundation for on which to continue examining individual differences in biological reactivity and the effects of this reactivity on psychological adjustment.

Findings from this study hold important research and clinical implications. Future research should continue to explore individual differences in how social networking sites are used, how information is interpreted, and how the resultant emotions are regulated, and their relation to subsequent effects on mental health. Furthermore, the complex interactions between social comparison, self-esteem, personality, gender, and one's offline social world should also be examined. Going forward, it is imperative that these findings are applied to clinical prevention and treatment efforts. While the popularity and prevalence of Facebook provides many unique opportunities, it also carries many risks for mental health, particularly for those already struggling with low self-esteem or social isolation. Given the negative consequences of rumination on Facebook, particularly following a negative event, clinicians should educate clients at risk for engaging in such maladaptive coping strategies (e.g., high ruminators) and provide other, more effective ways of managing negative affect. In some cases, it may be helpful to block access to potentially rumination-inducing material or provide alternative activities to Facebook use. It is important to acknowledge that Facebook use may act as a trigger for engaging in these maladaptive emotion regulation strategies, rather than causing negative outcomes. Thus, negative consequences of online use are likely an extension of underlying issues rather than a direct result of online use. As such, it is important to continue to identify and explore ways in which individual vulnerability factors may interact with newer mediums to affect onset and maintenance of emotional disorders. Future findings may shed light on the role of new media in fostering and hindering adjustment following a negative life event and hold valuable implications for the use of social networking sites to regulate emotions.

References

- Abramson, L. Y., Alloy, L. B., Hogan, M. E., Whitehouse, W. G., Donovan, P., Rose, D. T., et al. (2002). Cognitive vulnerability to depression: Theory and evidence. In R. L. Leahy, & E. T. Dowd (Eds.), *Clinical Advances in Cognitive Psychotherapy: Theory and Application* (pp. 75-92). New York, NY: Springer Publishing Co.
- Alexa: The Web Information Company. (2011). *Facebook.com*. Retrieved April 27, 2011 from <http://www.alexa.com/siteinfo/facebook.com>
- Anderson Analytics. (2009). *American College Students Survey*. Retrieved January 15, 2010 from <http://www.emarketer.com/Article.aspx?R=1007418>
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed. text revised). Washington, DC: Author.
- Banaji, M. R. (2001). Implicit attitudes can be measured. In H. L. Roediger, III, J. S. Nairne, I. Neath, & A. Surprenant (Eds.), *The nature of remembering: Essays in honor of Robert G. Crowder* (pp. 117-150). Washington, DC: American Psychological Association.
- Barlow, D.H. (2002). *Anxiety and its disorders: The nature and treatment of anxiety and panic* (2nd ed.). New York, NY: Guilford.
- Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic and statistical considerations. *Journal of Personality and Social Psychology*, 51, 1173-1182.
- Barrett, L. F., & Russell, J. A. (1998). Independence and bipolarity in the structure of current affect. *Journal of Personality and Social Psychology*, 74, 967-984.
- Bazner, E., Bromer, P., Hammelstein, P., & Meyer, T. D. (2006). Current and former depression and their relationship to the effects of social comparison processes. Results of an internet-based study. *Journal of Affective Disorders*, 93, 97-103.
- Beck, A. T., & Steer, R. A. (1993). *Beck Depression Inventory—Manual*. San Antonio: Psychological Corp.
- Beck, A. T., Steer, R.A., & Garbin, M. G. (1988) Psychometric properties of the Beck Depression Inventory: Twenty-five years of evaluation. *Clinical Psychology Review*, 8, 77-100.
- Bosson, J. K., Swann, W. B., & Pennebaker, J. W. (2000). Stalking the perfect measure of implicit self-esteem: The blind mien and the elephant revisited? *Journal of Personality and Social Psychology*, 79, 631-643.

- Bradburn, N., Rips, L., & Shevell, S. (1987). Answering autobiographical questions: The impact of memory and inference on surveys. *Science*, *236*, 157–61.
- Bradley, M. M. (2000). Emotion and motivation. In J. T. Cacioppo, L. G. Tassinary, & G. G. Berntson (Eds.), *Handbook of psychophysiology* (2nd ed., pp. 602–642). Cambridge, England: Cambridge University Press.
- Brown, J. D., & Mankowski, T. A. (1993). Self-esteem, mood, and self-evaluation: Changes in mood and the way you see you. *Journal of Personality and Social Psychology*, *64*, 421-430.
- Brownley, K. A., Hurwitz, B. E., & Schneiderman, N. (2000). Cardiovascular psychophysiology In J. T. Cacioppo, L. G. Tassinary, & G. G. Berntson (Eds.), *Handbook of psychophysiology* (pp. 224-264). New York: Cambridge University Press.
- Bryk, A. S., & Raudenbush, S. W. (1992). *Hierarchical linear models*. Newbury Park, CA: Sage.
- Butler, J. M., Whalen, C. K., & Jamner, L. D. (2009). Bummed out now, feeling sick later: Weekday versus weekend negative affect and physical symptom reports in high school freshman. *Journal of Adolescent Health*, *44*, 452-457.
- Caplan, S. E. (2003). Preference for online social interaction: A theory of problematic Internet use and psychosocial well-being. *Communication Research*, *30*, 625-648.
- Chak, K. & Leung, L. (2004). Shyness and locus of control as predictors of Internet addiction and Internet use. *Cyberpsychology and Behavior*, *7*, 559-570.
- Charles, K. (2011). 'Facebook anxiety' highlighted by study. *Therapy Today*, *22*(2). Retrieved from <http://www.therapytoday.net/article/show/2348/>
- Cheung, M. S., Gilbert, P., & Irons, C. (2004). An exploration of shame, rank, and rumination in relation to depression. *Personality and Individual Differences*, *36*, 1143-1153.
- Choo, P., Levine, T., & Hatfield, E. (1996). Gender, love schemas, and reactions to romantic break-ups. *Journal of Social Behavior and Personality*, *11*, 143-160.
- Christensen, T. C., Barrett, L. F., Bliss-Moreau, E., Lebo, K., & Kaschub, C. (2003). A practical guide to experience-sampling procedures. *Journal of Happiness Studies*, *4*, 53-78.
- Clark, L. A. & Watson, D. (1988). Mood and the mundane: Relations between daily life events and self-reported mood. *Journal of Personality and Social Psychology*, *54*, 296-308.

- Collins, J. E. & Clark, L. F. (1989). Responsibility and rumination: The trouble with understanding the dissolution of a relationship. *Social Cognition*, 7, 152-173.
- Conner, T. & Barrett, L. F. (2005). Implicit self-attitudes predict spontaneous affect in daily life. *Emotion*, 5, 476-488.
- Conti, R. (2001). Time flies: Investigating the connection between intrinsic motivation and the experience of time. *Journal of Personality*, 69, 1-26.
- Conway, M., Csank, P. A. R., Holm, S. L., & Blake, C. K. (2000). On assessing individual differences in rumination on sadness. *Journal of Personality Assessment*, 75, 404-425.
- Cruise, C. E., Broderick, J. E., Porter, L., & Kaell, A. (1996). Reactive effects of diary self-assessment in chronic pain patients. *Pain*, 67, 253-58.
- Csikszentmihalyi, M., & Larson, R. (1987). Validity and reliability of the experience-sampling method. *Journal of Nervous and Mental Disease*, 175, 526-536.
- Cutler, S. E., Larsen, R. J., & Bunce, S. C. (1996). Repressive coping study and the experience and recall of emotion: A naturalistic study of daily affect. *Journal of Personality*, 64, 379-405.
- Davis, R.N., & Nolen-Hoeksema, S. (2000). Cognitive inflexibility among ruminators and nonruminators. *Cognitive Therapy & Research*, 24, 699-711.
- Diener, E., & Emmons, R. A. (1984). The independence of positive and negative affect. *Journal of Personality and Social Psychology*, 47, 1105-1117.
- Ebeling-Witte, S., Frank, M. L., & Lester, D. (2007). Shyness, Internet use, and personality. *CyberPsychology and Behavior*, 10, 713-716.
- Ellison, N. B., Steinfield, C., & Lampe, C. (2007). The benefits of Facebook 'friends': Social capital and college students' use of online social network sites. *Journal of Computer-Mediated Communication*, 12, 1143-1168.
- Facebook. (2011). *Facebook.com*. Retrieved April 27, 2011 from <http://www.facebook.com/press/info.php?statistics>
- Feng, Z., Mowei, S., Mei, X., Haiyan, Z., & Ning, Z. (2006). A structural equation modeling of motives, behaviors of Internet use and related social-psychological health. *Acta Psychologica Sinica*, 38, 407-413.
- Festinger, L. (1954). A theory of social comparison processes. *Human Relations*, 7, 117-140.

- Fischer, A., Manstead, A., Evers, C., Timmers, M., & Valk, G. (2004). Motives and norms underlying emotion regulation. In P. Philippot & R.S. Feldman (Eds.), *The Regulation of Emotion* (pp. 187-210). New York, NY: Lawrence Erlbaum Associates Publishers.
- Flory, J. D., Raikkonen, K., Matthews, K. A., & Owens, J. F. (2000). Self-focused attention and mood during everyday social interactions. *Personality and Social Psychology Bulletin*, *26*, 875-885.
- Flynn, M. & Rudolph, K. (2007). Perceptual asymmetry and youths' responses to stress: Understanding vulnerability to depression. *Cognition & Emotion*, *21*, 773-788.
- Foa, E. B., Riggs, D. S., Dancu, C. V. S., & Rothbaum B. O. (1993). Reliability and validity of a brief instrument for assessing post-traumatic stress disorder. *Journal of Traumatic Stress*, *6*, 459-473
- Frank, E., De Raedt, R., & De Houwer, J. (2008). Activation of latent self-schemas as a cognitive vulnerability factor for depression: The potential role of implicit self-esteem. *Cognition and emotion*, *22*, 1588-1599.
- Fritz, H. L. (1999). The role of rumination in adjustment to a first coronary event. *Dissertation Abstracts International: Section B: The Sciences & Engineering*, *60* (1-B), 0410.
- Gibbons, F. X., & Buunk, B. P. (1999). Individual differences in social comparison: Development of a scale of social comparison orientation. *Journal of Personality and Social Psychology*, *76*, 129-142.
- Gordon, C. F., Juang, L. P., & Syed, M. (2007). Internet use and well-being among college students: Beyond frequency of use. *Journal of College Student Development*, *48*, 674-688.
- Gorski, J., & Young, M. A. (2002). Sociotropy/autonomy, self-construal, response style, and gender in adolescents. *Personality and Individual Differences*, *32*, 463-478.
- Gosling, S., Augustine, A., Vazire, S., Holtzman, N., & Gaddis, S. (2011). Manifestations of personality in online social networks: Self-reported Facebook-related behaviors and observable profile information *Cyberpsychology, Behavior, and Social Networking*. Epub. ahead of print. doi: 10.1089/cyber.2010.0087
- Greenwald, A. G., & Banaji, M. R. (1995). Implicit social cognition: Attitudes, self-esteem, and stereotypes. *Psychological Review*, *102*, 4-27.
- Greenwald, A. G., & Farnham, S. D. (2000). Using the Implicit Association Test to measure self-esteem and self-concept. *Journal of Personality and Social Psychology*, *79*, 1022-1038.

- Greenwald, A. G., McGhee, D. E., & Schwartz, J. K. L. (1998). Measuring individual differences in implicit cognition: The Implicit Association Test. *Journal of Personality and Social Psychology*, 74, 1464-1480.
- Gross, J. J. (1998). The emerging field of emotion regulation: An integrative review. *Review of General Psychology*, 2, 271-299.
- Gross, J. J. (Ed.) (2007). *Handbook of emotion regulation*. New York, NY: Guilford Press.
- Gross, J. J., & John, O. P. (2002). Wise emotion regulation. In L. Feldman Barrett & P. Salovey (Eds.), *The wisdom of feelings: Psychological processes in emotional intelligence* (pp. 297-318). New York: Guilford.
- Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*, 85, 348-362.
- Haferkamp, N. & Kramer, N. C. (2010). Social comparison 2.0: Examining the effects of online profiles on social-networking sites. *Cyberpsychology, Behavior, and Social Networking*, Epub. ahead of print. doi:10.1089/cyber.2010.0120.
- Hatzenbuehler, M. K., Nolen-Hoeksema, S., & Dovidio, J. (2009). How does stigma "get under the skin"? The mediating role of emotion regulation. *Psychological Science*, 27, 223-232.
- Heimpel, S. A., Wood, J. V., Marshall, M. A., & Brown, J. D. (2002). Do people with low self-esteem really want to feel better? Self-esteem differences in motivation to repair negative moods. *Journal of Personality and Social Psychology*, 82, 128-147.
- Hektner, J. M., Schmidt, J. A., & Csikszentmihalyi, M. (2007). *Experience sampling method: Measuring the quality of everyday life*. Thousand Oaks, CA: Sage
- Hilt, L. M., Cha, C. B., & Nolen-Hoeksema, S. (2008). Non-suicidal self-injury in young adolescent girls: Moderators of the distress-function relationship. *Journal of Consulting and Clinical Psychology*, 76, 63-71.
- Hufford, M. R. (2007). Special methodological challenges and opportunities in ecological momentary assessment. In A. A. Stone, S. Shiffman, A. Atienza, & Nebeling (Eds.), *The science of real-time data capture: Self-reports in health research* (pp. 54-75). New York: Oxford Univ. Press.
- IStrategyLabs. (2009). *2009 Facebook Demographics and Statistics Report: 276% Growth in 35-54 Year Old Users*. Retrieved December 11, 2009 from <http://www.istrategylabs.com/2009-Facebook-demographics-and-statistics-report-276-growth-in-35-54-year-old-users/>.

- John, O. P. & Gross, J. J. (2004). Healthy and unhealthy emotion regulation: Personality processes, individual differences, and lifespan development. *Journal of Personality, 72*, 1301-1334.
- Joinson, A. N. (2008). 'Looking at,' 'looking up' or 'keeping up with' people? Motives and uses of Facebook. Proceedings from the twenty-sixth annual *SIGCHI Conference on Human Factors in Computing System*. Italy.
- Joormann, J., Yoon, K. L., & Siemer, M. (2009). Cognition, attention and emotion regulation. To appear in A. Kring & D. Sloan (Eds.), *Emotion Regulation and Psychopathology*. NY, New York: Guilford Press.
- Kaczmarek, P., & Backlund, B., & Biemer, P. (1990). The dynamics of ending a romantic relationship: An empirical assessment of grief in college students. *Journal of College Student Development, 31*, 319-324.
- Kang, S. (2007). Disembodiment in online social interaction: Impact of online chat on social support and psychosocial well-being. *CyberPsychology and Behavior, 10*, 475-477.
- Kashdan, T. B. & Steger, M. F. (2006). Expanding the topography of social anxiety: An experience-sampling assessment of positive emotions, positive events, and emotion suppression. *Psychological Science, 17*, 120-128.
- Kato, T. (2005). The relationship between coping with stress due to romantic break-ups and mental health. *Japanese Society of Social Psychology, 20*, 171-180.
- Kessler, R.C., Chiu, W.T., Demler, O., & Walters, E.E. (2005). Prevalence, severity, and comorbidity of twelve-month DSM-IV disorders in the National Comorbidity Survey Replication (NCS-R). *Archives of General Psychiatry, 62*, 617-27.
- Kiesler, S. & Kraut, R. (1999). Internet use and ties that bind. *American Psychologist, 54*, 783-784.
- Kramer, N. C. & Winter, S. (2008). Impression management 2.0: The relationship of self-esteem, extraversion, self-efficacy, and self-presentation within social networking sites. *Journal of Media Psychology, 20*, 106-116.
- Kraut, R., Patterson, M., Lundmark, V., Kiesler, S., Mukophadhyay, T., & Scherlis, W. (1998). Internet paradox: A social technology that reduces social involvement and psychological well-being? *American Psychology, 53*, 1017-1031.
- Kreft, I. G. G., & de Leeuw, J. (1998). *Introducing multilevel modeling*. Thousand Oaks, CA: Sage.
- Kring, A. M. & Werner, K. H. (2004). Emotion regulation in psychopathology. In P. Philippot & R.S. Feldman (Eds.), *The Regulation of Emotion* (pp. 359-385). New York, NY: Lawrence Erlbaum Associates Publishers.

- Lacey, J. I. (1967). Somatic response patterning and stress: Some revisions of activation theory. In M. H. Appley and R. Trumbull (Eds.), *Psychological Stress*, (pp. 14-42). New York, NY: Appleton-Century-Crofts.
- LaRose, R., Eastin, M.S., & Gregg, J. (2001). Reformulating the Internet paradox: Social cognitive explanations of Internet use and depression. *Journal of Online Behavior, 1*, Retrieved from <http://www.behavior.net/JOB/v1n2/paradox.html>
- Litt, M. D., Cooney, N. L., & Morse, P. (1998). Ecological Momentary Assessment (EMA) with treated alcoholics: methodological problems and potential solutions. *Health Psychology, 17*, 48-52
- Lovallo, W. R., & Thomas, T. L. (2000). Stress hormones in psychophysiological research: Emotional, behavioral, and cognitive implications. In J. T. Cacioppo, L. G. Tassinary, and G. G. Berntson (Eds.), *Handbook of Psychophysiology: Second Edition* (pp. 224-264). Cambridge, UK: Cambridge University Press.
- Lyubomirsky, S., Caldwell, N. D., & Nolen-Hoeksema, S. (1998). Effects of ruminative and distracting responses to depressed mood on the retrieval of autobiographical memories. *Journal of Personality and Social Psychology, 75*, 166-177.
- Lyubomirsky, S., & Nolen-Hoeksema, S. (1993). Self-perpetuating properties of dysphoric rumination. *Journal of Personality and Social Psychology, 65*, 339-349.
- Lyubomirsky, S., & Nolen-Hoeksema, S. (1995). Effects of self-focused rumination on negative thinking and interpersonal problem-solving. *Journal of Personality and Social Psychology, 69*, 176-190.
- Lyubomirsky, S., Tucker, K. L., Caldwell, N. D., & Berg, K. (1999). Why ruminators are poor problem solvers: Clues from the phenomenology of dysphoric rumination. *Journal of Personality and Social Psychology, 77*, 1041-1060.
- Maas, C.J.M. & Hox, J.J. (2002). Sample sizes for multilevel modeling. In J. Blasius, J. Hox, E. de Leeuw & P. Schmidt (Eds.), *Social Science Methodology in the New Millennium. Proceedings of the Fifth International Conference on Logic and Methodology*. Opladen, RG: Leske + Budrich Verlag (CD-ROM).
- Mathews, A. & MacLeod, C. (2005). Cognitive vulnerability to emotional disorders. *Annual Reviews in Clinical Psychology, 1*, 167-195.
- McCullough, M. E., Rachal, K. C., Sandage, S. J., Worthington, E. L., Jr., Brown, S. W., & Hight, T. L. (1998). Interpersonal forgiving in close relationships: II. Theoretical elaboration and measurement. *Journal of Personality and Social Psychology, 75*, 1586-1603.
- Moberly, N. J. & Watkins, E. R. (2008). Ruminative self-focus, negative life events, and negative affect. *Behaviour Research and Therapy, 46*, 1034-1039.

- Morgan, C. & Cotton, S. R. (2003). The relationship between internet activities and depressive symptoms in a sample of college freshmen. *CyberPsychology and Behavior*, 6, 133-142.
- Muise, A., Christofides, E., & Desmarais, S. (2009). More information than you ever wanted: Does Facebook bring out the green-eyed monster of jealousy? *CyberPsychology & Behavior*, 12, 441-444.
- Nezlek, J. B. (2001). Multilevel random coefficient analyses of event- and interval-contingent data in social and personality psychology research. *Personality and Social Psychology Bulletin*, 27, 774-785.
- Nezlek, J. B. (2008). An introduction to multilevel modeling for social and personality psychology. *Social and Personality Psychology Compass*, 2, 842-860.
- Nock, M.K., & Prinstein, M.J. (2004). A functional approach to the assessment of self-mutilative behavior. *Journal of Consulting and Clinical Psychology*, 72, 885-890.
- Nolen-Hoeksema, S. (1991). Responses to depression and their effects on the duration of depressive episodes. *Journal of Abnormal Psychology*, 100, 569-582.
- Nolen-Hoeksema, S. (2000). The role of rumination in depressive disorders and mixed anxiety/depressive symptoms. *Journal of Abnormal Psychology*, 109, 504-511.
- Nolen-Hoeksema, S., & Harrell, Z. A. (2002). Rumination, depression, and alcohol use: Tests of gender differences. *Journal of Cognitive Psychotherapy*, 16, 391-403.
- Nolen-Hoeksema, S., & Larson, J. (1999). *Coping with loss*. Mahwah, NJ: Lawrence Erlbaum.
- Nolen-Hoeksema, S., & Morrow, J. (1993). Effects of rumination and distraction on naturally occurring depressed mood. *Cognition and Emotion*, 7, 561-570.
- Nolen-Hoeksema, S., Morrow, J. & Fredrickson, B. L. (1993). Response styles and the duration of episodes of depressed mood. *Journal of Abnormal Psychology*, 67, 92-104.
- Nolen-Hoeksema, S., Stice, E., Wade, E., & Bohon, C. (2007). Reciprocal relations between rumination and bulimic, substance abuse and depressive symptoms in female adolescents. *Journal of Abnormal Psychology*, 116, 198-207.
- Nolen-Hoeksema, S., Wisco, B. E., & Lyubomirsky, S. (2008). Rethinking rumination. *Perspectives on Psychological Science*, 3, 400-424.
- O'Connor, S. & Rosenblood, L. (1996). Affiliation motivation in everyday experience: A theoretical comparison. *Journal of Personality and Social Psychology*, 70, 513-522.

- O’Keeffe, G. W., Clarke-Pearson, K., and Council on Communications and Media. (2011). Clinical Report: The impact of social media on children, adolescents, and families. *Pediatrics*, *127*, 800-804.
- Olson, M. A., & Fazio, R. H. (2001). Implicit attitude formation through classical conditioning. *Psychological Science*, *12*, 413-417.
- Olson, M. A., & Fazio, R. H. (2002). Implicit acquisition and manifestation of classically conditioned attitudes. *Social Cognition*, *20*, 89-103.
- Pempek, T. A., Yermolayeva, Y. A., & Calvert, S. L. (2009). College students’ social networking experiences on Facebook. *Journal of Applied Developmental Psychology*, *30*, 227-238.
- Phillips, M. (2009, February). MySpace or yours?: Social networking sites surveillance in romantic relationships. Paper presented at the annual meeting of the *Western States Communication Association*, Mesa, AZ.
- Raacke, J. & Bonds-Raacke, J. (2008). MySpace and Facebook: Applying the uses and gratifications theory to exploring friend-networking sites. *CyberPsychology and Behavior*, *11*, 169-174.
- Radloff, L. S. (1977). The CES-D scale: a self-report depression scale for research in the general population. *Applied Psychological Measures*, *1*, 385–401.
- Radloff, L. S. (1991). The use of the Center for Epidemiologic Studies Depression Scale in adolescents and young adults. *Journal of Youth and Adolescence*, *20*, 149–166.
- Raudenbush, S., Bryk, A., & Congdon, R. (2004). *HLM for Windows*. Version 6.06.
- Ray, R. D., Wilhelm, F. H., & Gross, J. J. (2008). All in the mind’s eye? Anger, rumination, and reappraisal. *Journal of Personality and Social Psychology*, *94*, 133-145.
- Rempel, J.K., Holmes, J.G. & Zanna, M.P. (1985). Trust in close relationships. *Journal of Personality and Social Psychology*, *49*, 95-112.
- Rierdan, J. (1999). Internet-depression link? *American Psychologist*, *54*, 781-782.
- Roberts, J. E., Gilboa, E., & Gotlib, I. H. (1998). Ruminative response style and vulnerability to episodes of dysphoria: Gender, neuroticism, and episode duration. *Cognitive Therapy and Research*, *22*, 401-423.
- Rosenberg, M. (1986). *Conceiving the Self*. Krieger: Malabar, FL.
- Rosenberg, M. (1989). *Society and the Adolescent Self-Image*. Revised edition. Middletown, CT: Wesleyan University Press.

- Ross, C., Orr, E. S., Sisic, M., Arseneault, J. M., Simmering, M. G., & Orr, R. R. (2009). Personality and motivations associated with Facebook use. *Computers in Human Behavior, 25*, 578-586.
- Rottenberg, J. (2007). Cardiac vagal control in depression: A critical analysis. *Biological Psychology, 74*, 200-211.
- Rottenberg, J., Kasch, K. L., Gross, J. J., & Gotlib, I. H. (2002). Sadness and amusement reactivity differentially predict concurrent and prospective functioning in major depressive disorder. *Emotion, 2*, 135-146.
- Rudolph, A., Schroder-Abe, M., Schutz, A., Gregg, A. P., & Sedikides, C. (2008). Through a glass, less darkly? Reassessing convergent and discriminant validity in measures of implicit self-esteem. *European Journal of Psychological Assessment, 24*, 273-281.
- Saffrey, C., & Ehrenberg, M. (2007). When thinking hurts: Attachment, rumination, and post-relationship adjustment. *Personal Relationships, 14*, 351-368.
- Sanders, C. E., Field, T. M., Diego, M., & Kaplan, M. (2000). The relationship of Internet use to depression and social isolation among adolescents. *Adolescence, 35*, 237-242.
- Schimmack, U. (2003). Affect measurement in experience sampling research. *Journal of Happiness Studies, 4*, 79-106.
- Schwarz, N. (2007). Retrospective and concurrent self-reports: the rationale for real-time data capture. In A. A. Stone, S. Shiffman, A. Atienza, & Nebeling (Eds.), *The science of real-time data capture: Self-reports in health research* (pp. 11-26). New York: Oxford Univ. Press.
- Schwinghammer, S. A., & Stapel, D. A. (2006). The effects of different types of self-activation on social comparison orientation. *Social Cognition, 24*, 703-722.
- Scollon, C. N., Kim-Prieto, C., & Diener, E. (2003). Experience sampling: promises and pitfalls, strengths and weaknesses. *Journal of Happiness Studies, 4*, 5-34.
- Shapiro, J. S. (1999). Loneliness: Paradox or artifact? *American Psychologist, 54*, 782-783.
- Shaw, L. H. & Gant, L. M. (2002). In defense of the Internet: The relationship between Internet communication and depression, loneliness, self-esteem, and perceived social support. *CyberPsychology and Behavior, 5*, 157-171.
- Shaw, M. & Black, D. W. (2008). Internet addiction: Definition, assessment, epidemiology and clinical management. *CNS Drugs, 22*, 353-365.

- Sheldon, P. (2008). The relationship between unwillingness to communicate and students' Facebook use. *Journal of Media Psychology, 20*, 65-75.
- Shiffman, S. (2007). Designing protocols for ecological momentary assessment. In A. A. Stone, S. Shiffman, A. Atienza, & Nebeling (Eds.), *The science of real-time data capture: Self-reports in health research* (pp. 27-53). New York: Oxford Univ. Press.
- Shiffman, S., Stone, A. A., & Hufford, M. R. (2008). Ecological momentary assessment. *Annual Review of Clinical Psychology, 4*, 1-32.
- Silk, J. S., Steinberg, L., & Morris, A. (2003). Adolescents' emotion regulation in daily life: Links to depressive symptoms and problem behavior. *Child Development, 74*, 1869-1880.
- Simpson, J. A. (1987). The dissolution of romantic relationships: Factors involved in relationship stability and emotional distress. *Journal of Personality and Social Psychology, 53*, 683-692.
- Smith, S. M., & Petty, R. E. (1995). Personality moderators of mood congruency effects on cognition: The role of self-esteem and negative mood regulation. *Journal of Personality and Social Psychology, 68*, 1092-1107.
- Spasojevic, J., & Alloy, L. B. (2001). Rumination as a common mechanism relating depressive risk to depression. *Emotion, 1*, 25-37.
- Stern, L. A., & Taylor, K. (2007). Social networking on Facebook. *Journal of the Communication, Speech & Theatre Association of North Dakota, 20*, 9-20.
- Stone, A.A., Shiffman, S., Atienza, A., & Nebeling, L. (2007). Historical roots and rationale of ecological momentary assessment (EMA). In A. A. Stone, S. Shiffman, A. Atienza, & Nebeling (Eds.), *The science of real-time data capture: self-reports in health research* (pp. 3-10). New York: Oxford Univ. Press.
- Suls, J., & Wheeler, L. (2000). A selective history of classic and neo-social comparison theory. *Handbook of Social Comparison*. New York: Kluwer Academic/Plenum Publishers.
- Taylor, S. E., Wayment, H. E., & Carrillo, M. A. (1995). Social comparison and self-regulation. In R.M. Sorrentino & E.T. Higgins (Eds.) *Handbook of motivation and cognition* (pp. 3-27). New York: Guilford Press.
- Thompson, R. A. (1994). Emotion regulation: A theme in search of definition. *Monographs of the Society for Research In Child Development, 59*, 25-52.
- Trask, P. & Sigmon, S. T. (1999). Ruminating and distracting: The effects of sequential tasks on depressed mood. *Cognitive Therapy and Research, 23*, 231-246.

- Tversky , A., & Kahneman ,D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology*, 5, 207–32.
- Waller, K. (2008). Trait self-esteem moderates the effect of initiator status on emotional and cognitive responses to romantic relationship dissolution. *Dissertation Abstracts International*, 69, 3-B.
- Walther, J. B., Van Der Heide, B., Kim, S., Westerman, D., & Tong, S. T. (2008). The role of friends' appearance and behavior on evaluations of individuals on Facebook: Are we known by the company we keep? *Human Communication Research*, 34, 28-49.
- Watson, D., & Clark, L. A. (1991). *The Mood and Anxiety Symptom Questionnaire* Unpublished manuscript, University of Iowa, Department of Psychology, Iowa City.
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of Positive and Negative Affect: The PANAS scales. *Journal of Personality and Social Psychology*, 54, 1063-1070.
- Watson, D., Clark, L. A., Weber, K., Assenheimer, J. S., Strauss, M. E., & McCormick, R. A. (1995a). Testing a tripartite model: I. Evaluating the convergent and discriminant validity of anxiety and depression symptom scales. *Journal of Abnormal Psychology*, 704, 3-14.
- Watson, D., Clark, L. A., Weber, K., Assenheimer, J. S., Strauss, M. E., & McCormick, R. A. (1995b). Testing a tripartite model: II. Exploring the symptom structure of anxiety and depression in student, adult, and patient samples. *Journal of Abnormal Psychology*, 704, 15-25.
- Weiser, E. (2001). The functions of internet use and their social and psychological consequences. *CyberPsychology and Behavior*, 4, 723-743.
- Wheeler, L., & Reis, H. (1991). Self-recording of everyday life events: origins, types, and uses. *Journal of Personality*, 59, 339–54.
- Wilson, K., Fornasier, S., & White, K. M. (2010). Psychological predictors of young adults' use of social networking sites. *Cyberpsychology, Behavior, and Social Networking*, 13, 173-177.
- Windham, R. C. (2008). The changing landscape of adolescent Internet communication and its relationship to psychosocial adjustment and academic performance. *Dissertation Abstracts International*, 68, 12-B.
- Wise, K., A., Alhabash, S., & Park, H. (2010). Emotional responses during social information seeking on Facebook. *Cyberpsychology, Behavior, And Social Networking*, 13, 555-562.

- Wood, J. V. (1989). Theory and research concerning social comparisons of personal attributes. *Psychological Bulletin*, *106*, 231-248.
- Wood, J. V., Heimpel, S. A., Manwell, L. A., & Whittington, E. J. (2009). This mood is familiar and I don't deserve to feel better anyway: Mechanisms underlying self-esteem differences in motivation to repair sad moods. *Journal of Personality and Social Psychology*, *96*, 363-380.
- Wood, J. V., Saltzberg, J. A., Neale, J. M., Stone, A. A., & Rachmiel, T. B. (1990). Self-focused attention, coping responses, and distressed mood in everyday life. *Personality Processes and Individual Differences*, *58*, 1027-1036.
- Valkenburg, P. J. (2011). Online communication among adolescents: An integrated model of its attraction, opportunities, and risks. *Journal of Adolescent Health*, *48*, 121-7.
- Valkenburg, P. M. & Peter, J. (2009). Social consequences of the Internet for adolescents: A decade of Research. *Current Directions in Psychological Science*, *18*, 1-5.
- Vickers, K. S., & Vogeltanz-Holm, N. D. (2003). The effects of rumination and distraction tasks on psychophysiological responses and mood in dysphoric and nondysphoric individuals. *Cognitive Therapy and Research*, *27*, 331-348.
- Xiaoming, Y. (2005). The mental health problems of internet-addicted college students. *Psychological Science*, *28*, 1476-1478.
- Ybarra, M. L., Alexander, C., & Mitchell, K. J. (2005). Depressive symptomatology, youth Internet use, and online interactions: A national survey. *Journal of Adolescent Health*, *36*, 9-18.
- Yen, J., Ko, C., Yen, C., Chen, S., Chung, W., & Chen, C. (2008). Psychiatric symptoms in adolescents with internet addiction: Comparison with substance use. *Psychiatric and Clinical Neurosciences*, *62*, 9-16.
- Zhao, S., Grasmuck, S., & Martin, J. (2008). Identity construction on Facebook: Digital empowerment in anchored relationships. *Computers in Human Behavior*, *24*, 1816-1836.
- Zhu, K. & Wu, H. (2004). Psychosocial factors of Internet Addiction Disorder in college students. *Chinese Mental Health Journal*, *18*, 796-798.

Tables

Table 1
Demographics

Characteristic	<i>M (SD)</i>	%
Racial Background		
Asian		1.7
Black/African American		10.0
White/Caucasian		71.7
Hispanic or Latino		13.3
Other		3.3
Pre-CES-D: Total	16.82 (11.33)	
Post-CES-D: Total	34.91 (10.73)	
ERQ: Reappraisal	28.62 (7.33)	
ERQ: Suppression	14.50 (6.61)	
IAT <i>d</i> score	0.58 (0.31)	
INCOM	40.22 (6.82)	
ISEL: Tangible	18.67 (5.56)	
ISEL: Belonging	21.45 (7.42)	
ISEL: Appraisal	19.96 (7.48)	
ISEL: Self	25.03 (4.51)	
ISEL: Total	83.40 (22.14)	
Pre-MASQ: General distress: Anxious sxs	22.75 (7.07)	
Post-MASQ: General distress: Anxious sxs	19.49 (6.72)	
Pre-MASQ: Anxious arousal	27.08 (8.47)	
Post-MASQ: Anxious arousal	24.86 (9.13)	
Pre-MASQ: General distress: Depressive sxs	26.17 (9.95)	
Post-MASQ: General distress: Depressive sxs	21.58 (8.40)	
Pre-MASQ: Anhedonic depression	55.62 (15.37)	
Post-MASQ: Anhedonic depression	56.44 (14.51)	
RRS: Brooding	11.35 (4.09)	
RRS: Reflection	9.88 (4.00)	
RRS: Total	51.20 (14.82)	
RSE	52.53 (10.01)	

Note. *N* = 60, CES-D = Center for Epidemiological Studies - Depression Scale, ERQ = Emotion Regulation Questionnaire, IAT = Implicit Association Test, INCOM = Iowa-Netherlands Comparison Orientation Scale, ISEL = Interpersonal Support Evaluation List, MASQ = Mood and Anxiety Symptom Questionnaire, RRS = Ruminative Response Scale, RSE = Rosenberg Self-Esteem Scale, Sxs = symptoms

Table 2
Relationship Characteristics

Characteristic	%
How long ago was the breakup?	
≤ 7 days ago	3.3
8 to 14 days ago	1.7
15 to 21 days ago	23.3
22 to 28 days ago	33.3
> 29 days ago	38.3
Duration of relationship	
< 1 month	1.7
2 to 4 months	10.0
4 to 6 months	15.0
6 to 9 months	15.0
9 months to 1 year	10.0
1 to 2 years	25.0
2 years to 3 years	13.3
> 3 years	10.0
Who ended the relationship?	
Me	33.3
The other person	20.0
It was mutual	36.7
Unclear	10.0
Face-to-face contact since breakup	
None at all	54.2
One hour or less	16.9
2 – 5 hours	5.1
5 to 10 hours	3.4
> 10 hours	20.3
Non-face-to-face contact since breakup	
None at all	5.0
One hour or less	25.0
2 – 5 hours	26.7
5 to 10 hours	20.0
> 10 hours	23.3
My ex-significant other (check all that apply):	
Cheated on me	1.7
Lied to me	5.0
Did something else to betray me	3.3
None of the above	61.7
More than one of above	26.7

Relationship Characteristics (cont).

Characteristic	<i>M (SD)</i>
Importance of relationship	4.02 (.96)
Closeness with ex	4.62 (.69)
Seriousness of relationship	4.15 (.95)
Amicableness of breakup	3.00 (1.30)
Current distress due to breakup	3.17 (.94)

Table 3
Descriptive Statistics for Pre- and Post-Login Questionnaires

Login Measure	<i>M</i>	<i>(SE)</i>
Duration	3.59	1.44
Pre-positive affect	7.71	2.51
Post-positive affect	7.46	2.50
Pre-negative affect	11.07	4.30
Post-negative affect	11.11	3.95
Total rumination scale	27.03	10.69
Rumination (no-ex) scale	11.55	4.86
Ex-specific rumination scale	15.49	6.51

Login activity	%
Viewed profiles:	
Own	88.6
Friend/acquaintance	85.4
Ex	50.3
Current SO	9.1
No one	4.3
Viewed ex-related info:	
Chat/messages	28.0
Pictures/videos	46.3
Status, wall, friend list, etc.	59.1
Other	30.6
None	
Logged on from:	
Mobile device	8.7
Personal computer	82.1
Public computer	9.2

Note. *N* = 59

Table 4
Descriptive Statistics for Follow-up Questionnaire

Follow-up Measure	%
Average time spent on FB per day	
< 15 mins	10.3
15 to 29 mins	27.6
30 to 59 mins	32.8
Between 1 to 2 hours	20.7
Between 2 to 3 hours	6.9
> 3 hrs	1.7
Average number of daily logins	
1 time or less	5.2
2-4 times	65.5
5-9 times	25.9
10-15 times	1.7
> 15 times	1.7
Frequency of time examining content pertaining to ex	
Never (0%)	5.2
Some (25%)	65.5
Half (50%)	17.2
Most (75%)	6.9
Everytime (100%)	5.2
Face-to-face contact	
None	62.1
1 hr or less	10.3
2-5 hours	5.2
5-10 hours	10.3
>10 hours	12.1
You blocked	
Yes	13.3
No	83.3
They blocked	
Yes	6.9
No	93.1
Back together	
Yes	10.3
No	86.7

Note. N = 58

Descriptive Statistics for Follow-up Questionnaire (cont.)

Follow-up Measure	<i>M (SE)</i>
Total rumination scale	31.5 (9.9)
Rumination (no-ex) scale	13.6 (4.3)
Ex-specific rumination scale	17.9 (6.6)

Table 5

Descriptive Statistics for Unconditional Models

Change in Affect	<i>M</i>	<i>(SE)</i>	<i>Within</i>	<i>Between</i>
Change in positive affect	-0.24	0.10	3.38	0.05
Change in negative affect	0.04	0.18	6.05	0.85

Note. N = 58

Table 6

Parameter Estimates for Changes in Positive and Negative Affect with Facebook Use as a Predictor

Variable	Coefficient	<i>(SE)</i>	<i>t</i>
Intercept	-0.25	0.11	-2.35*
Change in positive affect	0.14	0.07	1.96*
Intercept	0.08	0.17	0.46
Change in negative affect	-0.19	0.11	-1.75†

*** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .10$.

Table 7

Pearsons Correlations Between Long-term Facebook Use and Depression and Anxiety Scores

	1	2	3	4	5	6	7	8	9	10	11	12
Follow-up Questionnaire												
1. Average number of logins	-											
2. Average duration of time spent on Facebook	.26*	-										
Depression and Anxiety Measures												
3. Pre-CESD	0.20	0.08	-									
4. Pre-MASQ general distress: anxiety	0.16	-0.09	.58***	-								
5. Pre-MASQ anxious arousal	.28*	-0.11	.50***	.69***	-							
6. Pre-MASQ general distress: depression	0.20	0.11	.83***	.72***	.59***	-						
7. Pre-MASQ anhedonic depression	-0.06	-0.01	.73***	.28*	0.16	.61***	-					
8. Post-CESD	0.20	0.00	.61***	.38**	.52***	.54***	.31*	-				
9. Post-MASQ general distress: anxiety	.27*	-0.16	.37**	.46***	.57***	.34**	0.09	.56***	-			
10. Post-MASQ anxious arousal	0.21	-0.27*	.39**	.35**	.63***	.31*	0.10	.63***	.83**	-		
11. Post-MASQ general distress: depression	0.15	-0.07	.50***	.43**	.56***	.57***	.28*	.76***	.75**	.71***	-	
12. Post-MASQ anhedonic depression	-0.80	-0.08	.39**	0.25	0.22	.42**	.44**	.62***	.39**	.33**	.59***	-

p < .001, *p < .01, *p < .05

Table 8

Pearsons Correlations Between Trait Rumination and Heart Rate

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Ruminative Response Scale																	
1. RRS total	.																
2. RRS reflection	.81***	.															
3. RRS brooding	.85***	.56***	.														
4. RRS depression	.92***	.61***	.72***	.													
5. RRS brooding and depression	.96***	.63***	.88***	.96***	.												
Heart rate averages																	
6. Baseline average HR	0.09	0.08	0.01	0.10	0.07	.											
7. View ex-SO average HR	-0.00	0.03	-0.08	0.01	-0.02	.92***	.										
8. Rest A average HR	0.01	.02	-0.07	0.03	-0.01	.96***	.96***	.									
9. Acquaintance average HR	-0.01	0.00	-0.09	0.01	-0.02	.93***	.94***	.97***	.								
10. Rest B average HR	0.02	0.06	-0.10	0.04	-0.01	.95***	.93***	.97***	.97***	.							
11. Ruminative on ex-SO average HR	0.01	0.02	-0.09	0.04	-0.01	.94***	.95***	.96***	.97***	.97***	.						
Heart rate differences																	
12. Difference: View ex-SO & Baseline	-0.22	-0.11	-0.21	-0.22	-0.23†	-0.14	0.27*	0.06	0.01	0.00	0.09	.					
13. Difference: Acquaintance & Rest A	-0.08	-0.09	-0.06	-0.05	-0.06	-0.14	-0.22	-0.30*	-0.05	-0.14	-0.14	-0.21	.				
14. Difference: Ruminative on ex-SO & Rest B	0.06	-0.15	0.01	0.01	0.01	-0.05	0.10	-0.01	-0.02	-0.11	0.13	.35**	-0.03	.			
15. Difference: Ruminative on ex-SO & Ex-SO	0.02	-0.05	-0.02	0.07	0.04	-0.20	-0.43***	-0.26*	-0.20	-0.14	-0.12	-0.58***	.28*	0.08	.		
16. Difference: Ruminative on ex-SO & Acquaintance	0.07	0.08	-0.02	0.09	0.05	-0.09	0.03	-0.03	-0.12	-0.01	0.14	.30*	-0.36**	.60***	.29*	.	
17. Difference: View ex-SO & Acquaintance	0.03	0.10	0.00	-0.01	-0.00	0.12	.43***	0.22	0.10	0.13	0.21	.76***	-.52***	.34**	-.74***	.43***	.

*** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .10$.

Table 9
Summary of Linear Regression Analysis for Variables Predicting Post-MASQ Anxious Arousal Scores

Variable	b (SE)	t
(Constant)	5.74 (3.15)	1.83†
Pre-MASQ anxious arousal	0.68 (.11)	6.24***
HR Diff: Ruminare on ex vs. view acq	-0.52 (.34)	-1.55
HR Diff: View ex vs. view acq	0.42 (.23)	1.82†

*** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .10$.

Note. HR diff = differences in heart rate; Acq = acquaintance profile

Table 10
Summary of Linear Regression Analysis for Variables Predicting Post-MASQ Anhedonic Depression Scores

Variable	b (SE)	t
(Constant)	35.34 (6.87)	5.14***
Pre-MASQ anhedonic depression	0.39 (.12)	3.18**
HR Diff: Ruminare on ex vs. view ex	0.68 (.63)	1.08
HR Diff: View ex vs. view acq	1.05 (.59)	1.78†
(Constant)	35.34 (6.87)	5.14***
Pre-MASQ anhedonic depression	0.39 (.12)	3.18**
HR Diff: Ruminare on ex vs. view ex	-0.37 (.43)	-0.87
HR Diff: Ruminare on ex vs. view acq	1.05 (.59)	1.78†

*** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .10$.

Note. HR diff = differences in heart rate; Acq = acquaintance profile

Table 11

Summary of Hierarchical Linear Model Examining Explicit Self-Esteem (RSE) as a Moderator of Facebook Rumination

Model predictor	Coefficient (SE)	<i>t</i>
Intercept, γ_{00}	27.25 (1.17)	23.27***
Facebook use, γ_{10}	.17 (.41)	0.41
Explicit self-esteem, γ_{01}	-.17 (.12)	-1.40
Explicit self-esteem x Facebook use, γ_{11}	.13 (.04)	3.08**

*** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .10$.

Table 12

Summary of Hierarchical Linear Model Examining Implicit Self-Esteem (IAT) as a Moderator of Facebook Rumination

Model predictor	Coefficient (SE)	<i>t</i>
Intercept, γ_{00}	27.13 (1.20)	22.64***
Facebook use, γ_{10}	.32 (.45)	0.71
Explicit self-esteem, γ_{01}	.79 (3.82)	0.21
Explicit self-esteem x Facebook use, γ_{11}	.28 (1.49)	0.19

*** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .10$.

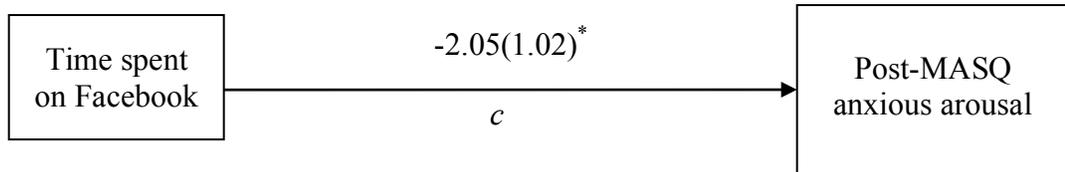
Table 13

Summary of Hierarchical Linear Model Examining Social Comparison (INCOM) as a Moderator of Facebook Rumination

Model predictor	Coefficient (SE)	<i>t</i>
Intercept, γ_{00}	27.13 (1.15)	23.62***
Facebook use, γ_{10}	.34 (.44)	0.77
Social comparison, γ_{01}	.41 (.19)	2.17*
Social comparison x Facebook use, γ_{11}	-.06 (.08)	-0.77

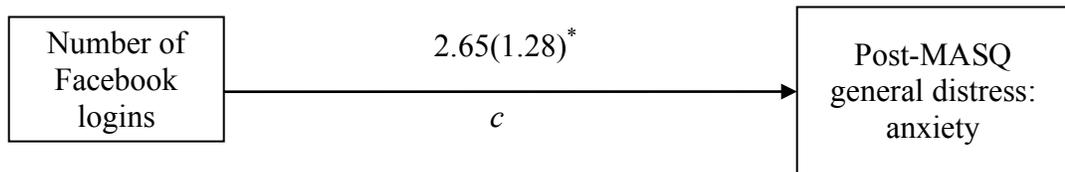
*** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .10$.

Figures



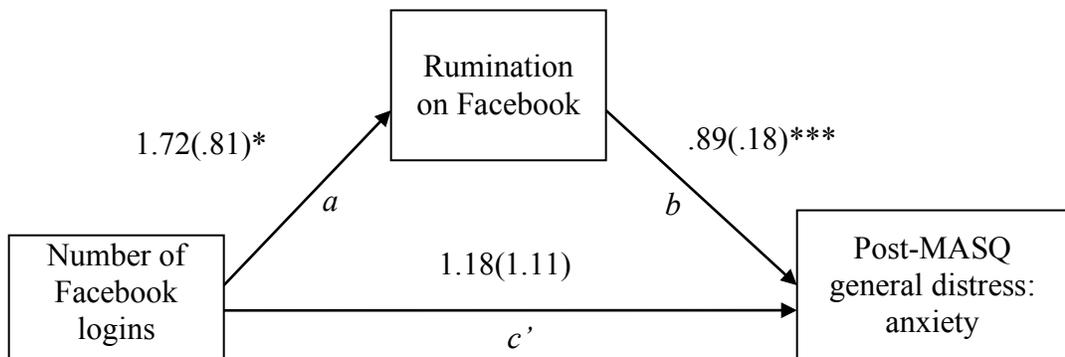
*** $p < .001$. ** $p < .01$. * $p < .05$.

Figure 4. Direct effect of amount of time spent on Facebook on post-MASQ anxious arousal scores.



*** $p < .001$. ** $p < .01$. * $p < .05$.

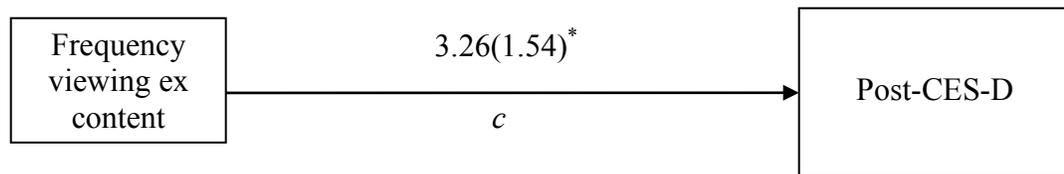
Figure 5. Direct effect of number of Facebook logins on post-MASQ general distress: anxiety scores.



Sobel: $z = 1.95(.79)^*$

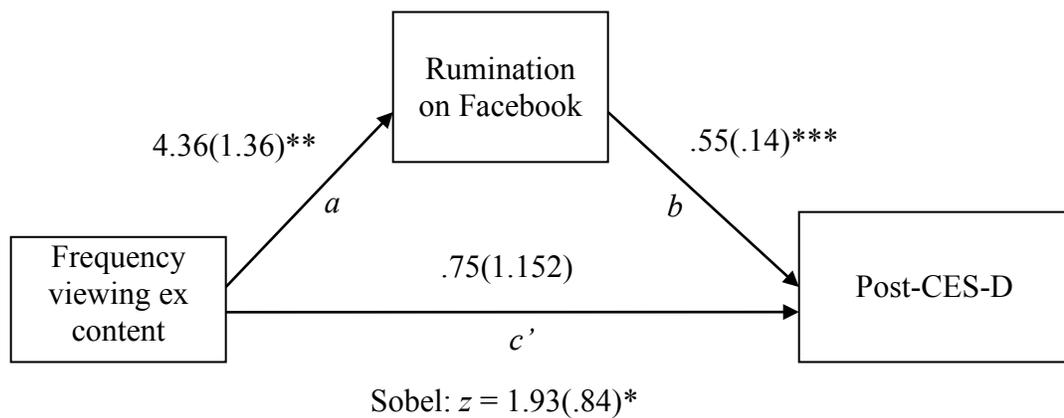
*** $p < .001$. ** $p < .01$. * $p \leq .05$.

Figure 6. Mediation model with rumination on Facebook as a mediator of Facebook logins and post-MASQ general distress: anxiety scores.



*** $p < .001$. ** $p < .01$. * $p < .05$.

Figure 7. Direct effect of frequency of viewing content related to ex-significant other on post-CES-D scores.



*** $p < .001$. ** $p < .01$. * $p \leq .05$.

Figure 8. Mediation model with rumination on Facebook as a mediator of frequency of viewing content related to ex-significant other and post-CES-D scores.

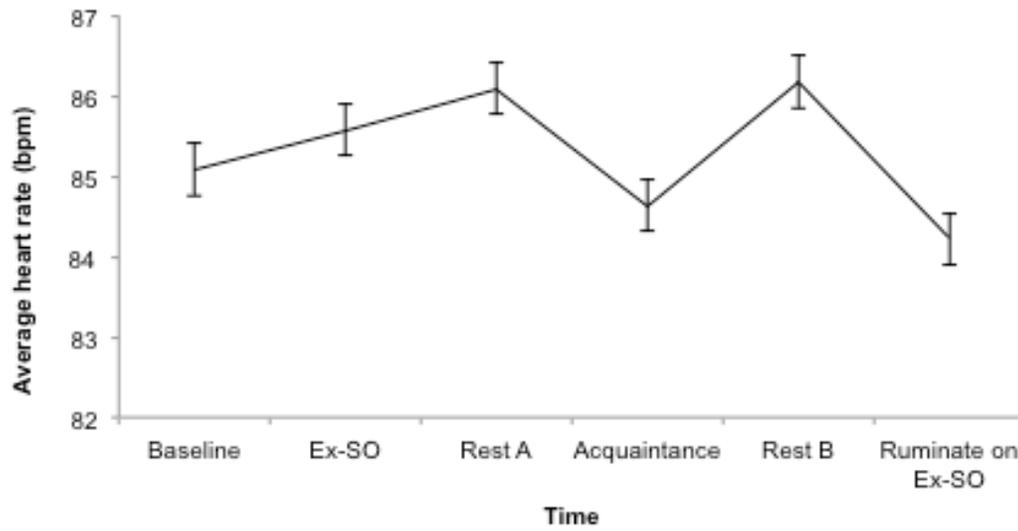


Figure 10. Average heart rate (bpm) over time during Facebook manipulation. Error bars represent one standard error.

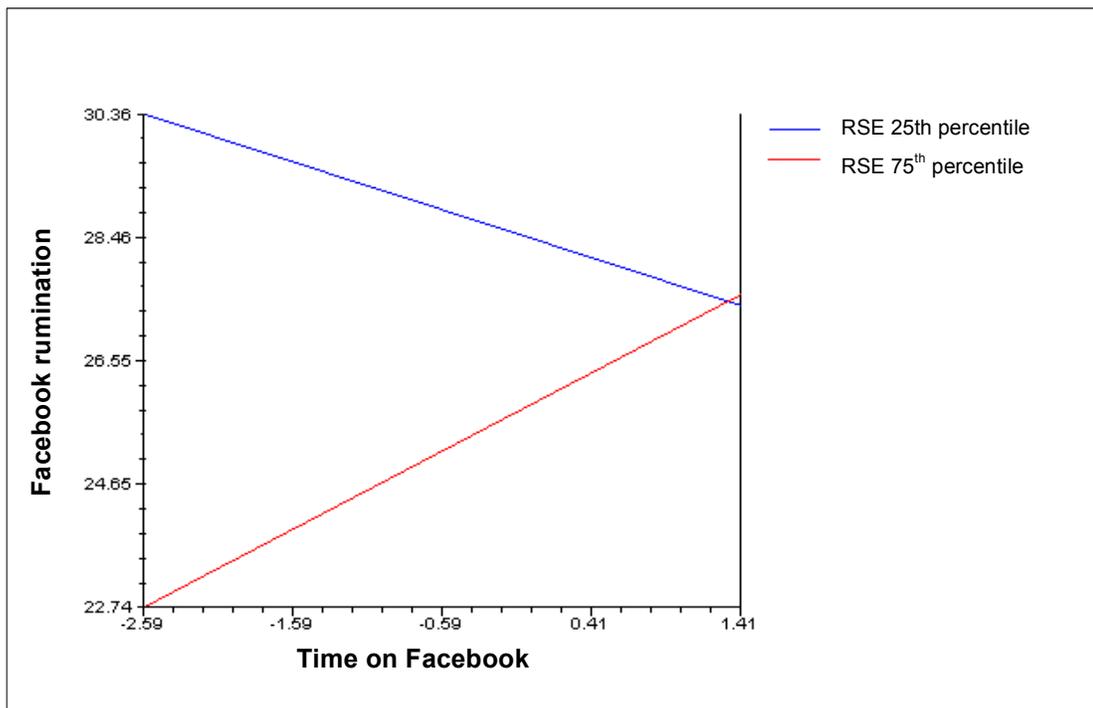


Figure 11. Explicit self-esteem (RSE) as a moderator of the relation between Facebook use (i.e., time spent on Facebook) and rumination levels while on Facebook. All variables are measured at the individual level (Level 1) and are grand-mean centered.

Appendices

Appendix A: Breakup Questionnaire

Please indicate a number between 1 (strongly disagree) and 7 (strongly agree) in the space

Before each statement to indicate how much the following statements apply to you and your ex-significant other.

Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree
1	2	3	4	5	6	7

- _____ 1. Before the break-up, I tended to think about how things affect 'us' as a couple more than how things affect 'me' as an individual.
- _____ 2. Before the break-up, I was more comfortable thinking in terms of 'my' things than 'our' things.
- _____ 3. Before the break-up, I liked to think of my partner and me more in terms of 'us' and 'we' than 'me' and 'him/her.'
- _____ 4. Before the break-up, I felt that I wanted this relationship to stay strong no matter what rough times we encountered.
- _____ 5. Before the break-up, my relationship with my partner was more important to me than almost anything else.
- _____ 6. Before the break-up, I was not particularly dedicated to this relationship.
- _____ 7. Before the break-up, I couldn't always depend on my partner, especially when it came to things that were important to me.
- _____ 8. Before the break-up, even when my partner made excuses which sounded rather unlikely, I was confident that he/she was telling the truth.
- _____ 9. Before the break-up, I trusted my partner and I was willing to let him/her engage in activities that other partners find too threatening.
- _____ 10. Before the break-up, I was confident that my partner would not cheat on me, even if the opportunity arose and there was no chance that he/she would get caught

Appendix B: Demographics

Participant ID: _____

Date: _____

Age: _____ years

Gender: (Circle one). Male Female

Ethnic Background: To which ethnic group do you most closely belong (check one):

- _____ Hispanic or Latino
- _____ Not Hispanic or Latino
- _____ Unknown

Racial Background: To which racial group do you most closely belong (check all that apply)

- _____ American Indian/Alaska Native
- _____ Asian
- _____ Black/African American
- _____ Native Hawaiian/Pacific Islander
- _____ White/Caucasian
- _____ Hispanic or Latino
- _____ Other (specify): _____

Marital Status: Please check your current marital status.

- _____ Single
- _____ Married
- _____ Domestic partner (living together)
- _____ Separated
- _____ Divorced
- _____ Widowed

Children: If applicable, please provide the following information about your children.

Number of children: _____

Age and sex of each child:

Education: How many years of education did you complete? _____

Please check the highest level of schooling that you completed.

- _____ Elementary school
- _____ Junior high school
- _____ High school
- _____ Some college
- _____ If checked, what year of college are you in? _____
- _____ Technical school
- _____ Junior college
- _____ Four-year college
- _____ Graduate or professional degree

Occupation: What is your current occupation? _____

Income (optional): Please check your annual household income.

- _____ Less than \$10,000
- _____ \$10,000 - \$25,000
- _____ \$25,000 - \$50,000
- _____ \$50,000 - \$75,000
- _____ \$75,000 - \$100,000
- _____ More than \$100,000

Residence: Please indicate how long you have been residing in the Miami area.

- _____ Less than 6 months
- _____ Between 6-12 months
- _____ Between 1-2 years
- _____ Between 2-3 years
- _____ Between 3-4 years
- _____ Greater than 4 years

Appendix C: Facebook Activity Measure (FAMe)

GENERAL ONLINE USE

1. On average, how much time each day do you spend on social networking sites (e.g., Facebook, MySpace, etc.)?
 - a) Less than 30 minutes
 - b) Between 30 minutes to 1 hour
 - c) Between 1 to 2 hours
 - d) Between 2 to 3 hours
 - e) Between 3 to 4 hours
 - f) More than 4 hours

2. Out of all the time you spend online, what percentage of that time do you spend on social networking sites?
 - a) Less than 25%
 - b) 25-50%
 - c) 51-75%
 - d) 75-90%
 - e) 91-100%

3. What is the social networking site that you use the most?
 - a) Facebook
 - b) MySpace
 - c) Linked In
 - d) Friendster
 - e) Twitter
 - f) Other

4. Do you own a Blackberry, iPhone, or a similar mobile device that allows you to log onto Facebook when you are away from a computer?
 - Yes (If answer yes, please include Facebook usage on these devices in your answers to all of the following questions, and proceed to the next question - #5).
 - No (If no, skip to question #6).

5. If you own a Blackberry, iPhone, or a similar mobile device that allows you to log onto Facebook when you are away from a computer, what percentage of your Facebook usage is through this device?
 - a) Less than 25%
 - b) 25-50%
 - c) 51-75%
 - d) 75-100%

6. Out of all the time you spend online, what percentage of that time do you spend on Facebook?
 - a) Less than 25%
 - b) 25-50%
 - c) 51-75%
 - d) 75-90%
 - e) 91-100%

7. Out of all of the sites you visit on the Internet, how would you rank Facebook?
 - a) First
 - b) Second
 - c) Third
 - d) Fourth
 - e) Higher than fourth

8. On average, how *much* time each day do you spend on Facebook?
 - a) Less than 1 hour
 - b) Between 1 to 2 hours
 - c) Between 2 to 3 hours
 - d) Between 3 to 4 hours
 - e) More than 4 hours

9. On average, how *many* times a day do you log into Facebook?
 - a) 1 time/day or less
 - b) 2-4 times/day
 - c) 5-9 times/day
 - d) 10-15 times/day
 - e) Over 15 times/day

10. Each time you log on, on average, how long are you actively using Facebook?
 - a) Less than 5 minutes
 - b) 5 to 9 minutes
 - c) 10 to 15 minutes
 - d) 16 to 20 minutes
 - e) Greater than 20 minutes

11. How big of a role does Facebook play in your social world (i.e., learning about events, parties, etc.; seeing a person's profile or status updates; keeping in touch with people via walls, status posts, messages; chatting; sending gifts; etc. – This could be keeping in touch by either just *reading* others' updates or communicating to them by *writing* them yourself.)
 - a) A really big part
 - b) A pretty big part
 - c) Somewhat
 - d) A little part
 - e) Not at all

12. In your own life, how important is Facebook for keeping in touch and up to date with people you are not able to physically see often (e.g., friends in another city, family, old friends you've reconnected with, chatting, etc.)?
- Very important
 - Somewhat important
 - A little important
 - Not at all important
13. On average, how often do you visit a person's profile that you have lost touch with/no longer have physical contact with (e.g., an old friend/boyfriend/girlfriend)?
- Very frequently (1 x/day or more)
 - Often (several times/week, but not every day)
 - Sometimes (1x/week or less)
 - Rarely (1x/month or less)
 - Never
14. On average, how often do you visit someone's profile that you do not know (e.g., a friend of a friend)?
- Very frequently (1 x/day or more)
 - Often (several times/week, but not every day)
 - Sometimes (1x/week or less)
 - Rarely (1x/month or less)
 - Never
15. On average, how often do you write on other people's walls?
- Very frequently (1 x/day or more)
 - Often (several times/week, but not every day)
 - Sometimes (1x/week or less)
 - Rarely (1x/month or less)
 - Never
16. On average, how often do other people write on your wall?
- Very frequently (1 x/day or more)
 - Often (several times/week, but not every day)
 - Sometimes (1x/week or less)
 - Rarely (1x/month or less)
 - Never
17. On average, how often do you communicate sending/receiving messages on Facebook?
- Very frequently (1 x/day or more)
 - Often (several times/week, but not every day)
 - Sometimes (1x/week or less)
 - Rarely (1x/month or less)
 - Never

18. On average, how often do you communicate by “chatting” on Facebook?
- Very frequently (1 x/day or more)
 - Often (several times/week, but not every day)
 - Sometimes (1x/week or less)
 - Rarely (1x/month or less)
 - Never
19. On average, how often do you update your status?
- Very frequently (1 x/day or more)
 - Often (several times/week, but not every day)
 - Sometimes (1x/week or less)
 - Rarely (1x/month or less)
 - Never
20. On average, how often do you read/check other people’s status updates?
- 1 time/day or less
 - 2-4 times/day
 - 5-9 times/day
 - 10-15 times/day
 - Over 15 times/day
21. On average, how often do you upload pictures?
- Very frequently (1 x/day or more)
 - Often (several times/week, but not every day)
 - Sometimes (1x/week or less)
 - Rarely (1x/month or less)
 - Never
22. On average, how often do you view photos your friends have posted?
- Very frequently (1 x/day or more)
 - Often (several times/week, but not every day)
 - Sometimes (1x/week or less)
 - Rarely (1x/month or less)
 - Never
23. On average, how often do you view photos of a person you have lost touch with/no longer have physical contact with (e.g., an old friend/boyfriend/girlfriend)?
- Very frequently (1 x/day or more)
 - Often (several times/week, but not every day)
 - Sometimes (1x/week or less)
 - Rarely (1x/month or less)
 - Never

24. On average, how often do you view photos of a person you do not know (e.g., a friend of a friend)?
- Very frequently (1 x/day or more)
 - Often (several times/week, but not every day)
 - Sometimes (1x/week or less)
 - Rarely (1x/month or less)
 - Never
25. On average, how often do you update your profile?
- Very frequently (1 x/day or more)
 - Often (several times/week, but not every day)
 - Sometimes (1x/week or less)
 - Rarely (1x/month or less)
 - Never

VARIOUS MOOD STATES

1. When I am feeling **sad/down**, I spend _____ time on Facebook than I usually do.
- Much more
 - Somewhat more
 - About the same amount of
 - Somewhat less
 - Much less
2. When I am feeling **happy**, I spend _____ time on Facebook than I usually do.
- Much more
 - Somewhat more
 - About the same amount of
 - Somewhat less
 - Much less
3. When I am feeling **lonely**, I spend _____ time on Facebook than I usually do.
- Much more
 - Somewhat more
 - About the same amount of
 - Somewhat less
 - Much less

4. When I am feeling **angry**, I spend _____ time on Facebook than I usually do.
- Much more
 - Somewhat more
 - About the same amount of
 - Somewhat less
 - Much less
5. When I am feeling **good about myself**, I spend _____ time on Facebook than I usually do.
- Much more
 - Somewhat more
 - About the same amount of
 - Somewhat less
 - Much less
6. When I am feeling **bad about myself**, I spend _____ time on Facebook than I usually do.
- Much more
 - Somewhat more
 - About the same amount of
 - Somewhat less
 - Much less
7. When I am feeling **sad/down**, I log onto Facebook _____ than I usually do.
- Much more often
 - Somewhat more often
 - About the same number of times
 - Somewhat less often
 - Much less often
8. When I am feeling **happy**, I log onto Facebook _____ than I usually do.
- Much more often
 - Somewhat more often
 - About the same number of times
 - Somewhat less often
 - Much less often

9. When I am feeling **lonely**, I log onto Facebook _____ than I usually do.
- Much more often
 - Somewhat more often
 - About the same number of times
 - Somewhat less often
 - Much less often
10. When I am feeling **angry**, I log onto Facebook _____ than I usually do.
- Much more often
 - Somewhat more often
 - About the same number of times
 - Somewhat less often
 - Much less often
11. When I am feeling **good about myself**, I log onto Facebook _____ than I usually do.
- Much more often
 - Somewhat more often
 - About the same number of times
 - Somewhat less often
 - Much less often
12. When I am feeling **bad about myself**, I log onto Facebook _____ than I usually do.
- Much more often
 - Somewhat more often
 - About the same number of times
 - Somewhat less often
 - Much less often
13. When you are feeling **sad/down**, how much time do you spend on Facebook thinking about how you feel and trying to understand why you feel the way you do?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual

14. When you are feeling **happy**, how much time do you spend on Facebook thinking about how you feel and trying to understand why you feel the way you do?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual
15. When you are feeling **lonely**, how much time do you spend on Facebook thinking about how you feel and trying to understand why you feel the way you do?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual
16. When you are feeling **angry**, how much time do you spend on Facebook thinking about how you feel and trying to understand why you feel the way you do?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual
17. When you are feeling **good about yourself**, how much time do you spend on Facebook thinking about how you feel and trying to understand why you feel the way you do?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual
18. When you are feeling **bad about yourself**, how much time do you spend on Facebook thinking about how you feel and trying to understand why you feel the way you do?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual

19. When you are feeling **sad/down**, how much time do you spend on Facebook comparing yourself to others and thinking about your own shortcomings or faults?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual
20. When you are feeling **happy**, how much time do you spend on Facebook comparing yourself to others and thinking about your own shortcomings or faults?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual
21. When you are feeling **lonely**, how much time do you spend on Facebook comparing yourself to others and thinking about your own shortcomings or faults?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual
22. When you are feeling **angry**, how much time do you spend on Facebook comparing yourself to others and thinking about your own shortcomings or faults?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual
23. When you are feeling **good about yourself**, how much time do you spend on Facebook comparing yourself to others and thinking about your own shortcomings or faults?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual

24. When you are feeling **bad about yourself**, how much time do you spend on Facebook comparing yourself to others and thinking about your own shortcomings or faults?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual
25. When you are feeling **sad/down**, how much do you compare your own mood to other people's perceived level of contentment/happiness on Facebook?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual
26. When you are feeling **happy**, how much do you compare your own mood to other people's perceived level of contentment/happiness on Facebook?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual
27. When you are feeling **lonely**, how much do you compare your own mood to other people's perceived level of contentment/happiness on Facebook?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual
28. When you are feeling **angry**, how much do you compare your own mood to other people's perceived level of contentment/happiness on Facebook?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual

29. When you are feeling **good about yourself**, how much do you compare your own mood to other people's perceived level of contentment/happiness on Facebook?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual
30. When you are feeling **bad about yourself**, how much do you compare your own mood to other people's perceived level of contentment/happiness on Facebook?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual
31. When you are feeling **sad/down**, how much do you use Facebook for social support (e.g., communicating with friends via wall posts, messages, chatting, etc.)?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual
32. When you are feeling **happy**, how much do you use Facebook for social support (e.g., communicating with friends via wall posts, messages, chatting, etc.)?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual
33. When you are feeling **lonely**, how much do you use Facebook for social support (e.g., communicating with friends via wall posts, messages, chatting, etc.)?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual

34. When you are feeling **angry**, how much do you use Facebook for social support (e.g., communicating with friends via wall posts, messages, chatting, etc.)?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual
35. When you are feeling **good about yourself**, how much do you use Facebook for social support (e.g., communicating with friends via wall posts, messages, chatting, etc.)?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual
36. When you are feeling **bad about yourself**, how much do you use Facebook for social support (e.g., communicating with friends via wall posts, messages, chatting, etc.)?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual
37. When you are feeling **sad/down**, how much do you use Facebook to distract yourself?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual
38. When you are feeling **happy**, how much do you use Facebook to distract yourself?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual
39. When you are feeling **lonely**, how much do you use Facebook to distract yourself?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual

40. When you are feeling **angry**, how much do you use Facebook to distract yourself?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual
41. When you are feeling **good about yourself**, how much do you use Facebook to distract yourself?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual
42. When you are feeling **bad about yourself**, how much do you use Facebook to distract yourself?
- Much more than usual
 - Somewhat more than usual
 - About the same
 - Somewhat less than usual
 - Much less than usual
43. **After** spending time on Facebook when I am feeling **sad/down**, I usually feel _____ compared to how I was feeling **before** spending time on the site.
- Much better
 - Somewhat better
 - About the same
 - Somewhat worse
 - Much worse
44. **After** spending time on Facebook when I am feeling **happy**, I usually feel _____ compared to how I was feeling **before** spending time on the site.
- Much better
 - Somewhat better
 - About the same
 - Somewhat worse
 - Much worse
45. **After** spending time on Facebook when I am feeling **lonely**, I usually feel _____ compared to how I was feeling **before** spending time on the site.
- Much better
 - Somewhat better
 - About the same
 - Somewhat worse
 - Much worse

46. **After** spending time on Facebook when I am feeling **angry**, I usually feel _____ compared to how I was feeling **before** spending time on the site.
- a) Much better
 - b) Somewhat better
 - c) About the same
 - d) Somewhat worse
 - e) Much worse
47. **After** spending time on Facebook when I am feeling **good about myself**, I usually feel _____ compared to how I was feeling **before** spending time on the site.
- a) Much better
 - b) Somewhat better
 - c) About the same
 - d) Somewhat worse
 - e) Much worse
48. **After** spending time on Facebook when I am feeling **bad about myself**, I usually feel _____ compared to how I was feeling **before** spending time on the site.
- a) Much better
 - b) Somewhat better
 - c) About the same
 - d) Somewhat worse
 - e) Much worse

Appendix D: Interpersonal Support Evaluation List (ISEL) - College Version

This scale is made up of a list of statements each of which may or may not be true about you. For each statement we would like you to circle **probably TRUE (PT)** if the statement is true about you or **probably false (PF)** if the statement is not true about you. You may find that many of the statements are neither clearly true nor clearly false. In these cases, try to decide quickly whether probably true or probably false is most descriptive of you. Although some questions will be difficult to answer, it is important that you pick one alternative or the other. Remember to circle only one of the alternatives for each statement.

Please read each item quickly but carefully before responding. Remember that this is not a test and there are no right or wrong answers.

- 1 = Definitely true
- 2 = Probably true
- 3 = Probably false
- 4 = Definitely false

Tangible scale

1. I know someone who would loan me \$50 so I could go away for the weekend.
2. I know someone who would give me some old dishes if I moved into my own apartment.
3. I know someone who would loan me \$100 to help pay my tuition.
4. If I needed it, my family would provide me with an allowance and spending money.
5. If I wanted a date for a party next weekend, I know someone at school or in town who would fix me up.
6. I know someone at school or in town who would bring my meals to my room or apartment if I were sick.
7. I don't know anyone who would loan me several hundred dollars to pay a doctor bill or dental bill.
8. I don't know anyone who would give me some old furniture if I moved into my own apartment.
9. Even if I needed it my family would (or could) not give me money for tuition and books.
10. I don't know anyone at school or in town who would help me study for an exam by spending several hours reading me questions.
11. I don't know anyone at school or in town who would loan me their car for a couple of hours.
12. I don't know anyone at school or in town who would get assignments for me from my teachers if I was sick.

Belonging scale

1. There are people at school or in town who I regularly run, exercise, or play sports with.

2. I hang out in a friend's room or apartment quite a lot.
3. I can get a date who I enjoy spending time with whenever I want.
4. If I decided at dinner time to take a study break this evening and go to a movie, I could easily find someone to go with me.
5. People hang out in my room or apartment during the day or in the evening.
6. I belong to a group at school or in town that meets regularly or does things together regularly.
7. I am not a member of any social groups (such as church groups, clubs, teams, etc.)
8. Lately, I often feel lonely, like I don't have anyone to reach out to.
9. I don't have friends at school or in town who would comfort me by showing some physical affection.
10. I don't often get invited to do things with other people.
11. I don't talk to a member of my family at least once a week.
12. I don't usually spend two evenings on the weekend doing something with others.

Appraisal Scale

1. I know someone who I see or talk to often with whom I would feel perfectly comfortable talking about problems I might have budgeting my time between school and my social life.
2. I know someone who I see or talk to often with whom I would feel perfectly comfortable talking about any problems I might have adjusting to college life.
3. I know someone who I see or talk to often with whom I would feel perfectly comfortable talking about sexually transmitted diseases.
4. I know someone who I see or talk to often with whom I would feel perfectly comfortable talking about any problems I might have meeting people.
5. I know someone who I see or talk to often with whom I would feel perfectly comfortable discussing any sexual problems I might have.
6. I know someone who I see or talk to often with whom I would feel perfectly comfortable talking about any problems I might have with drugs.
7. There isn't anyone at school or in town with whom I would feel perfectly comfortable talking about any problems I might have with making friends.
8. There isn't anyone at school or in town with whom I would feel perfectly comfortable talking about any problems I might have getting along with my parents.
9. There isn't anyone at school or in town with whom I would feel perfectly comfortable talking about difficulties with my social life.
10. There isn't anyone at school or in town with whom I would feel perfectly comfortable talking about my feelings of loneliness and depression.
11. I don't know anyone at school or in town who makes my problems clearer and easier to understand.
12. Lately, when I've been troubled, I keep things to myself.

Self Esteem Scale

1. Most people who know me well think highly of me.
2. Most of my friends think that I'm smart.
3. Most of my friends don't do as well as I do in school.
4. I will have a better future than most other people will.

5. Most of my friends have not adjusted to college as easily as I have.
6. Most people think I have a good sense of humor.
7. I don't feel friendly with any teaching assistants, professors, campus or student officials.
8. Most of my friends are more satisfied or happier with themselves than I am.
9. Most of my friend are more popular than I am.
10. Most of my friends are more interesting than I am.
11. Most of my friends have more control over what happens to them than I.
12. Most people are more attractive than I am.

Appendix E: Iowa-Netherlands Comparison Orientation Measure (INCOM)

Most people compare themselves from time to time with others. For example, they may compare the way they feel, their opinions, their abilities, and/or their situation with those of other people. There is nothing particularly “good” or “bad” about this type of comparison, and some people do it more than others. We would like to find out how often you compare yourself with other people. To do that we would like you to indicate how much you agree with each statement below, by using the following scale.

A	B	C	D	E
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 I do things compared with how others do things.
3. If I want to find out how well I have done something, I compare what I have done with how 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 F: Relationship Questionnaire

1. How long ago was the break-up?
 - a) \leq 7 days ago
 - b) 8 to 14 days ago
 - c) 15 to 21 days ago
 - d) 22 to 28 days ago
 - e) $>$ 29 days ago

2. How long was the relationship?
 - a) $<$ 1 month
 - b) 2 to 4 months
 - c) 4 to 6 months
 - d) 6 to 9 months
 - e) 9 months to 1 year
 - f) 1 to 2 years
 - g) 2 years to 3 years
 - h) $>$ 3 years

3. Who ended the relationship?
 - a) Me
 - b) The other person
 - c) It was mutual
 - d) It's unclear.

4. Compared to your relationships with other people in your life, how important was this relationship to you?

1	2	3	4	5
Not important at all, many other relationships are more important		Average, some relationships are more important, some are less		Extremely important, easily the most important relationship in my life

5. How close were you with your ex-significant other?

1	2	3	4	5
Not close at all		Somewhat close		Extremely close

6. How serious was the relationship?

1	2	3	4	5
Not serious at all/ Very causal		Somewhat serious		Extremely serious (the most serious relationship I've ever had)

7. How amicable was the break-up?

1	2	3	4	5
Not amicable at all Very negative/messy		Somewhat amicable		Extremely amicable, still very good friends

8. Right now, how distressing is the break-up for you?
- | | | | | |
|------------------------|---|----------------------|---|-----------------------|
| 1 | 2 | 3 | 4 | 5 |
| Not distressing at all | | Somewhat distressing | | Extremely distressing |
9. I blocked or defriended my ex-significant other on Facebook.
- True
 - False
10. My ex-significant other blocked or defriended me on Facebook.
- True
 - False
11. Since the breakup, how much in-person (“face-to-face”) contact or communication have you had with your ex-significant other?
- None at all
 - One hour or less
 - 2 – 5 hours
 - 5 to 10 hours
 - > 10 hours
12. Since the breakup, how much contact have you had with your ex-significant other that was **NOT** face-to-face (e.g., by telephone, email, letters, text message, via Facebook messages, wall posts, chat, etc.)?
- None at all
 - One hour or less
 - 2 – 5 hours
 - 5 to 10 hours
 - > 10 hours
13. My ex-significant other (check all that apply):
- cheated on me
 - lied to me
 - did something else to betray me
 - none of the above
14. Please briefly describe your recent breakup (2-3 sentences).

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

Instructions: Below is a list of ways people sometimes feel or behave. For each item, please think and indicate how often or how consistently you have felt or behaved this way during THE PAST WEEK by circling the appropriate response number.

During the past week:

0 = RARELY (less than 1 day)

1 = SOMETIMES (1 to 2 days)

2 = OFTEN (3 to 4 days)

3 = MOST OF THE TIME (5 to 7 days)

1. I was bothered by things that usually don't bother me.	0	1	2	3
2. I did not feel like eating; my appetite was poor.	0	1	2	3
3. I felt that I could not shake off the blues even with help from my family or friends.	0	1	2	3
4. I felt that I was just as good as other people.	0	1	2	3
5. I had trouble keeping my mind on what I was doing.	0	1	2	3
6. I felt depressed.	0	1	2	3
7. I felt that everything I did was an effort.	0	1	2	3
8. I felt hopeful about the future.	0	1	2	3
9. I thought my life had been a failure.	0	1	2	3
10. I felt fearful.	0	1	2	3
11. My sleep was restless.	0	1	2	3
12. I was happy.	0	1	2	3
13. I talked less than usual.	0	1	2	3
14. I felt lonely.	0	1	2	3
15. People were unfriendly.	0	1	2	3
16. I enjoyed life.	0	1	2	3
17. I had crying spells.	0	1	2	3
18. I felt sad.	0	1	2	3
19. I felt that people dislike me.	0	1	2	3
20. I could not get "going."	0	1	2	3

Appendix H: Mood and Anxiety Symptom Questionnaire – Short Version (MASQ-S)

Below is a list of feelings, sensations, problems, and experiences that people sometimes have. Read each item and then mark the appropriate choice. Use the choice that best describes how much you have felt or experienced things this way **this past week, including today**. Use this scale when answering:

1 ————— 2 ————— 3 ————— 4 ————— 5
 not at all a little bit moderately quite a bit extremely

	1	2	3	4	5
1. Felt sad	1	2	3	4	5
2. Startled easily	1	2	3	4	5
3. Felt cheerful	1	2	3	4	5
4. Felt afraid	1	2	3	4	5
5. Felt discouraged	1	2	3	4	5
6. Hands were shaky	1	2	3	4	5
7. Felt optimistic	1	2	3	4	5
8. Had diarrhea	1	2	3	4	5
9. Felt worthless	1	2	3	4	5
10. Felt really happy	1	2	3	4	5
11. Felt nervous	1	2	3	4	5
12. Felt depressed	1	2	3	4	5
13. Was short of breath	1	2	3	4	5
14. Felt uneasy	1	2	3	4	5
15. Was proud of myself	1	2	3	4	5
16. Had a lump in my throat	1	2	3	4	5
17. Felt faint	1	2	3	4	5
18. Felt unattractive	1	2	3	4	5
19. Had hot or cold spells	1	2	3	4	5
20. Had an upset stomach	1	2	3	4	5
21. Felt like a failure	1	2	3	4	5
22. Felt like I was having a lot of fun	1	2	3	4	5
23. Blamed myself for a lot of things	1	2	3	4	5
24. Hands were cold and sweaty	1	2	3	4	5
25. Felt withdrawn from other people	1	2	3	4	5
26. Felt keyed up, "on edge"	1	2	3	4	5
27. Felt like I had a lot of energy	1	2	3	4	5
28. Was trembling or shaking	1	2	3	4	5
29. Felt inferior to others	1	2	3	4	5

	1	2	3	4	5			
	not at all	a little bit	moderately	quite a bit	extremely			
30.	Had trouble swallowing			1	2	3	4	5
31.	Felt like crying			1	2	3	4	5
32.	Was unable to relax			1	2	3	4	5
33.	Felt really slowed down			1	2	3	4	5
34.	Was disappointed in myself			1	2	3	4	5
35.	Felt nauseous			1	2	3	4	5
36.	Felt hopeless			1	2	3	4	5
37.	Felt dizzy or lightheaded			1	2	3	4	5
38.	Felt sluggish or tired			1	2	3	4	5
39.	Felt really "up" or lively			1	2	3	4	5
40.	Had pain in my chest			1	2	3	4	5
41.	Felt really bored			1	2	3	4	5
42.	Felt like I was choking			1	2	3	4	5
43.	Looked forward to things with enjoyment			1	2	3	4	5
44.	Muscles twitched or trembled			1	2	3	4	5
45.	Felt pessimistic about the future			1	2	3	4	5
46.	Had a very dry mouth			1	2	3	4	5
47.	Felt like I had a lot of interesting things to do			1	2	3	4	5
48.	Was afraid I was going to die			1	2	3	4	5
49.	Felt like I had accomplished a lot			1	2	3	4	5
50.	Felt like it took extra effort to get started			1	2	3	4	5
51.	Felt like nothing was very enjoyable			1	2	3	4	5
52.	Heart was racing or pounding			1	2	3	4	5
53.	Felt like I had a lot to look forward to			1	2	3	4	5
54.	Felt numbness or tingling in my body			1	2	3	4	5
55.	Felt tense or "high-strung"			1	2	3	4	5
56.	Felt hopeful about the future			1	2	3	4	5
57.	Felt like there wasn't anything interesting or fun to do			1	2	3	4	5
58.	Seemed to move quickly and easily			1	2	3	4	5
59.	Muscles were tense or sore			1	2	3	4	5
60.	Felt really good about myself			1	2	3	4	5
61.	Thought about death or suicide			1	2	3	4	5
62.	Had to urinate frequently			1	2	3	4	5

Appendix I: Emotion Regulation Questionnaire (ERQ)

We would like to ask you some questions about your emotional life, in particular, how you control (that is, regulate and manage) your emotions. The questions below involve two distinct aspects of your emotional life. One is your emotional experience, or what you feel inside. The other is your emotional expression, or how you show your emotions in the way you talk, gesture or behave. Although some of the following questions may seem similar to one another, they differ in important ways. For each of them, please answer using the following scale:

1-----2-----3-----4-----5-----6-----7
strongly neutral strongly
disagree agree

1. ___ When I want to feel more *positive* emotion (such as joy or amusement), I *change what I'm thinking about*.
2. ___ I keep my emotions to myself.
3. ___ When I want to feel less *negative* emotion (such as sadness or anger), I *change what I'm thinking about*.
4. ___ When I am feeling *positive* emotions, I am careful not to express them.
5. ___ When I'm faced with a stressful situation, I make myself *think about it* in a way that helps me stay calm.
6. ___ I control my emotions by *not expressing* them.
7. ___ When I want to feel more *positive* emotion, I *change the way I am thinking about the situation*.
8. ___ I control my emotions by *changing the way I think about the situation I'm in*.
9. ___ When I am feeling *negative* emotions, I make sure not to express them.
10. ___ When I want to feel less *negative* emotion, I *change the way I'm thinking about the situation*.

Appendix J: Ruminative Response Scale (RRS)

People think and do many different things when they feel depressed. Please read each of the following items and indicate whether you never, sometimes, often, or always think or do each one when you feel down, sad, or depressed. Please indicate what you generally do, *not* what you think you should do.

	Almost Never	Some -times	Often	Almost Always
1. Think about how alone you feel	1	2	3	4
2. Think "I won't be able to do my job/work because I feel so badly."	1	2	3	4
3. Think about your feelings of fatigue and achiness	1	2	3	4
4. Think about how hard it is to concentrate	1	2	3	4
5. Think about how passive and unmotivated you feel	1	2	3	4
6. Analyze recent events to try to understand why you are depressed	1	2	3	4
7. Think about how you don't seem to feel anything any more	1	2	3	4
8. Think "Why can't I get going?"	1	2	3	4
9. Think "Why do I always react this way?"	1	2	3	4
10. Go away by yourself and think about why you feel this way	1	2	3	4
11. Write down what you are thinking about and analyze it	1	2	3	4
12. Think about a recent situation, wishing it had gone better	1	2	3	4
13. Think "Why do I have problems other people don't have?"	1	2	3	4
14. Think about how sad you feel	1	2	3	4
15. Think about all your shortcomings, failings, faults, mistakes	1	2	3	4
16. Think about how you don't feel up to doing anything	1	2	3	4
17. Analyze your personality to try to understand why you are depressed	1	2	3	4
18. Go someplace alone to think about your feelings	1	2	3	4
19. Think about how angry you are with yourself	1	2	3	4
20. Listen to sad music	1	2	3	4
21. Isolate yourself and think about the reasons why you feel sad	1	2	3	4
22. Try to understand yourself by focusing on your depressed feelings	1	2	3	4
23. What am I doing to deserve this?	1	2	3	4
24. I won't be able to concentrate if I keep feeling this way.	1	2	3	4
25. Why can't I handle things better?	1	2	3	4

Appendix K: Affect Rating Form

Please circle the number that best indicates how you feel right now.

1. Angry

0 1 2 3 4 5 6 7 8 9 10
(not at all) (very much)

2. Anxious

0 1 2 3 4 5 6 7 8 9 10
(not at all) (very much)

3. Amused

0 1 2 3 4 5 6 7 8 9 10
(not at all) (very much)

4. Tense

0 1 2 3 4 5 6 7 8 9 10
(not at all) (very much)

5. Irritated

0 1 2 3 4 5 6 7 8 9 10
(not at all) (very much)

6. Sad

0 1 2 3 4 5 6 7 8 9 10
(not at all) (very much)

7. Upset

0 1 2 3 4 5 6 7 8 9 10
(not at all) (very much)

8. Nervous

0 1 2 3 4 5 6 7 8 9 10
(not at all) (very much)

9. Joyful

0 1 2 3 4 5 6 7 8 9 10
(not at all) (very much)

Appendix L: Biological Measure of Rumination Instructions

1) Ex-significant other (3 minutes)

Please go to your **ex-significant other's** Facebook profile and browse around the information available on the site. This may include areas such as his/her wall, pictures, and information.

2) Acquaintance (3 minutes)

Please go to an **acquaintance's** Facebook profile and browse around the information available on the site. This may include areas such as his/her wall, pictures, and information.

3) Ex-significant other with Rumination Prompts (5 minutes)

Please go to your **ex-significant other's** Facebook profile and think about...

1. how to understand your feelings.
2. how happy/sad you are feeling.
3. why things turn out the way that they do for you.
4. how hopeful/hopeless you are feeling.
5. how similar/different you are relative to other people.
6. the kind of person you are and wish you were.

Appendix M: Implicit Association Task (IAT) Items

Me/Self and Non-self/Other items:

- **Me/Self:** I, me, my, mine, myself
- **Non-self/Other:** they, them, their, it, themselves

Evaluative *Positive* and *Negative* trait words:

- **Positive:** smart, success, valued, strong, proud, loved, honest, competent, worthy, nice
- **Negative:** stupid, ugly, failure, awful, useless, weak, ashamed, hated, guilty, awkward

SIDE OF SCREEN:	LEFT (“E”)	RIGHT (“I”)	
Block 1 (PRAC):	self	other	(20 trials)
Block 2 (PRAC):	<i>positive</i>	<i>negative</i>	(20 trials)
Block 3 (TEST):	<i>self/positive</i>	<i>other/negative</i>	(20 trials)
Block 4 (TEST):	<i>self/positive</i>	<i>other/negative</i>	(40 trials)
Block 5 (PRAC):	<i>negative</i>	<i>positive</i>	(20 trials)
Block 6 (TEST):	<i>self/negative</i>	<i>other/positive</i>	(20 trials)
Block 7 (TEST):	<i>self/ negative</i>	<i>other/ positive</i>	(40 trials)

Appendix N: Rosenberg Self-Esteem Scale

Please answer the following questions, using the scale below.

1	2	3	4	5	6	7
Totally Disagree	Disagree very much	Disagree slightly	Neutral	Agree slightly	Agree very much	Totally agree

1. On the whole, I am satisfied with myself. 1 2 3 4 5 6 7
2. At times I think that I am no good at all. 1 2 3 4 5 6 7
3. I feel that I have a number of good qualities. 1 2 3 4 5 6 7
4. I am able to do things as well as most other people. 1 2 3 4 5 6 7
5. I feel that I do not have much to be proud of. 1 2 3 4 5 6 7
6. I certainly feel useless at times. 1 2 3 4 5 6 7
7. I feel that I'm a person of worth, at least on an equal plane with others. 1 2 3 4 5 6 7
8. I wish I could have more respect for myself. 1 2 3 4 5 6 7
9. All in all, I am inclined to feel that I am a failure. 1 2 3 4 5 6 7
10. I take a positive attitude toward myself. 1 2 3 4 5 6 7

Appendix O: Diary Study Instructions

Thank you for agreeing to participate in the diary portion of our study. In this part of the study, you will be asked to complete brief online questionnaires about your everyday Facebook use for **4 consecutive days**. This will include 2 weekdays and one weekend.

That means if today is:

- a day from **Saturday to Wednesday** (Sat, Sun, Mon, Tues, or Wed), you should start completing the questionnaires when you wake up on Thursday morning until you go to bed at night on Sunday (Thurs, Fri, Sat, Sun)
- a **Thursday**, you should start completing the questionnaires when you wake up on Friday morning until you go to bed at night on Monday (Fri, Sat, Sun, Mon)
- a **Friday**, you should start completing the questionnaires when you wake up on Saturday morning until you go to bed at night on Tuesday (Sat, Sun, Mon, Tues)

During this time, **EACH TIME** you log onto Facebook, we will ask you to complete brief questionnaires. That means that **RIGHT BEFORE** each login, we will ask you to complete a brief set of questions that will not take longer than 2 minutes. It is very important for our study that you complete this questionnaire **before** logging on and viewing anything on Facebook.

Also, **RIGHT AFTER** you login, we will ask you to complete some questions that will not take longer than 2 minutes. It is very important that you complete these questionnaires right **after** logging off of Facebook.

When you log onto each questionnaire, you will be prompted to enter your 3-digit ID number. **Your ID # is:** _____.

So during these four consecutive days, **EACH MORNING**, we will send you an email containing links to the PRE and POST-log-in questionnaires that you should complete each time you log on and off of Facebook those days.

What is the best email address to reach you at?

EACH NIGHT, you will also receive an email with a link to a brief online questionnaire. At the end of each day, please click on that link and answer the questions regarding your activities in the **past day**. This will take approximately 3 to 5 minutes.

Finally, in **ONE MONTH**, you will receive an email with a link to online questionnaires. Please complete these. These will take approximately 15 minutes.

You will now receive samples of the online questionnaires that you will be completing. Please practice filling each one out, and be sure to notify the experimenter if you have any questions about any of them.

Thank you again for your participation in our study. Given how popular Facebook is and what a large part of people's lives it has become, we really believe that it is important to

study how it impacts our everyday lives. By completing these questionnaires each time you log in and out of Facebook and each night, we are able to gather information about how Facebook influences us. Your participation is essential to making important advances in this field, and we are extremely appreciative of your time and effort.

Please remember that your participation is entirely voluntary and you are free to withdraw your consent at any time in the study, without any consequence to you. In addition, your information is kept strictly confidential. No personal identifiers will be placed on any of your information, and any study materials will be labeled with an ID number.

In case of any questions or concerns about the study, feel free to contact the Study Coordinator, Tanya Tran at: UMFacebookstudy@gmail.com or (305) 284-2307.

Appendix P: Pre-login Questionnaire

1) Date: _____ Time: _____

2) Think about how you are feeling *right now*. Right now, I feel....

1	2	3	4	5
not at all	a little	moderately	quite a bit	extremely
_____ sad		_____ bored		_____ upset
_____ excited		_____ happy		_____ good about self
_____ anxious		_____ distressed		_____ lonely
_____ relaxed		_____ guilty		

Appendix Q: Post-login Questionnaire

1) Date: _____ Time: _____

2) Think about how you are feeling *right now*. Right now, I feel....

1	2	3	4	5	
not at all	a little	moderately	quite a bit	extremely	
_____	sad	_____	bored	_____	upset
_____	excited	_____	happy	_____	good about self
_____	anxious	_____	distressed	_____	lonely
_____	relaxed	_____	guilty		

Please answer the following questions about your FB usage during your **most recent login**.

3) While on Facebook, how often did you do the following?

1	2	3	4	5
not at all	a little	moderately	quite a bit	a lot
a)	Think about positive/good things (D)			
b)	Think about negative/bad things (Rum)			
c)	Think about how alone I feel (Rum)			
d)	Try to change my emotions by thinking about ways to distract myself from my feelings (D)			
e)	Think about my own shortcomings, failings, faults, mistakes (Rum)			
f)	Think about how sad I feel (Rum)			
g)	Think about things I can do to make myself feel better (D)			
h)	Think about how angry I am with myself (Rum)			
i)	Try to distract myself by chatting, or using games or applications (D)			
j)	Compare myself to others (Rum)			
k)	Think about what I could have done differently (Rum)			
l)	Try to distract myself by looking at pictures, messages, or wall posts (D)			

- 4) While on Facebook, how often did you **think about your breakup and/or view content related to your ex-significant other** and do the following?

1	2	3	4	5
not at all	a little	moderately	quite a bit	a lot

- a) Think about positive/good things (D)
 - b) Think about negative/bad things (Rum)
 - c) Think about how alone I feel (Rum)
 - d) Try to change my emotions by thinking about ways to distract myself from my feelings (D)
 - e) Think about my own shortcomings, failings, faults, mistakes (Rum)
 - f) Think about how sad I feel (Rum)
 - g) Mark "quite a bit"
 - h) Think about how angry I am with my ex-significant other (Rum)
 - i) Think about things I can do to make myself feel better (D)
 - j) Think about how angry I am with myself (Rum)
 - k) Try to distract myself by chatting, or using games or applications (D)
 - l) Think about what my ex's life is like without me (Rum)
 - m) Compare myself to others (Rum)
 - n) Think about what I could have done differently (Rum)
 - o) Try to distract myself by looking at pictures, messages, or wall posts unrelated to my ex (D)
- 5) How long did you spend on FB?
- a) ≤ 5 minutes
 - b) 6 to 10 minutes
 - c) 11 to 15 minutes
 - d) 16 to 20 minutes
 - e) > 20 minutes
- 6) I viewed the following people's profiles (check all that apply):
- My own
 - Friend or acquaintance
 - Ex-significant other
 - Current SO
 - No one
- 7) While on FB, I viewed or used the following which contained information about my ex-significant other (note: this information did **not** necessarily have to be on your ex-significant other's profile) (check all that apply):
- Chat, messages
 - Pictures, videos
 - Status updates, wall postings, ex-significant other's friend list, events, or any profile content on ex-significant other's profile or on someone else's profile pertaining to him/her

- Other: _____
 None

8) I logged on from:

- a) My mobile device (e.g., iPhone, Blackberry, etc.)
b) Personal computer
c) Public computer

9) Where are you right now?

- a) Dorm/apt/home (i.e., wherever you live when not in class)
b) School (in class)
c) School/campus (**not** in class; e.g., in hall, food court, etc.)
d) Not on campus in public (e.g., grocery store, out to dinner, etc.)
e) Other: _____

10) I am:

- a) Alone
b) With a friend(s)
c) In public (people are around but I'm not interacting with anyone)
d) Other: _____

Appendix R: Daily Questionnaire

Please answer the following questions regarding your FB usage **TODAY (since the last time you completed these daily questions)**.

- 1) Date: _____ Time: _____
- 2) How much time did you spend on FB today?
 - a) < 15 minutes
 - b) 15 to 29 minutes
 - c) 30 to 59 minutes
 - d) Between 1 to 2 hours
 - e) Between 2 to 3 hours
 - f) > 3 hours
- 3) How many times did you log on to FB today?
 - a) None
 - b) 1-2 times
 - c) 3-5 times
 - d) 6-9 times
 - e) 10-15 times
 - f) >15 times
- 4) Each time you logged on today, on average, how long did you actively browse/use Facebook?
 - a) \leq 5 minutes
 - b) 6 to 10 minutes
 - c) 11 to 15 minutes
 - d) 16 to 20 minutes
 - e) > 20 minutes
- 5) Did anything very **good** happen in your life today?
 Yes
 No
- 6) Did anything very **bad** happen in your life today?
 Yes
 No
- 7) Today, I had contact with my ex-significant other via (check all that apply):
 I did **not** have contact with my ex-significant other (If checked this, **skip to # 9**)
 In person (face-to-face)
 NOT in person (e.g., by telephone, email, text message, letter, via Facebook messages, wall posts, chat, etc.)

- 8) This interaction with my ex-significant other was:
- Very positive
 - Somewhat positive
 - Neither negative nor positive
 - Somewhat negative
 - Very negative
- 9) How often did you view content (e.g., status updates, pictures, wall posts, profile, notes, videos, email notification, etc.) pertaining to your ex-significant other today? (note: this information did **not** necessarily have to be on your ex-significant other's profile)
- Never (0%)
 - Some of the time I logged on (~ 25%)
 - About half of the time I logged on (~ 50%)
 - Most of the time I logged on (~ 75%)
 - Every time I logged on (100%)
- 10) What percentage of the time that you logged on today did you log on through your mobile device (e.g., iPhone, Blackberry)?
- Never (0%)
 - Some of the time I logged on (~ 25%)
 - About half of the time I logged on (~ 50%)
 - Most of the time I logged on (~ 75%)
 - Every time I logged on (100%)
- 11) How many times did you log onto Facebook and **not** complete a pre-login questionnaire?
- None
 - 1 time
 - 2-3 times
 - 4-5 times
 - > 5 times
- 12) How many times did you log onto Facebook and **not** complete a pre-login questionnaire?
- None
 - 1 time
 - 2-3 times
 - 4-5 times
 - > 5 times

- 13) How many times did you complete a **pre-login** questionnaire after already having started to browse Facebook?
- a) None
 - b) 1 time
 - c) 2-3 times
 - d) 4-5 times
 - e) > 5 times
- 14) How many times did you complete a **post-login** questionnaire **more than 5 minutes** after logging off of Facebook?
- a) None
 - b) 1 time
 - c) 2-3 times
 - d) 4-5 times
 - e) > 5 times
- 15) Was your Facebook use today indicative of your average Facebook use?
- a) Yes
 - b) No, I usually use it much less
 - c) No, I usually use it much more

Appendix S: Follow-up Questionnaire

Please answer the following questions regarding your Facebook usage in the **past month**.

- 1) Date: _____ Time: _____
- 2) On average, how much time did you spend on Facebook **per day**?
 - a) < 15 minutes
 - b) 15 to 29 minutes
 - c) 30 to 59 minutes
 - d) Between 1 to 2 hours
 - e) Between 2 to 3 hours
 - f) > 3 hours
- 3) On average, how many times did you log on to Facebook **per day**?
 - a) ≤ 1 time
 - b) 2-4 times
 - c) 5-9 times
 - d) 10-15 times
 - e) > 15 times
- 4) Each time you logged on, on average, how long did you actively browse/use Facebook?
 - a) ≤ 5 minutes
 - b) 6 to 10 minutes
 - c) 11 to 15 minutes
 - d) 16 to 20 minutes
 - e) > 20 minutes
- 5) On average, how often did you view content (e.g., status updates, pictures, wall posts, profile, notes, videos, etc.) pertaining to your ex-significant other?
 - a) Never (0%)
 - b) Some of the time I logged on (~ 25%)
 - c) About half of the time I logged on (~ 50%)
 - d) Most of the time I logged on (~ 75%)
 - e) Every time I logged on (100%)
- 6) While on Facebook in **the past month**, how often did you do the following?

1	2	3	4	5
not at all	a little	moderately	quite a bit	a lot

 - a) Think about positive/good things (D)
 - b) Think about negative/bad things (Rum)
 - c) Think about how alone I feel (Rum)

- d) Try to change my emotions by thinking about ways to distract myself from my feelings (D)
- e) Think about my own shortcomings, failings, faults, mistakes (Rum)
- f) Think about how sad I feel (Rum)
- g) Think about things I can do to make myself feel better (D)
- h) Think about how angry I am with myself (Rum)
- i) Try to distract myself by chatting, or using games or applications (D)
- j) Compare myself to others (Rum)
- k) Think about what I could have done differently (Rum)
- l) Try to distract myself by looking at pictures, messages, or wall posts (D)
- 7) While on Facebook in **the past month**, how often did you **think about your breakup and/or view content related to your ex-significant other** and do the following?
- | | | | | |
|------------|----------|------------|-------------|-------|
| 1 | 2 | 3 | 4 | 5 |
| not at all | a little | moderately | quite a bit | a lot |
- a) Think about positive/good things (D)
- b) Think about negative/bad things (Rum)
- c) Think about how alone I feel (Rum)
- d) Try to change my emotions by thinking about ways to distract myself from my feelings (D)
- e) Think about my own shortcomings, failings, faults, mistakes (Rum)
- f) Think about how sad I feel (Rum)
- g) Mark “quite a bit”
- h) Think about how angry I am with my ex-significant other (Rum)
- i) Think about things I can do to make myself feel better (D)
- j) Think about how angry I am with myself (Rum)
- k) Try to distract myself by chatting, or using games or applications (D)
- l) Think about what my ex’s life is like without me (Rum)
- m) Compare myself to others (Rum)
- n) Think about what I could have done differently (Rum)
- o) Try to distract myself by looking at pictures, messages, or wall posts unrelated to my ex (D)
- 8) Did anything very **good** happen in your life this month?
- Yes
- No
- 9) Did anything very **bad** happen in your life this month?
- Yes
- No

- 10) In the past month, how much in-person (“face-to-face”) contact or communication have you had with your ex-significant other?
- None at all
 - One hour or less
 - 2 – 5 hours
 - 5 to 10 hours
 - > 10 hours
- 11) In the past month, how much contact have you had with your ex-significant other that was **NOT** face-to-face (e.g., by telephone, email, letters, text message, via Facebook messages, wall posts, chat, etc.)?
- None at all
 - One hour or less
 - 2 – 5 hours
 - 5 to 10 hours
 - > 10 hours
- 12) Did you block or de-friend your ex-significant other at anytime during the course of the study?
- Yes
- No
- 13) Did your ex-significant other block or de-friend you at anytime during the course of the study?
- Yes
- No
- 14) Did you and your ex-significant other get back together at anytime during the course of the study?
- Yes
- No (**skip to #16**)
- 15) If yes, are you still together?
- Yes
- No
- 16) Please briefly describe your recent break-up (2-3 sentences): _____
- _____
- 17) When completing the questionnaires during the course of the **entire study**, how many times did you not tell the truth or change what was going on?
- None
 - 1 time
 - 2-4 times
 - 4-6 times
 - > 6 times