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LOYOLA UNIVERSITY CHICAGO

FEAR OF MISSING OUT:  
A MODERATED MEDIATION APPROACH  
TO SOCIAL MEDIA USE

A THESIS SUBMITTED TO  
THE FACULTY OF THE GRADUATE SCHOOL  
IN CANDIDACY FOR THE DEGREE OF  
MASTER OF ARTS

PROGRAM IN CLINICAL PSYCHOLOGY

BY

BRYNN M. HUGUENEL

CHICAGO, IL

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## ABSTRACT

Literature examining the relation between social media use and mental health outcomes remains mixed and inconclusive. The current study explores whether fear of missing out (FOMO) mediates the relation between social networking site (SNS) use and negative mental health outcomes. Further, the relation is examined in a more nuanced way by including multidimensional measures of SNS use and moderators of Facebook activities and individual-level characteristics. These research questions have been framed within the developmental context of emerging adulthood. Data was collected from undergraduate students ( $N=296$ ) who participated in two time points of a short-term longitudinal survey, which included various measures of psychological and physical functioning, SNS use, and well-being. Mediation analyses using bootstrapping methods indicated that the intensity of Facebook use did not predict anxiety or depression, as mediated by FOMO. A longitudinal moderated multiple regression analysis did not reveal a significant moderation of specific Facebook activities on the relation between intensity of Facebook use and FOMO. Finally, longitudinal moderated multiple regression analyses did not find that individual characteristics of social comparison and social connectedness moderate the relations between FOMO and negative mental health outcomes. Post-hoc analyses showed that social connectedness moderated the relation between FOMO and anxiety. Further, passive behaviors on social media indirectly predicted higher levels of anxiety and depression through increases in FOMO. This study gives pause in making sweeping negative



conclusions about SNS use, finding that the manner in which one uses SNSs may be more important than duration of time spent online.

## CHAPTER ONE

### INTRODUCTION

Over time, Internet use has shifted from practical purposes related to commerce and information dissemination to entertainment and socialization, as exemplified through the use of social networking sites (SNSs). SNSs include all online activity in which users communicate through words, pictures, and videos to share information, ideas, and other personal content (Peck, 2008). Developments in mobile devices and wireless Internet connectivity have led to an increased prevalence of SNS use, with Facebook reporting the highest usership rates (Lenhart, Purcell, Smith, & Zickuhr, 2010; Statista, 2015). Currently, the majority of individuals with Facebook accounts are emerging adults, those aged 18 to 25 (Kittinger, Correia, & Irons, 2012). SNS use by this group may aid in the navigation of developmental tasks of identity growth, social approval, increased autonomy, and adjustment to instability (Arnett, 2006; Roisman, Masten, Coatsworth, & Tellegen, 2004; Schulenberg, Bryant, & O'Malley, 2004).

Given that many forms of mental illness first emerge during this developmental period (Schulenberg & Zarrett, 2006), it is critical to elucidate ways in which contextual factors like SNSs can contribute to divergent paths in mental health. Current research remains conflicted as to whether SNS use is associated with positive or negative mental health outcomes, with some indicating that SNS use has positive effects on overall well-being (Burke, Marlow, & Lento, 2010) and increased social capital (Burke et al., 2010; Ellison, Steinfield, & Lampe, 2007),

whereas others indicate that SNS use is linked with negative outcomes like increased psychiatric symptoms (Alabi, 2013; Alavi et al., 2011; Gregory, 2012; Kross et al., 2013; Rosen, 2011) and increased loneliness (Engelberg & Sjöberg, 2004; Kubey, Lavin, & Barrows, 2001). These discrepancies call for the examination of mediators and moderators to better understand the complexity of this relation.

A concept labeled “fear of missing out” (FOMO) has caught attention in popular media recently, and is described as the pervasive apprehension that others are having more rewarding experiences (Przybylski, Murayama, DeHaan, & Gladwell, 2013). Since SNS use is related to FOMO (Alt, 2015; Przybylski et al., 2013; White, 2013), and FOMO predicts negative mental health outcomes (Australian Psychological Society, 2015; Przybylski et al., 2013; Vaidya & Krishnan, 2016), FOMO may mediate the relation between SNS use and negative mental health outcomes.

Research has yet to examine the mechanisms by which FOMO may lead to negative mental health outcomes for some users, but not for others. Since SNS users carefully construct positive self-images online, biased upward comparisons are common and have been associated with depression, anxiety, and stress (Feinstein, 2013; Gilbert, McEwan, Bellew, Mills, & Gale, 2009; Zuo, 2014). Further, innate needs for social connection and belonging are strong motivators for SNS use (Baumeister & Leary, 1995), and those who engage in problematic Internet use are more likely to become over-reliant on virtual relationships and thereby reduce their face-to-face interactions, resulting in problems in functioning (Caplan, 2006; Chak & Leung, 2004; Young, Pistner, O’Mara, & Buchanan, 1999). Therefore, those who are prone to social comparisons and those who are lacking in real-life social connections may be at risk for developing negative mental health outcomes when faced with feelings of FOMO.

Finally, exposure to media use has heterogeneous effects on individuals depending on their specific activities and motivations (Aboujaoude et al., 2006; Burke et al., 2010; Ross et al., 2009; Ruggiero, 2000). Active behaviors on Facebook, like writing comments or posts, have been linked to decreases in loneliness and depression (Burke et al., 2010), whereas passive behaviors, like viewing one's newsfeed, have been linked to worse social adjustment (Gray, Vitak, Easton, & Ellison, 2013). In addition, inconsistent results in mental health findings may be due in part to the examination of SNS use as a one-dimensional variable in previous studies (Valkenburg, Peter, & Schouten, 2006). Thus, future research would benefit from both capturing SNS use in a more dynamic way and exploring the moderating effects of individuals' specific activities on SNSs.

Using a moderated mediation model, the present study investigates the relation between Facebook use and negative mental health outcomes in a college-attending emerging adult sample. The current study examines whether FOMO mediates the relation between Facebook use and negative mental health outcomes, whether individuals' specific behaviors on Facebook moderate the path between Facebook use and FOMO, and whether individual characteristics, such as levels of social comparison and connectedness, moderate the path between FOMO and negative mental health outcomes.

## CHAPTER TWO

### REVIEW OF THE RELEVANT LITERATURE

Prior to the advent of the Internet, information was limited to a few sources, such as family, friends, television, and newspaper, and because of this, dissemination of information was infrequent (Chou et al., 2009; Wortham, 2011). Initially, the Internet was utilized for commerce and information dissemination and there was a smaller quantity of sources available. However, as the Internet became more mainstreamed, the uses expanded to include entertainment and socialization through the incorporation of gaming networks, internet relay chats, multiuser dungeons, and eventually social networking sites (Weiser, 2001). As such, the Internet can be used bifunctionally, with online activities relating to: a) goods and information acquisition, which involves a practical orientation towards Internet use, and b) socio-affective regulation, with individuals using the Internet to fulfill needs for affiliation and socialization (Weiser, 2001).

Social networking sites (SNSs) encompass all online activity in which users communicate through words, pictures, or audio/video content with the purposes of sharing information, establishing personal connections, and/or building community (Peck, 2008). Research indicates that using SNSs is now the fourth most popular online activity and is becoming increasingly incorporated into daily life (Kittinger et al., 2012). This recent shift toward SNS popularity has transformed individuals from passive media consumers into active prosumers, meaning that they control information by creating, sharing, and reacting to online content (Rutledge, 2014). Ultimately, SNSs are more interactive and accessible than prior forms

of media, and many users engage in multiple SNSs to build a richer media experience (Rutledge, 2014; Young & Rogers, 1998).

### **Increasing Prevalence and Integration of SNSs**

Advancements in technology, especially the introduction of wireless, Internet-enabled mobile devices, have provided users with constant and infinite information and connectivity. The ability to access the Internet frequently and easily has, in turn, supported the rapid growth of SNSs and their integration into daily life (Lenhart et al., 2010).

Although Facebook is over ten years old, it is still regarded as the dominant SNS, with 71% of Internet users aged 18 or older reporting that Facebook is their SNS of choice (Duggan et al., 2015; Kittinger et al., 2012). While more individuals are using multiple SNSs and newer sites have experienced more rapid growth in recent years (Statista, 2015), Facebook remains the most popular site with a usership far exceeding that of other SNSs and average rates of daily use increasing from 40 to 50 minutes per day between 2014 and 2016 (Statista, 2015; Stewart, 2016). Although Facebook has become a mainstay in our culture, the specific uses of the site have changed over time. For example, Facebook users today send fewer personal messages and post fewer comments on group pages than in previous years, and instead prefer to use Facebook to post comments on friends' walls and to share pictures (Lenhart, et al., 2010).

Currently, the majority of individuals with Facebook accounts are emerging adults, and when this age group is engaged with SNSs, the majority of their time is spent on Facebook specifically (Kittinger et al., 2012). Research indicates that college students on average use Facebook between 30-90 minutes per day (Coyne, Padilla-Walker, & Howard, 2013; Fox & Moreland, 2015; Zuo, 2014). Thus, while shifts have occurred wherein Internet users are

engaging in multiple SNSs simultaneously, Facebook remains both relevant and popular in emerging adult populations.

### **Emerging Adulthood and its Developmental Features**

The developmental stage of emerging adulthood, capturing ages 18 to 25, is characterized by individuals who identify neither as adolescents nor as adults (Arnett, 2000; Arnett, 2006). Emerging adults are tasked with exploring and developing their identity in terms of romance, work, and overall worldviews, in addition to navigating instability, especially in terms of residential changes (Arnett, 2006; Arnett, 2007; Roisman et al., 2004; Schulenberg et al., 2004). Further, this stage allows individuals to be self-focused and have the freedom to explore identity without other major and impeding commitments (Arnett, 2000; Arnett, 2007). Ultimately, success in moving towards developmental goals is strongly linked with gaining or maintaining positive well-being, which is important since emerging adulthood can be a time of increasing mental health concerns (Aseltine & Gore, 1993; Schulenberg et al., 2004; Schulenberg, Sameroff, & Cicchetti, 2004).

Emerging adults rely heavily on their own resources, such as SNSs, to navigate the aforementioned developmental tasks (Côté & Levine, 2002). According to the Uses and Gratifications theory of SNS use, individuals engage in specific forms of media that are able to fulfill their social and psychological needs (Coyne et al., 2013). Similarly, the Media Practice Model states that one's sense of self influences the media that one engages in and attends to, how one experiences media, and how it is incorporated into one's everyday life (Brown, 2006). Thus, one's needs, knowledge, and personal characteristics will drive one to engage in a certain type of media, and this feedback between media and the self continues in a cyclical manner (Brown, 2006). Since an individual's needs will be influenced in part by their developmental stage and its

associated tasks, it is important to apply a developmental lens when considering how and why emerging adults use SNSs.

Since SNSs provide access to social networks, these sites are especially appealing to emerging adults, who rely on social capital to progress towards accomplishing developmental tasks (Mazzoni & Iannone, 2014). Through the observation of social behavior, individuals are able to learn social rules, norms, and scripts in hopes of achieving acceptance and positive reinforcement (Brown, 2006). This is important since group connections, values, and acceptance have heightened saliency and priority at this age. SNSs facilitate this process by making social behavior explicit and easily observed (Peck, 2008), and SNSs have been likened to social voyeurism in that users can pass time idly while also learning about society at large (Boyd, 2007).

Further, SNSs provide a virtual space in which emerging adults can create, test, and solidify identities, social and romantic connections, and occupational and societal roles (Brown, 2006). The anonymity of SNSs can encourage self-disclosure, which promotes identity development, and users can connect with others who share similar interests but may not have been accessible otherwise in real life (Shapiro & Margolin, 2014). Individuals can use posts and photos to express their interests and identity, and receiving feedback through comments, “likes,” and “shares” can validate experiences and provide self-clarity (Pempek, Yermolayeva, & Calvert, 2009). However, this sense of self-awareness online can also encourage comparisons between the self and audience expectations, and resulting tension may be relieved through profile changes and the solicitation of advice and social cues (Marder, Houghton, Joinson, Shankar, & Bull, 2016).



Finally, it is important to consider that emerging adulthood is a period of development in which many forms of mental illness first emerge (Schulenberg & Zarrett, 2006). The transition to more emotional, financial, and overall independence, in combination with the changes in contexts, social roles, and relationships, may lead to divergent paths of mental health (Schulenberg et al., 2004; Schulenberg & Zarrett, 2006). For example, incidence rates for major depression (McGorry, Purcell, Goldstone, & Amminger, 2011; Rohde, Lewinsohn, Klein, Seeley, & Gau, 2012), bipolar disorders (Lewinsohn et al., 2000; McGorry et al., 2011), schizophrenia (McGorry, 2011; McGorry et al., 2011), and borderline personality disorder (Grant et al., 2008) all increase during this time period. In line with the diathesis-stress model of mental illness, both the person and the context must be accounted for when exploring the potential courses for mental health. Consequently, SNS use may have unique effects on emerging adults, who are frequent users of social media, use SNSs to accomplish developmental tasks, and are in a life-stage associated with fluctuating mental health statuses.

### **The Importance of the College Context**

When exploring the role that context plays in the usage of SNS, it is also important to consider the college environment. College supports the processes of gaining control, agency, and autonomy during emerging adulthood by removing the individual from the family context and immersing him or her in an environment of diverse ideas, behaviors, attitudes, and people (Tanner, 2006). Since autonomy and identity development can be supported through SNSs, it is not surprising that social media use is prevalent within the college context.

Facebook was originally developed to facilitate the maintenance of old and the establishment of new social ties as individuals entered college (Ross et al., 2009). Still today, students report using Facebook to stay connected with family and friends after they move away

from home, thereby providing them with stronger social supports (Ellison et al., 2007; Gemmill & Peterson, 2006). The new and unfamiliar college environment drives the need to create new, more relevant social connections, and SNSs are an easy and effective way to do so (Mazzoni & Iannone, 2014).

It is important to consider how the stress of both the college context and the developmental stage of emerging adulthood may place individuals at risk for problematic SNS use (Anderson, 2001). Internet use is expected, if not required, by most professors and courses, and so students are online more now than ever before (Chak & Leung, 2004). Acclimating to new and more intense academic requirements, and balancing these with building community and social connections, can be stressful. In response to this stress, students may use the Internet, and specifically SNSs, as a coping mechanism. Excessive SNS use may be one way for students to gain a sense of control over their lives in the new, unfamiliar college setting after leaving home for the first time (Kubey et al., 2001). Other students may turn to SNSs to cope by building and strengthening social supports (Aseltine & Gore, 1993).

Additionally, for many, college is the first time away from parents and their surveillance (Chak & Leung, 2004; Coyne et al., 2013). Without having someone nearby monitoring their activities and use of time, some students may spend an excessive amount of time on SNSs. Thus, the large spans of unstructured time that are common in college can lead to problematic SNS use for those who are not as well-equipped in time management and activity structuring (Chak & Leung, 2004).

College represents a time in which many individuals are in close contact with an unprecedented number of peers, and this, in combination with the unfamiliar social context, increases the need for social approval. During emerging adulthood, peer influence continues to

be the primary motivator for individuals' behavior, especially delinquent or problematic behavior (Aseltine & Gore, 1993). Thus, if students see or simply *believe* that others their age are engaging in SNSs constantly, they may feel pressured to do the same in order to adhere to social norms. This heightened desire for approval has been found to underlie both problematic drinking and Internet use in college (Kuss & Griffiths, 2011).

Finally, the transition to college may also prompt or exacerbate underlying mental health vulnerabilities (Aseltine & Gore, 1993). It is not uncommon for major transitions to affect one's mental health trajectory due to the significant stress and changes that occur during such times (Schulenberg et al., 2004). For example, the social changes that occur when one graduates high school have been found to affect critical areas of functioning, which in turn negatively affect mental health (Aseltine & Gore, 1993). Thus, the college context may place emerging adults at risk for problematic SNS use as they navigate newfound freedoms, construct new social communities, and cope with academic and transitional stress.

### **SNSs and Mental Health**

The current literature examining the links between SNS use and mental health outcomes is largely inconclusive due to conflicting results. This section serves to present the prevailing themes in the literature examining the intersection of SNSs and mental health, both in terms of positive and negative outcomes.

Some research indicates that Facebook use is correlated with overall well-being (Burke et al., 2010). The most common positive finding is that Facebook is associated with the formation and solidification of new social connections, in addition to the maintenance of old connections (Burke et al., 2010; Ellison et al., 2007; Kross et al., 2013; Lenhart, 2009; Shah, Kwak, & Holbert, 2001; Steinfield, Ellison, & Lampe, 2008). In turn, increases in social capital have been

associated with positive social and well-being outcomes, such as increased self-esteem and life satisfaction (Ellison et al., 2007), lower loneliness (Burke et al., 2010; Soudi & b Duggi, 2016), and overall adjustment to college (Kalpidou, Costin & Morris, 2011).

By allowing users to tailor their profiles and share thoughts, photos, and videos, SNSs encourage self-presentation and expression, identity development, and creativity, all of which can be linked to positive well-being (Brown, 2006; Kuss & Griffiths, 2011; Weiser, 2001). Many SNS users report engaging in sites like Facebook in order to avoid negative emotional states like loneliness (Burke et al., 2010), boredom, and dissatisfaction with current relationships (Lampe, Ellison, & Steinfield, 2007). Receiving positive or supportive feedback through comments, “likes,” or “shares” on SNSs increases positive affect and self-esteem (Valkenburg et al., 2006). Furthermore, these sites allow for greater anonymity, which for some reduces social pressures, provides a sense of control over social encounters and responses, and allows a truer expression of the self (Engelberg & Sjöberg, 2004; Wilson, Fornasier, & White, 2010). For these reasons, Facebook has been found to provide the largest psychological and well-being benefits to those who have low self-esteem, low life-satisfaction, high social anxiety, or identify as being a “misfit” (Brown, 2006; Caplan, 2006; Ellison et al., 2007; Valkenburg et al., 2006).

Although benefits have been linked to SNS use, there is also a substantial base of research indicating the opposite. Kross et al. (2013) found that Facebook use predicts declines in users’ subjective well-being and mental health functioning. Daily overuse has been shown to place individuals at a heightened risk for anxiety, depression, addiction, and other health and psychiatric problems (Alabi, 2013; Alavi et al., 2011; Rosen, 2011; Zuo, 2014). More frequent Facebook use predicts lower life satisfaction two weeks later (Kross et al., 2013), and those who both spend more time on Facebook and report a greater investment in the site have lower self-

esteem related to their academic functioning, social skills, and physical appearance (Kalpidou et al., 2011; Zuo, 2014). Using SNSs for an average of two or more hours per day was independently linked to low self-ratings of mental health, as well as high levels of psychological distress and suicidal ideation (Sampasa-Kanyinga & Lewis, 2015).

The constant shifting between real and virtual social worlds has been associated with increases in anxiety (Gregory, 2012). While SNSs like Facebook may be helpful to those with social anxiety in the short-term, using them to avoid real-world interactions may be problematic in the long-term. Facebook can prime users to be concerned about self-presentation and to engage in social comparison, especially for those high in social anxiety (Rauch, Strobel, Bella, Odachowski, & Bloom, 2014). Even more common is for users to experience anxiety in response to feeling constantly connected to others now that SNSs can be accessed at any time and from any location. This is especially true for emerging adults since this group relate most strongly with friends through virtual connections (Gregory, 2012).

SNS and general Internet use may also have negative social implications, with Internet use commonly linked to increased feelings of loneliness and social isolation (Enez-Darcin et al., 2016; Engelberg & Sjöberg, 2004; Fox & Moreland, 2015; Kraut et al., 1998; Kubey et al., 2001; Stoll, 1995). Using Facebook for the purpose of social interaction may actually diminish social capital, especially psychological components like trust, since virtual relationships are more superficial (Shah et al., 2001). Frequency of SNS use does not predict supportive interactions, which reinforces the idea that virtual relationships may lack the intimacy of in-person relationships (Oh, Ozkaya, & LaRose, 2014). SNSs may even serve to disrupt pre-existing relationships by creating new or worsening previous sources of conflict due to differing

expectations of others' accessibility on SNSs or of transparency in online interactions (Fox & Moreland, 2015).

Excessive SNS use also has been linked to worse academic outcomes, with 76% of college students indicating that SNS use has a negative effect on their academic functioning (Pempek et al., 2009). SNS use may affect academics by taking time away from studying, thus resulting in an overall loss of productivity in coursework, as evidenced by higher rates of SNS use negatively predicting GPAs and time spent studying (Anderson, 2001; Fox & Moreland, 2015; Kuss & Griffiths, 2011). Further, more students are engaging in SNSs while in class or at work, which distracts them from the material and impedes learning (Coyne et al., 2013; Kubey et al., 2001).

Most concerning is the addictive potential SNSs, with 9-15% of college samples endorsing one or more typical markers of addiction when describing their SNS use (Anderson, 2001; Chak & Leung, 2004; Kubey et al., 2001; Müller et al., 2016; Song, Larose, Eastin, & Lin, 2004). Those who report using their Smartphone primarily for SNSs have higher addiction scores than those who use their phone for other purposes, like text messaging or checking emails (Enez-Darcin et al., 2016). Communicative activities like SNSs may be the most addictive Internet features since they allow users to escape from the outside world and its associated negative feelings or experiences (Kubey et al., 2001; Song et al., 2004; Young & Rogers, 1998). While dysfunctional coping strategies like distraction and escape can relieve stress initially, overuse of these strategies can be problematic (Kuss & Griffiths, 2011). This addictive potential is troublesome since pathological SNS use has been linked to a variety of negative mental health outcomes, including impulsivity, aggression, anxiety, ADHD, social phobia, depression, and worse social competence (Coyne et al., 2013).

Evidently, the literature surrounding social media use and mental health outcomes is conflicting and ill-defined. This confusion within the field signifies that more research is needed, and that future research must examine more detailed models that include moderators and/or mediators. It is clear that some individuals may benefit from their SNS use while others may not; however, it is not yet clear what specifically moderates and/or mediates the relation between SNS use and negative mental health outcomes. Thus, the current study examines the variable “fear of missing out” (FOMO) as a mediator of that relation, and variables specific to SNS activities and personal characteristics as moderators.

### **Development of a “Fear of Missing Out”**

More recently in popular culture, Facebook use has been related to a concept known as FOMO, which is the consuming worry that others may be having more rewarding experiences than oneself (Przybylski et al., 2013). Due to the volume of information on SNSs, it can be difficult for users to decide what to incorporate or use since in choosing, the user is inherently *not* choosing the multitude of other options. This sparks the fear that one has made a bad or wrong decision about how to spend one’s time, especially since one can view others’ activities in real-time through SNSs, thereby imagining how life could be different (Wortham, 2011).

FOMO is most prevalent in SNS users aged 18 to 33, peaking at age 24 with 66% experiencing this fear (Abel, Buff, & Burr, 2016; Australian Psychological Society, 2015; White, 2013). This phenomenon has become so pervasive that users admit to purposefully trying to provoke FOMO in others through the content of their posts (Hetz, Dawson, & Cullen, 2015). Emerging adults report using SNSs both to brag about their lives and to track updates since they want to be “in the know” constantly (JWTIntelligence, 2012). On the other hand, these same users feel overwhelmed by the amount of information that must be consumed in order to satisfy

the need for knowledge, and report feeling nervous and socially excluded when they see on SNSs that friends are engaged in an activity that they are not involved in too (JWTIntelligence, 2012). FOMO may produce feelings of relative deprivation in users, such that comparing their lives to the content that others post on Facebook prompts users to feel worse about themselves, their current situation, and their long-term goals (JWTIntelligence, 2012). Emerging adults may be especially vulnerable to relative deprivation since they have less-stable identities and fewer formative experiences, while simultaneously having the most time and desire for new experiences (JWTIntelligence, 2012).

The idea of others having more or better experiences and/or material goods is not new, with Kandell (1998) including a fear of missing out on something as a marker of Internet addiction nearly twenty years ago. However, the recent increases in time spent on SNSs have encouraged greater awareness of others' activities, and individuals are no longer using SNSs to access friends but to know what others are doing and saying (Quinn & Oldmeadow, 2013). Since SNSs afford an unprecedented level of insight into information and activities in real-time, individuals may engage in SNSs excessively in order to fulfill innate desires to feel accepted and to know what others in their social group are doing (Abel et al., 2016). As compared to other age groups, emerging adults are most likely to use Facebook to resolve fears triggered by FOMO, with higher levels of FOMO spurring significantly more frequent Facebook checking (Abel et al., 2016; JWTIntelligence, 2012). In this way, a cyclical pattern between FOMO and Facebook use develops, as more time spent on Facebook leads to heightened expectations that more important information is available and will be missed potentially (Przybylski et al., 2013). Those high in FOMO are more likely to feel that they are missing out on social information after they use SNSs, which may preliminarily indicate the directionality of this relation (Abel et al., 2016).



Therefore, an interesting dilemma occurs wherein over half of emerging adults turn to SNSs to relax, and yet 60% report feeling burnt out by SNSs and have a difficult time sleeping or relaxing after logging on (Australian Psychological Society, 2015).

Previous research indicates that FOMO has potential mental health implications for SNS users. FOMO has been linked with anxiety and depression in adolescent populations (Australian Psychological Society, 2015), lower mood and life satisfaction (Alt, 2015; Przybylski et al., 2013), greater alcohol consumption (Riordan, Flett, Hunter, Scarf, & Conner, 2015), and worse academic outcomes (Alt, 2015). Additionally, SNS users report that FOMO is associated with feelings of inadequacy, loneliness, detachment from others, and jealousy (Australian Psychological Society, 2015). Importantly, prior research indicates that FOMO predicts Internet addiction, providing support for the directionality of this relation (Vaidya & Krishnan, 2016). Further, many of those who qualify for Internet addiction report that their Internet use is partially motivated by the desire to stay in the loop with friends (Anderson, 2001). While users do not differ in their rates of Facebook use when spending time alone, those high in FOMO are significantly more likely than those low in FOMO to check Facebook while with others, in class, and while driving (Abel et al., 2016; Alt, 2015; Przybylski et al., 2013; White, 2013). Similarly to those who qualify for Internet addiction, those who experience high levels of FOMO report discomfort if they cannot connect to SNSs and difficulty relaxing after SNS use (Australian Psychological Society, 2015). These findings indicate that FOMO and problematic SNS use commonly occur hand-in-hand, serving to exacerbate each other.

Evidently, FOMO is both pervasive and has potentially harmful effects on well-being and mental health. However, research focusing on FOMO is in the preliminary stages, and so it is difficult to identify what exactly FOMO is tapping into. One perspective is that FOMO may be a

type of cognitive distortion wherein individuals have a misperception that their lives are inadequate in some way (Australian Psychological Society, 2015; Wortham, 2011). FOMO may encourage individuals to jump to conclusions or exacerbate irrational thoughts for those who are already prone to cognitive distortions (White, 2013). Another perspective is that FOMO may be a form of peer pressure wherein individuals feel they must be constantly available to others through SNSs now that these applications can be accessed wirelessly (Fox & Moreland, 2015; Shapiro & Margolin, 2014). For example, the degree to which graduate students perceive that others expect them to be available through SNSs significantly predicts their intent to use SNSs (Choi & Chung, 2013). Despite feeling burnt out from being continually tethered to sites like Facebook, emerging adults report having difficulty disconnecting from them due to the social implications (Fox & Moreland, 2015). Finally, FOMO may be a type of social anxiety since there is a persistent concern that important social experiences are being missed (Dossey, 2014; Vaidya & Krishnan, 2016). FOMO is associated with a lower perceived social ranking, which in turn can lead to feelings of inferiority and anxiety (White, 2013). Supporting this theory, social anxiety and social interactions are two of the three psychological factors determined to comprise FOMO (Abel et al., 2016).

Prior research has explained FOMO through the perspective of self-determination theory, stating that those whose basic psychological needs of competence, autonomy, and relatedness are unfulfilled use SNSs at higher rates, and this association is mediated by FOMO (Przybylski et al., 2013). Using this model, Alt (2015) found that FOMO mediated the relation between extrinsic motivation and amotivation to SNS use during class time. However, this theory includes factors of both connectedness and comparison, and so it remains unknown which component may be more influential in driving FOMO levels. Similarly, Nadkarni and Hofmann

(2012) outlined a dual-factor model of Facebook use, with individuals engaging in Facebook to achieve self-presentation, such as by editing their own profile in response to the content posted by others, and to fulfill a sense of belonging by relating to others and gaining acceptance.

While FOMO appears to be a social concept, research is in the nascent stage and it remains unclear why some individuals experience FOMO, and what leads a subset of these individuals to then experience negative well-being outcomes. Examining variables of social comparison and social connectedness may help researchers to understand the risk factors for developing negative mental health outcomes when faced with FOMO.

### **The Facilitation of Social Comparisons**

Festinger's (1954) Social Comparison Theory states that individuals determine their own self-worth by observing how they compare to others, and this is especially true when an individual is in an uncertain or new situation. The interface of Facebook encourages comparison since users create profiles, accumulate friends, and join groups, all of which enable users to quantify and display accomplishments, identity, and social networks (Shapiro & Margolin, 2014). One of the leading motivations for using SNSs is to engage in self-presentation, and users commonly cite viewing others' profiles as a means of comparison (Haferkamp, Eimler, Papadakis & Kruck, 2012). SNSs also heighten competition for acceptance since other users make choices in what they support through "likes," comments, and sharing of posts. The tangible, quantifiable nature of approval on SNSs primes users to be cognizant that others are making judgments about their profile, posts, and ultimately them as a person (Gilbert et al., 2009). Being in an unfamiliar college environment, and in close proximity with others who seem similar to oneself, both can exacerbate the inclination to compare oneself to others (Buunk & Gibbons, 2007; Wortham, 2011).

The tendency to engage in social comparison online is especially problematic since sites like Facebook serve as highlight reels as users display their best moments. More than half of SNS users indicate that it is important for their social media presence to convey a certain image of them, and 78% use SNSs to share good news, whereas only 36% of users share bad news (JWTIntelligence, 2012; Kross et al., 2013). Humans have the desire to see themselves as good and valuable, and SNSs can fulfill these needs by providing users with unlimited time to edit images and posts in order to construct positive images of themselves. SNSs also provide self-affirmation through discrete feedback, and exposing an individual to their Facebook profile is as self-affirming as writing about one's values, which is the current gold standard in inducing states of self-affirmation (Toma & Hancock, 2013). Problematically, the desire for positive self-presentation is associated with Internet addiction since modifying profiles can boost positive emotions, thereby creating a pleasurable, and potentially addictive, online experience (Kuss & Griffiths, 2011; Song et al., 2004). The desire to create positive self-images online may even affect offline socialization as individuals document every enjoyable moment and then share them online (Fox & Moreland, 2015).

Thus, when users are comparing themselves to others' profiles, they are engaging in biased upward comparisons due to the propensity of heavily edited content (Johnson & Knobloch-Westerwick, 2014). Individuals who engage more frequently in upward comparisons have more negative outcomes (Buunk & Gibbons, 2007). For example, college students who have had a Facebook account for a longer amount of time are more likely to think that others are happier and have better lives than them (Chou & Edge, 2012). Additionally, upward social comparisons in regards to occupation statuses posted online lead men to perceive a greater discrepancy between their current and ideal careers, and viewing profiles of physically attractive

women lead other women to feel significantly less satisfied with their own bodies (Haferkamp & Krämer, 2011; Zuo, 2014).

Research dating back more than thirty years has linked increasing rates of psychopathology within Western societies to competitive drives (Gilbert 1989; James 1998; Lasch, 1980). The quantifiable nature of social approval on SNSs may cause individuals to focus more on their social rank as they become aware that others are judging them as superior or inferior, as indicated through feedback such as “likes” and comments (Gilbert et al., 2009). Striving for social acceptance has been linked to depression, anxiety, and stress, especially when the individual perceives that others are looking downward on them (Feinstein, 2013; Gilbert et al., 2009). When individuals view the profiles of people whom they rate as very physically attractive, they experience fewer positive emotions than when viewing profiles of people whom they rate as less physically attractive (Haferkamp & Krämer, 2011). Further, more time spent on Facebook is linked to increases in body dissatisfaction (Smith, Hames, & Joiner, 2013; Zuo, 2014); internalization of the thin ideal and drive for thinness (Tiggemann & Slater, 2013); and bulimic symptoms (Smith, Hames, & Joiner, 2013). More generally, greater levels of social comparison online are associated with lower self-esteem and greater symptoms of depression, anxiety, hostility, paranoia, and sensitivity (Zuo, 2014). Since much of users’ time on Facebook is spent viewing others’ profiles and posts, social comparison may be an important mechanism by which SNSs can affect mood or other psychological outcomes (Johnson & Knobloch-Westerwick, 2014).

### **The Role of Social Connectedness in SNSs**

According to Belongingness Theory, social exclusion can cause anxiety because it indicates a potential loss in social connection (Baumeister & Leary, 1995). Individuals who are

not fulfilling their social needs in real life may turn to SNSs to feel socially accepted or to learn social rules. For example, those who perceive a larger discrepancy between their real and ideal social interactions spend greater amounts of time on SNSs observing others' interactions, possibly in hopes of learning how to gain group acceptance (Burke et al., 2010).

A number of hypotheses have been examined in determining the effect that SNSs have on social connectedness. Due to the anonymity and emotional distance afforded through the Internet, the stimulation hypothesis states that users more easily self-disclose online than in real life, which supports better-quality relationships (Brown, 2006; Shapiro & Margolin, 2014). Similarly, the social compensation hypothesis posits that those who are uncomfortable with in-person interactions can use SNSs to develop virtual relationships that meet their social needs in a more comfortable way. Finally, the rich-get-richer hypothesis states that only individuals who are highly sociable in real life retain the added social benefits of SNSs. Therefore, those who have limited social skills in-person will have these same limitations online, and consequently will engage in low-quality connections that may replace potential, richer face-to-face relationships. Research indicates that those who socialize the most on SNSs have the greatest overall levels of social connection and experience the greatest increases in social capital through SNS use, which supports the rich-get-richer hypothesis (Brandtzæg, 2012). On the other hand, a literature review by Shapiro and Margolin (2014) found evidence supporting all three of these hypotheses, concluding that research needs to examine interactive effects and individual characteristics in order to better understand which social connection hypothesis holds true.

Social connections and relationships are extremely important as they regulate physiological responses, help to form identity, and are linked to social goals (Cozolino, 2007). Those who have strong relationships have better psychological outcomes, such as higher self-

esteem and life satisfaction (Ellison et al., 2007). Connectedness through SNSs is a distinct construct from general social connection (Grieve, Indian, Witteveen, Tolan, & Marrington, 2013), and a major benefit of SNSs is that they enhance social capital (Alloway, Horton, Alloway, & Dawson, 2013; Ellison et al., 2007). Increased social capital through SNSs is positively related to well-being and negatively related to anxiety and loneliness, suggesting that online relationships typically do not replace real-life interactions (Burke et al., 2010; Grieve et al., 2013; Yang & Brown, 2013). Facebook may be especially effective in building and maintaining weaker social ties by providing users with more personal details about these new friends (Brown, 2006; McKenna, Green, & Gleason, 2002; Steinfield et al., 2008).

While the majority of emerging adults on Facebook use the site to maintain or strengthen prior relationships, a small number use Facebook to seek out entirely new connections (Kross et al., 2013; Kuss & Griffiths, 2011; Lenhart, 2009; Subrahmanyam, Reich, Waechter & Espinoza, 2008). This highlights a subset of users who may be engaging in Facebook in socially atypical, and potentially harmful, ways. Shyness has been linked with problematic Internet use (Caplan, 2006; Chak & Leung, 2004; Young et al., 1999), and while SNSs can make socialization more comfortable for shy individuals, overreliance on these virtual relationships can lead to problems in social and occupational functioning. Research indicates that SNS use does not result in increased social interactions in real life, and that SNS users have significantly higher rates of loneliness over time than non-users (Brandtzæg, 2012). Although SNSs can benefit some users by increasing feelings of connectedness, this typically builds on pre-existing social capital, and so it is vital to consider levels of offline social connectedness and functioning when examining the overall impact of Facebook (Shapiro & Margolin, 2014). Therefore, those who are lacking in external, face-to-face social connections may be more susceptible to using SNSs in ways that are

problematic, such as becoming over reliant on online relationships and using them to supplant real life interactions. When these users see their virtual friends engaged with others through their Facebook content, they may be more likely to experience negative mental health outcomes due to their lack of social connectedness in real life.

### **Examination of SNS-Related Moderators**

Evidently, the research remains mixed as to whether social media use may be associated with positive or negative outcomes, which warrants a more detailed examination of this relation. Findings may be influenced by the inclusion of a one-dimensional measure of SNS use as an independent variable, thus missing important variability in use (Valkenburg et al., 2006). Oftentimes when SNS use has been included as a one-dimensional variable (e.g., frequency of SNS use), it does not emerge as significant predictor of well-being or psychological outcomes (Kalpidou et al., 2011; Oh et al., 2014). The one-dimensionality of Facebook use as a variable has been identified as limitations in previous studies (Oh et al., 2014), and so there is a call for the inclusion of multidimensional measurements. In addition to capturing the time individuals spend on sites like Facebook, it may be beneficial to include the degree to which individuals have integrated SNSs into their daily lives. When examining various motivations for SNS use, emotional attachment was found to be the strongest drive for individuals to access sites (Chen, Lu, Chau & Gupta, 2014). Thus, incorporating an index of attachment to SNSs would help to better describe Facebook use, and may be more predictive of psychological outcomes.

In part, prior results may be confounding due to a lack of examination into the specific ways in which users engage with SNSs, as well as the personal attributes that users bring to their SNS experience (Aboujaoude et al., 2006; Ross et al., 2009). By distinguishing between activities on SNSs, researchers may be able to better understand the consequences of SNS use



(Brandtzæg, 2012; Burke et al., 2010; Ruggiero 2000). For example, on Facebook one can be in direct communication with other users through wall posts, private messages, and photo tagging. Alternatively, users may simply consume content by reading status updates, browsing the newsfeed, or viewing others' profiles or photos. Thus, several studies have dichotomized Facebook activities into active content production and passive information consumption (Chen et al., 2014; Haferkamp & Krämer, 2011; Reich & Vorderer, 2013). Active use of SNSs has been linked to decreases in loneliness and depression, whereas passive use has been linked to higher levels of depression (Burke et al., 2010). Emerging adults report using Facebook most commonly to engage in passive activities, such as viewing others' profiles, reading the general newsfeed, and looking at others' photos (Pempek et al., 2009; Subrahmanyam et al., 2008), and these uses of Facebook are associated with worse social adjustment during their first year of college (Gray et al., 2013). Those who use Facebook in passive ways may be particularly at risk for developing FOMO since they are spending more time viewing the activities of others, and being exposed to this content may increase their levels of FOMO. Ultimately, the experiences of SNS users differ as a function of their specific activities on SNSs, and so it is important to explore this moderating variable when considering the effect of SNS use on well-being.

### **The Present Study**

The open questions left by existing research indicates a need for additional work that includes more multidimensional measures of social media use, moderators specific to activities on SNSs and individual-level characteristics, and mediators that may provide insight into the mechanisms by which social media may affect mental health.

*Aim 1: Mediation.* The current study sought to extend the current literature by examining the relation between Facebook use and negative mental health outcomes in the emerging adult

population, and whether FOMO may mediate this relation. It is hypothesized that emerging adults who use Facebook more intensely (e.g., spend more time on it and have it more integrated into their daily life) will experience higher levels of anxiety (Aim 1a; Figure 1) and depression (Aim 1b; Figure 2) symptoms. Further, it is predicted that levels of FOMO will account for a significant amount of the variance in negative mental health outcomes, indicating that FOMO mediates both of these relations. More specifically, it is expected that more intense Facebook use will contribute to higher levels of FOMO, which in turn will result in higher levels of depression and anxiety symptoms.

Figure 1. Model for Aim 1a: FOMO as a Mediator between Facebook Intensity and Anxiety

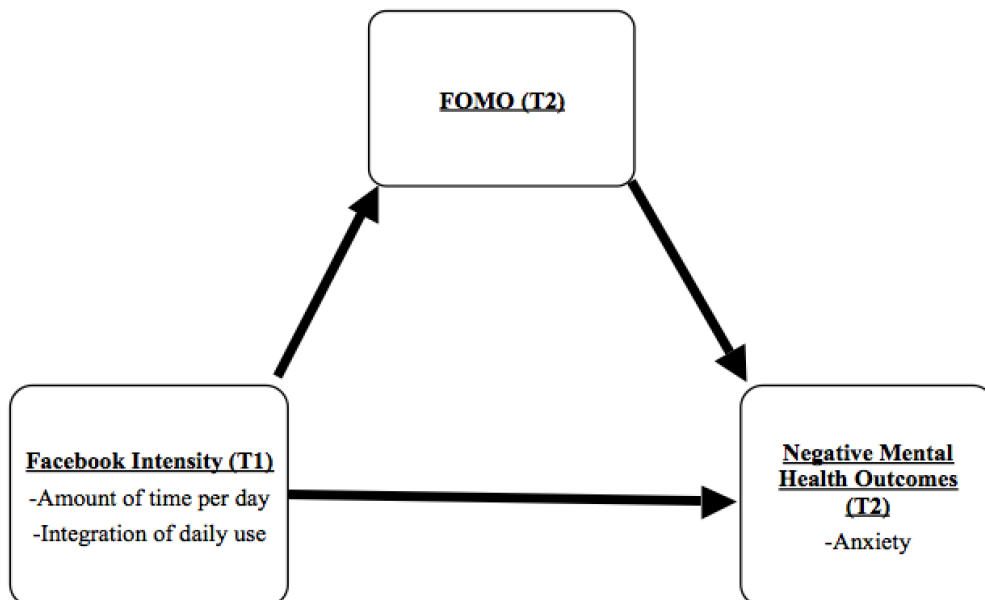
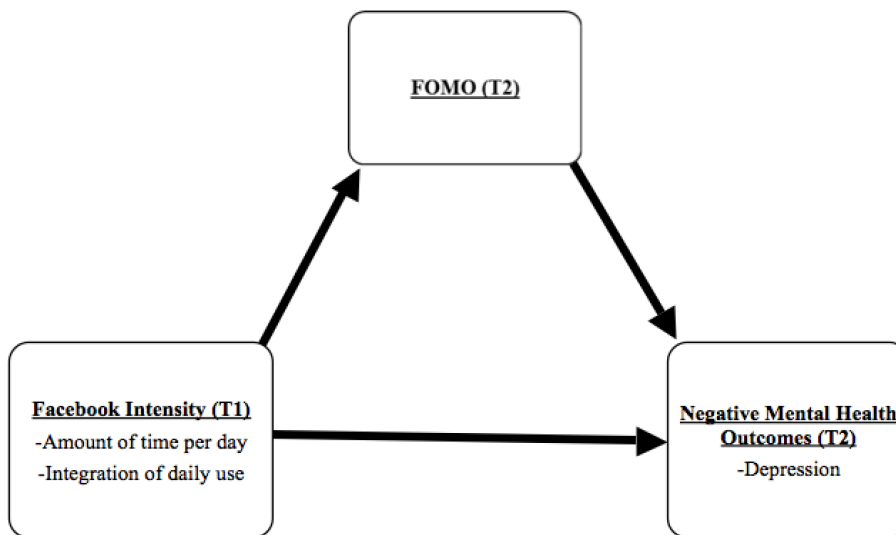
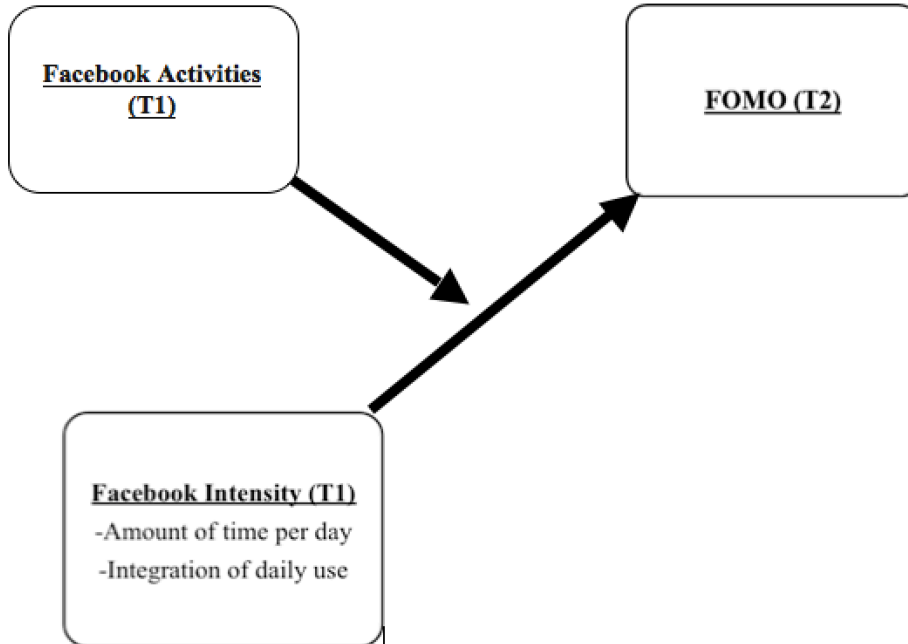


Figure 2. Model for Aim 1b: FOMO as a Mediator between Facebook Intensity and Depression



*Aim 2: Moderation of Path A.* Next, the study will examine the moderation effect of specific Facebook behaviors on the relation between intensity of Facebook use and FOMO (Figure 3). It is hypothesized that for those who use Facebook more intensely (e.g., spend more time on it and have it more integrated into daily life), engaging in predominantly passive behaviors on Facebook, such as browsing others' profiles and pictures, will contribute to higher levels of FOMO than engaging in predominantly active behaviors on Facebook.

Figure 3. Model for Aim 2: The Moderation of Facebook Activities on the Relation between Facebook Intensity and FOMO



*Aim 3: Moderation of Path B.* Finally, the study will investigate the moderating roles of individual characteristics, namely levels of social connectedness and social comparison, on the relation between FOMO and negative mental health outcomes. It is predicted that the relation between FOMO and anxiety symptoms will be stronger for those users who report high, as compared to low, levels of social comparison (Aim 3a; Figure 4). Further, it is predicted that the relation between FOMO and depression symptoms will be stronger for those users who have low, as compared to high, levels of overall social connection (Aim 3b; Figure 5).

Figure 4. Model for Aim 3a: The Moderation of Social Comparison on the Relation between FOMO and Anxiety

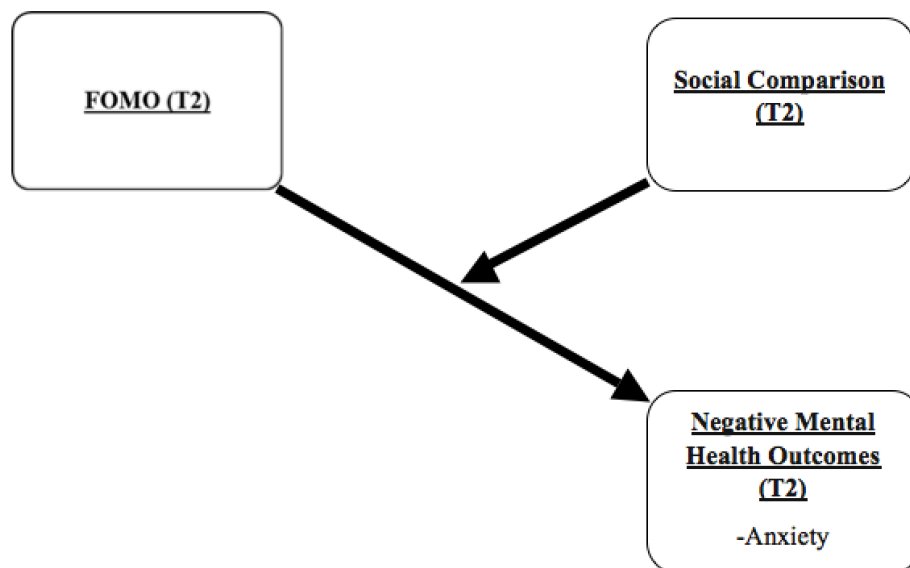
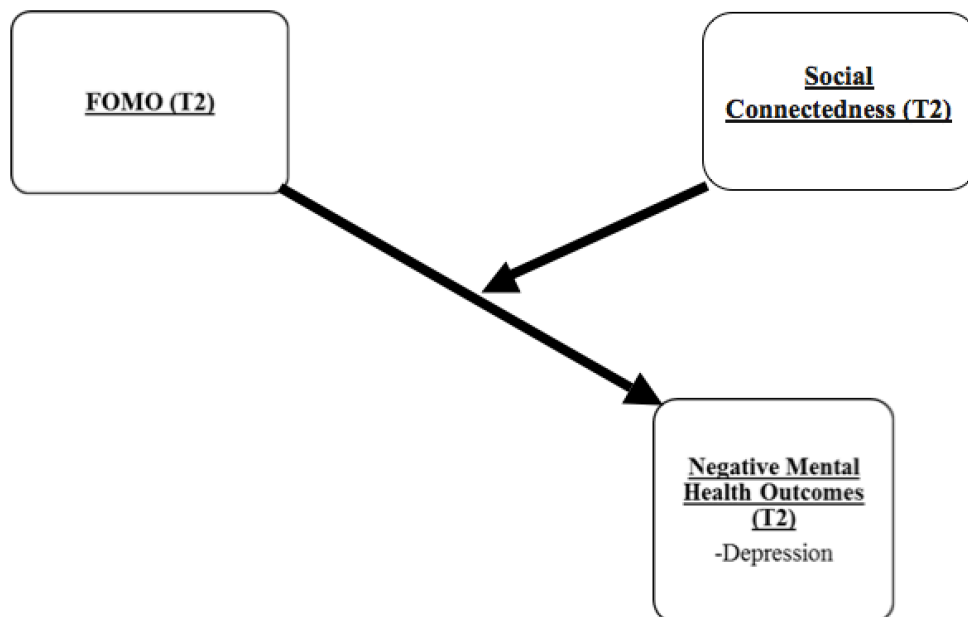


Figure 5. Model for Aim 3b: The Moderation of Social Connectedness on the Relation between FOMO and Depression



### **Potential Implications and Applications**

Understanding the relation between social media use, FOMO, individual factors, and mental health will allow researchers to better elucidate the implications of technology and SNS use on psychological functioning, and will inform possible intervention approaches for the emerging adult population. Results of studies in this area are difficult to reconcile due to their limited scope in terms of the amount and type of variables that are included. While these more simplistic models are important first steps, there is now a call for more comprehensive examinations that can better capture the multiple factors at play in individuals' complicated online experiences.

The proposed project would expand on current literature by examining the relation between social media use and mental health outcomes in a more nuanced way, and within a developmental context. Examining social media use in emerging adult populations is important since this group has high rates of SNS use and it is a developmental period of significant change and stress, which may place emerging adults at risk for developing negative mental health outcomes. Psychological experiences during this time period may differentially place individuals on paths of future well- or ill-being. This study would help to identify potential risk factors for the development of negative psychological functioning in response to social media use.

The identification of behaviors and emotions that may contribute to mental health outcomes will facilitate prevention and intervention services. Outcomes of depression and anxiety in emerging adulthood have important medical, academic, economic, and societal implications. It is vital for research to critically examine the implication of individuals' entrenchment in social media through longitudinal research, especially within the populations most involved in these activities.

## CHAPTER THREE

### METHODS

#### **Participants**

The present study analyzed data from undergraduate students attending a mid-sized, Jesuit university who participated in two timepoints of a short-term longitudinal study examining social media use and well-being. Of the 444 participants who completed the survey at Time 1, 71% also completed the survey at Time 2 ( $N=316$ ). Twenty participants indicated that they do not have a Facebook account, and so they were excluded from analyses. Thus, the final sample for the current study includes 296 participants.

The sample of participants is 85% female ( $N = 253$ ) and 15% male ( $N = 43$ ), with a mean age of 18.93 ( $SD= 1.02$ , Range = 17.00 – 24.00) at baseline. Fifty-three percent ( $N = 159$ ) are first-year students, 26% are second-year students ( $N = 78$ ), 7% are third-year students ( $N = 22$ ), and 4% are fourth-year students ( $N = 11$ ). Ninety-one percent ( $N= 275$ ) of participants identified as heterosexual. The majority of participants identified their religious affiliation as Catholic (56%), with other participants identifying as Protestant (8%), Hindu (3%), Orthodox Christian (3%), atheist (4%), Muslim (4%), Buddhist (1%), Jewish (1%), Evangelical Christian (1%), and Other (4%). Forty-three participants (15%) reported no religious affiliation. The majority of the participants (59%) identified racially and ethnically as Caucasian, followed by Asian American (19%), Hispanic (17%), African American (5%), Native Hawaiian or Pacific Islander (2%),

and Other (3%). Twenty-one percent of participants reported their parental annual household income between \$50,000 - \$75,000, followed by \$100,000 - \$150,000 (18%), \$75,000 - \$100,000 (17%), \$25,000 - \$50,000 (14%), \$150,000 - \$200,000 (12%), over \$200,000 (11%), and under \$25,000 (6%). Further, after the exclusion of outliers, as based on the criteria of scores falling three standard deviations away from the mean, the average amount of time spent on social media at baseline was 3.4 hours per day ( $SD = 2.10$ , Range = 0.00 – 12.50).

### **Procedure**

The present study used data from an ongoing longitudinal survey of undergraduates that was approved by the university's Institutional Review Board, with data collected in both the Fall and Spring semesters. Students were invited to complete the online survey for course credit, and those who completed the first round of the survey (T1) were invited to participate in a second timepoint two weeks later (T2). A time span of two weeks was chosen since prior research found that social media use significantly predicted change in psychological outcomes, such as life satisfaction and affective well-being, in that time-frame (Kross et al., 2013). Each survey was administered through the online tool Opinio and consisted of various measures of psychological and physical functioning, social media use, and well-being. All students with a valid Loyola student identification number were eligible to complete the study if they had not already done so, and all participants signed an online consent form at the beginning the survey. The survey took approximately twenty minutes to complete, and questions remained the same between the two timepoints.

### **Measures**

*Demographics.* Demographic information was collected at T1. This included participants' age, gender, sexual orientation, ethnicity/race, religious affiliation, parental



household income, and maternal and paternal education level. Parental income and education level will be combined as an index of socioeconomic status, with higher scores indicating higher socioeconomic status (SES; Hollingshead, 1975).

*General Social Media Use Item.* Participants were asked to report the amount of time they spend on social media during an average day.

*Integration of Facebook.* The degree to which Facebook is integrated into an individual's daily life was measured using the Social Media Use Integration Scale-Facebook (SMUIS-F; Jenkins-Guarnieri, Wright, & Johnson, 2013; see Appendix A). This 10-item scale is scored from 1 (*Strongly Disagree*) to 6 (*Strong Agree*), with higher total scores indicating a greater degree to which Facebook has been integrated into an individual's life. Example items include "I feel disconnected from friends when I have not logged into Facebook" and "Using Facebook is part of my everyday routine." The scale has yielded adequate reliability in the current sample ( $\alpha = .87$ ).

*Motivations for Facebook Use.* Individuals' specific reasons for using Facebook was assessed using the Understanding Motivations for Facebook Usage scale (Spiliotopoulos & Oakley, 2013; see Appendix A). This scale lists 23 activities one may engage in on Facebook, including "joining groups" and "viewing photos." Individuals are asked to rate each of the 23 activities on how important it is to them personally when using Facebook, from 1 (*Very Unimportant*) to 7 (*Very Important*).

*Fear of Missing Out.* Participants' level of FOMO was assessed using the Fear of Missing Out Scale (FOMOS; Przybylski et al., 2013; see Appendix A). The 10-item scale is scored using a Likert-style rating from 1 (*Not at all true of me*) to 5 (*Extremely true of me*), with higher total scores indicating higher levels of FOMO. Sample items include "When I miss out on

a planned get-together it bothers me” and “I get anxious when I don’t know what my friends are up to.” Analyses in the study show adequate internal consistency ( $\alpha = .87$ ).

*Social Connection.* Social connectedness, or the degree to which individuals feel connected to others in their social environment, was assessed using the 20-item Social Connectedness Scale- Revised (SCS-R; Lee & Robbins, 1995; see Appendix A). Responses are scored from 1 (*Strongly Disagree*) to 6 (*Strongly Agree*), with some items reverse-scored, and higher total scores indicating higher levels of connection to others. Sample items include “I see people as friendly and approachable” and “I am able to connect with other people.” Based on the final sample, this scale yields adequate internal consistency ( $\alpha = .86$ ).

*Social Comparison.* Participants’ tendency to compare themselves with others was captured using the Scale for Social Comparison Orientation (Gibbons & Buunk, 1999; see Appendix A). This 11-item scale is scored in a Likert-style from 1 (*I disagree strongly*) to 5 (*I agree strongly*), with higher total scores equating to higher levels of social comparison. Sample items include “I often compare myself with others with respect to what I have accomplished in life” and “I always like to know what others in a similar situation would do.” Based on the final sample, the scale yields adequate internal consistency ( $\alpha = .82$ ).

*Anxiety.* Anxiety was assessed using the 21-item Beck Anxiety Inventory (BAI; Beck, Epstein, Brown, & Steer, 1988; see Appendix A), in which participants report the extent that they have experienced symptoms of anxiety in the last month. Responses are keyed on a Likert-style scale ranging from 0 (*Not at all*) to 3 (*Severely—it bothered me a lot*). Sample symptoms include “numbness or tingling” and “indigestion.” The scale has yielded adequate internal consistency in the current sample ( $\alpha = .94$ ).

*Depression.* The Beck Depression Inventory-II (BDI-II; Beck, Steer, & Carbin, 1988; see Appendix A) is a 21-item questionnaire that assesses mood over the previous two weeks. Responses are scored 0 to 3, with higher total scores indicating greater symptoms of depression. Item 9, which assesses suicidality, was omitted from the current project since suicidality cannot be addressed in the moment if it were to be endorsed. The scale yields adequate internal consistency in the final sample ( $\alpha = .92$ ).

### **Statistical Treatment**

#### *Preliminary Analyses*

Given that some participants did not complete both timepoints of the survey, attrition analyses were conducted to examine whether differences exist between those who completed both timepoints of the survey and those who did not. Further, the psychometric properties of the aforementioned measures were evaluated using the final sample of data. This included examining the data through descriptive statistics and frequencies to determine general distributional properties, to identify outliers in the data, and to detect skewed data within the measures. Data transformations were performed as needed. Finally, in order to have a more general understanding of the relationship between independent and dependent variables, Pearson correlations were performed, and a correlation matrix was created prior to hypothesis testing.

#### *Primary Analyses*

*Covariates:* All analyses included gender and age as covariates, as these may contribute to differences in social media use, feelings of FOMO, and depression or anxiety outcomes.

*Analytic Plan for Aim 1: Mediation.* The amount of time spent on social media each day (General Social Media Use Item) and the degree to which Facebook is integrated into daily life (SMUIS-FB) were combined into a single score of “Facebook intensity” to convey the degree to

which Facebook is engrained in an individual's life. Since the General Facebook Use Item and SMUIS-FB were significantly correlated at both T1 and T2 (T1:  $r = .17, p < .01$ ; T2:  $r = .18, p < .01$ ; see Table 2), totals for both measures were converted to z-scores and summed to yield a composite score of Facebook intensity.

To examine whether Facebook intensity at T1 predicts anxiety or depression at T2, as mediated by FOMO at T2, Preacher and Hayes' (2008) bootstrapping methods through an SPSS macro were used. Two separate mediation analyses were conducted, the first examining whether FOMO at T2 accounts for a significant amount of the variance in anxiety symptoms at T2, as predicted by Facebook intensity at T1 (Aim 1a; Figure 1; Figure 6). The second analysis examined whether FOMO at T2 accounts for a significant amount of the variance in depression symptoms at T2, as predicted by Facebook intensity at T1 (Aim 1b; Figure 2; Figure 7). These mediation models test the hypotheses that: a) college students who have more intense Facebook use at T1 will experience higher levels of depressive and anxiety symptoms at T2, and b) that having Facebook more integrated into daily life at T1 will contribute to higher levels of FOMO at T2, which in turn will predict higher levels of depressive and anxiety symptoms at T2.

Bootstrapping is preferred over other mediation methods, such as the Sobel Test (Sobel, 1982), since it reduces the possibility for Type II errors and is thus less conservative (Preacher & Hayes, 2008). This method yields an approximation of the coefficients' sampling distribution of the direct path and percentile-based bootstrapping confidence intervals, indicating that if zero is not included between the upper and lower limits of the confidence interval, then it can be stated with 95% certainty that the indirect effect of a variable is not zero (Preacher & Hayes, 2008). In other words, it supports with 95% confidence that there is a significant indirect effect for the variables tested.

Figure 6. Full Model with Facebook Activities and Social Comparison as Moderators, and Anxiety as the Outcome

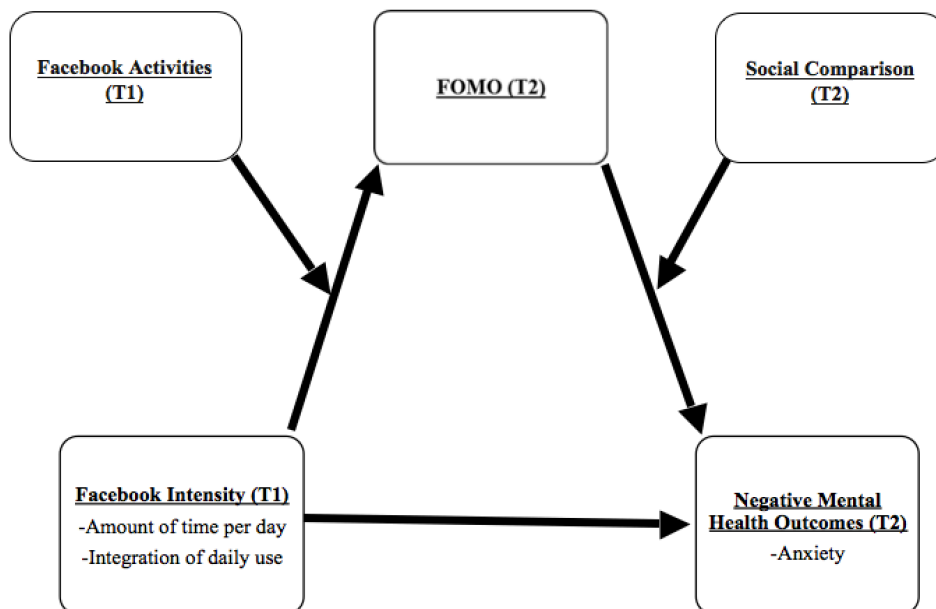
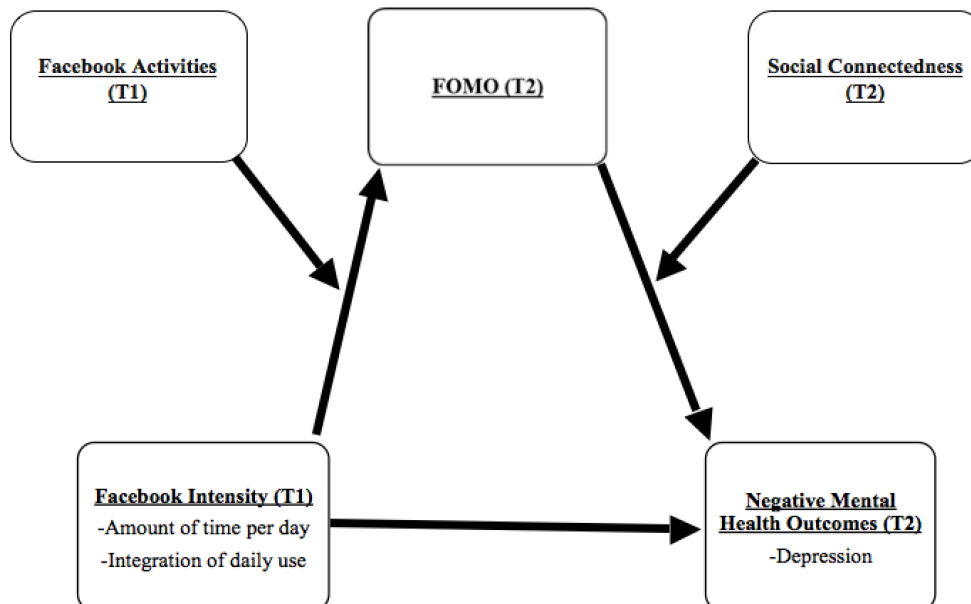


Figure 7. Full Model with Facebook Activities and Social Connectedness as Moderators, and Depression as the Outcome



*Analytic Plan for Aim 2: Moderation of Path A.* Each specific activity included in the Understanding the Motivations for Facebook Usage Scale was coded as an “active” or “passive”

behavior (see Appendix A for the delineation of active versus passive behaviors). While prior social media research has converted this scale into a dichotomous variable (Chen et al., 2014; Haferkamp & Krämer, 2011; Reich & Vorderer, 2013), doing so would not capture the variability in the data, making it less likely to be significantly related to other variables of interest. Thus, the current study includes Facebook activities as a continuous variable. The rating given to each active item was summed to create a total active score, and the same was done for passive items. The participant's passive score was then subtracted from his or her active score to create a total Facebook activities score, with positive scores indicating more active behaviors and negative scores indicating more passive behaviors.

A longitudinal moderated multiple regression analysis was performed to examine whether Facebook activities at T1 moderate the relation between Facebook intensity at T1 and FOMO at T2, while controlling for levels of FOMO at T1 (Aim 2; Figure 3). All variables were centered in order to be explored as moderators. Simple main effects for Facebook activities at T1 were tested, as well as the interaction between the moderator of Facebook activities and the predictor of Facebook intensity. Beta statistics that were significant for variables within the model were interpreted as having significant predictive power, thus serving as risk factors for the development of FOMO at T2. This analysis examined the third hypothesis that those who are more passive users of Facebook at T1 will report greater feelings of FOMO at T2 as compared to those who are more active users of Facebook at T1. Post-hoc probing through simple slopes was performed to more clearly illustrate significant interactions or moderating results.

*Analytic Plan for Aim 3: Moderation of Plan B.* A second set of longitudinal moderated multiple regression analyses were performed to examine whether the individual variables of

social connection and social comparison moderate relations between FOMO at T2 and negative mental health outcomes (e.g., anxiety and depression) at T2 when controlling T1 levels.

All variables were centered in order to be explored as moderators. Simple main effects of social connectedness and social comparison at T2 were tested, as well as the interaction between these two moderator variables and the outcomes of depression and anxiety, separately, at T2. Beta statistics that were significant for variables within the model were interpreted as having significant predictive power, thus serving as risk factors for the development of anxiety and/or depression symptoms at T2. Separate moderation analyses explored the hypotheses that FOMO will predict higher levels of anxiety symptoms for individuals reporting high, as opposed to low, levels of social comparison (Aim 3a; Figure 4), and that FOMO will predict higher levels of depressive symptoms for individuals reporting low, as opposed to high, levels of social connection (Aim 3b; Figure 5). Post-hoc probing through simple slopes was performed to more clearly illustrate any significant interactions or moderating results.

#### *Cross-Sectional Analyses*

Due to the conservative nature of a two-week longitudinal design, cross-sectional analyses were also conducted. Two separate sets of cross-sectional analyses were run for T1 and T2 data to further examine the relations between the variables of interest, and to provide cross-validation between the two timepoints.

#### *Power Analysis*

When a power of .80 and an alpha level of .05 are assumed in a mediation model utilizing percentile bootstrapping methodology, a sample size of 36 is needed to detect large effect sizes, a sample size of 78 is needed to detect medium effect sizes, and a sample size of 558 is needed to

detect small effect sizes (Fritz & MacKinnon, 2007). Thus, with a sample size of 296, this study is powered to detect a medium to large effect size.



## CHAPTER FOUR

### RESULTS

#### **Preliminary Analyses**

At baseline, study participants who completed both timepoints did not differ from those who completed only one timepoint in gender,  $\chi^2(1) = .09, p = .76$ , grade,  $\chi^2(5) = 3.53, p = .62$ , sexual orientation,  $\chi^2(4) = 6.24, p = .18$ , or age,  $t(397) = -1.38, p = .17$ . Further, there were no significant differences between the groups in ethnicity/race,  $\chi^2(13) = 10.62, p = .64$ , religion,  $\chi^2(10) = 13.503, p = .20$ , or annual parental income,  $\chi^2(7) = 3.012, p = .88$ . The data were then examined for missing values. Means and totals were computed if a participant responded to at least 80% of the items on a given measure. The data were examined for outliers and skewness. Data points were determined to be outliers if they fell beyond three standard deviations from the mean. A conservative approach to identifying skewness was used; variables were considered skewed and in need of transformation if skewness values were greater than 1.0 (Tabachnick & Fidell, 2013). Using this criterion, none of the variables of interest were skewed and data transformation was not needed.

#### *Descriptive Analyses*

Descriptive statistics for all study variables are listed in Table 1. Pearson correlations indicated that depression was positively correlated from T1 to T2,  $r = .78, p < .01$ , and similar results were found for anxiety,  $r = .68, p < .01$ . Facebook intensity at T1 was not significantly

correlated with FOMO, depression, or anxiety at T2. However, FOMO at T2 was significantly correlated with both depression,  $r = .31, p < .01$ , and anxiety,  $r = .28, p < .01$ , at T2. Facebook intensity at T1 was not significantly correlated with Facebook activities at T1, and Facebook activities at T1 was not significantly correlated with FOMO at T2. However, FOMO at T2 was significantly correlated with both social connectedness,  $r = -.29, p < .01$ , and social comparison,  $r = .54, p < .01$ , at T2. Further, social connectedness was significantly correlated with depression,  $r = -.45, p < .01$ , and anxiety,  $r = -.30, p < .01$ , at T2, and similar results were found for social comparison, depression:  $r = .30, p < .01$ ; anxiety:  $r = .22, p < .01$ .

Table 1. Descriptive Statistics for Each Measure

Table 1. Descriptive Statistics for Each Measure

<i>Variable</i>	<i>M</i>	<i>SD</i>	<i>Range</i>	<i>N</i>
<b>Facebook Intensity</b>				
T1 Facebook Integration	27.12	9.02	10 – 53	282
T1 General Social Media Use	3.36	2.10	0 – 12.50	300
T1 Facebook Intensity	.05	1.54	-2.91 – 9.70	272
T2 Facebook Integration	28.80	9.30	10 – 53	273
T2 General Social Media Use	3.84	2.76	0 – 12.50	288
T2 Facebook Intensity	.05	1.64	-3.12 – 8.85	205
<b>FOMO</b>				
T1 FOMO	25.41	8.17	10 – 48	299
T2 FOMO	24.74	8.12	10 – 47	296
<b>Mental Health</b>				
T1 Anxiety	17.02	12.96	0 – 54	296
T1 Depression	11.36	9.18	0 – 36	296
T2 Anxiety	13.57	12.27	0 – 52	293
T2 Depression	10.48	9.65	0 – 40	288
<b>Facebook Activities</b>				
T1 Facebook Activities	4.08	10.49	-39 – 32	282
<b>Social Comparison</b>				
T1 Social Comparison	37.18	6.82	19 – 55	299
T2 Social Comparison	35.59	7.32	16 – 55	295
<b>Social Connectedness</b>				
T1 Social Connectedness	81.70	13.32	32 – 110	295
T2 Social Connectedness	80.56	13.03	45 – 110	284

Table 2. Correlation Matrix for Variables of Interest

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. T1 Facebook Integration	--																
2. T1 General Social Media Use Item	.17**	--															
3. T1 Facebook Intensity	-.01	.01	--														
4. T1 FOMO	.30**	.17**	.12*	--													
5. T1 Anxiety	.00	.13*	-.06	.30**	--												
6. T1 Depression	.01	.10	-.05	.31**	.57**	--											
7. T1 Facebook Activities	.03	-.07	.06	-.08	-.07	-.09	--										
8. T1 Social Comparison	.18**	.09	.02	.53**	.23**	.36**	-.19**	--									
9. T1 Social Connectedness	.00	-.03	.05	-.16*	-.31**	-.48**	.01	-.14*	--								
10. T2 Facebook Integration	.74**	.17**	-.02	.34**	.04	.00	-.02	.23**	.01	--							
11. T2 General Social Media Use Item	.17**	.76**	.02	.18**	.09	.06	.02	.04	-.02	.18**	--						
12. T2 Facebook Intensity	-.08	.02	.78**	.08	-.04	-.05	.09	-.08	.09	-.04	.04	--					
13. T2 FOMO	.30**	.17**	.02	.72**	.24**	.29**	-.11	.38**	-.26**	.43**	.14*	-.02	--				
14. T2 Anxiety	-.03	.09	-.02	.26**	.68**	.43**	-.02	.19**	-.35**	.06	.06	.01	.28**	--			
15. T2 Depression	-.03	.13*	-.00	.27**	.56**	.78**	-.03	.27**	-.42**	.03	.11	-.05	.31**	.52**	--		
16. T2 Social Comparison	.17**	.06	-.02	.45**	.22**	.28**	-.15**	.61**	-.14**	-.29**	.00	-.11	.54**	.22**	.30**	--	
17. T2 Social Connectedness	.00	-.13*	-.04	-.23**	-.27**	-.43**	.04	-.21**	.73**	.01	-.14*	-.02	-.29**	-.30**	-.45**	-.14*	--

Note: \* significant at .05 level, \*\* significant at .01 level

## Primary Analyses

*Aim 1: Mediation.* The first aim was to examine whether Facebook intensity at T1 predicts anxiety or depression at T2, as mediated by FOMO at T2. Preacher and Hayes' (2008) bootstrapping methods were used to test these direct and indirect effects. Results indicate that intensity of Facebook use does not significantly predict anxiety symptoms two weeks later,  $\beta = .03, p = .51$ . Intensity of Facebook use at T1 also does not predict FOMO at T2,  $\beta = -.06, p = .20$ , but FOMO at T2 does significantly predict anxiety at T2,  $\beta = .30, p < .01$ , with higher levels of FOMO contributing to higher levels of anxiety. However, FOMO does not emerge as a significant mediator for the relation between intensity of Facebook use and subsequent anxiety, with a 95% CI (-.05 to .01). Additionally, results indicate that students' intensity of Facebook use does not significantly predict depressive symptoms two weeks later,  $\beta = .05, p = .24$ . Again, Facebook intensity at T1 does not predict FOMO at T2,  $\beta = -.05, p = .32$ , but FOMO at T2 does significantly predict depression at T2,  $\beta = .15, p < .05$ , with higher levels of FOMO contributing to higher levels of depressive symptoms. Ultimately, FOMO is not a significant mediator for the relation between intensity of Facebook use and depression, with a 95% CI (-.03 to .01).

*Aim 2: Moderation of Path A.* The second aim was to examine whether the activities that students engage in while using Facebook at T1 moderate the relation between intensity of Facebook use at T1 and FOMO at T2. A hierarchical moderated multiple regression analysis was conducted with the variables of Facebook intensity and Facebook activities centered by subtracting the respective mean from both (Baron & Kenny, 1986; Holmbeck, 1997, 2002). Age, gender, and FOMO at T1 were entered in step 1, followed by the centered variable of Facebook intensity at T1 in step 2. The centered moderator of Facebook activities at T1 was entered in step

3, and the interaction term between Facebook intensity and Facebook activities, both at T1, was entered in step 4. FOMO at T2 was the dependent variable in the analysis.

The regression analysis found that the degree of passive or active behaviors on Facebook at T1 does not have a significant main effect on FOMO at T2,  $\beta = -.04$ ,  $t = -.82$ ,  $p = .41$ . Further, there was not a significant interaction between Facebook activities and Facebook intensity at T1,  $\beta = -.05$ ,  $t = -1.08$ ,  $p = .28$ , indicating that the engagement in passive or active behaviors on Facebook does not moderate the relation between intensity of Facebook use at T1 and feelings of FOMO at T2.

*Aim 3: Moderation of Plan B.* The third aim was to examine whether social connectedness moderates the relation between FOMO and depression, all at T2, and whether degree of social comparison moderates the relation between FOMO and anxiety, all at T2. Two separate hierarchical moderated multiple regression analyses were conducted, and the variables of social connectedness, social comparison, and FOMO were centered by subtracting the respective mean from each variable (Baron & Kenny, 1986; Holmbeck, 1997, 2002).

For the first analysis, age, gender, and depression at T1 were entered in step 1, followed by the centered variable of FOMO at T2 in step 2. The centered moderator of social connectedness at T2 was entered in step 3, and the interaction term between T2 FOMO and social connectedness was entered in step 4. Depression at T2 was the dependent variable in the analysis. Regression analyses revealed that social connectedness at T2 has a significant main effect on depression at T2,  $\beta = -.11$ ,  $t = -2.38$ ,  $p < .05$ , such that higher levels of social connection predict lower levels of depressive symptoms. However, there is not a significant interaction between FOMO and social connectedness at T2,  $\beta = .05$ ,  $t = 1.23$ ,  $p = .22$ , indicating

that the degree of students' social connection does not moderate the relation between students' feelings of FOMO and depressive symptoms at T2.

For the second analysis, age, gender, and anxiety at T1 were entered in step 1, followed by the centered variable of FOMO at T2 in step 2. The centered moderator of social comparison at T2 was entered in step 3, and the interaction term between T2 FOMO and social comparison was entered in step 4. Anxiety at T2 was the dependent variable in the analysis. Regression analyses found that social comparison at T2 does not have a significant main effect on anxiety at T2,  $\beta = .04, t = .78, p = .44$ . Further, the interaction between FOMO and social comparison at T2 is not significant,  $\beta = -.005, t = -.10, p = .92$ , indicating that the degree of students' social comparison does not moderate the relation between students' feelings of FOMO and anxiety symptoms at T2.

### **Cross-Sectional Analyses: Time 1**

The lack of significant findings may be in part due to the brief longitudinal design of the current study, such that the variables of interest had little variability across the two weeks. Thus, cross-sectional analyses were conducted separately for T1 and T2 data.

Using all T1 data, bootstrapping methods again were used to examine whether Facebook intensity predicts anxiety, as mediated by FOMO. Findings indicate that students' intensity of Facebook use is neither significantly associated with anxiety,  $\beta = -.08, p = .19$ , nor FOMO,  $\beta = .07, p = .22$ . FOMO is significantly linked to anxiety,  $\beta = .27, p < .01$ , with higher levels of FOMO associated with higher levels of anxiety, but FOMO does not emerge as a significant mediator for the relation between Facebook intensity and anxiety, with a 95% CI (-.01 to .06). Additionally, intensity of Facebook use neither predicts depression,  $\beta = -.08, p = .18$ , nor FOMO,  $\beta = .07, p = .24$ . FOMO significantly predicts depressive symptoms,  $\beta = .34, p < .01$ ,

such that greater FOMO is associated with greater depressive symptoms, but FOMO is not a significant mediator between intensity of Facebook use and depression, with a 95% CI (-.01 to .06).

Next, a hierarchical moderated multiple regression analysis was conducted to examine whether Facebook activities moderates the relation between Facebook intensity and FOMO. Age and gender were entered in step 1, followed by the centered variable of Facebook intensity in step 2. Then, the centered moderator of Facebook activities was entered in step 3, and the interaction term between Facebook intensity and Facebook activities was entered in step 4. FOMO was the dependent variable in the analysis. Results indicate that Facebook activities do not have a significant main effect on FOMO,  $\beta = -.06$ ,  $t = -.87$ ,  $p = .39$ . Further, there is not a significant interaction between Facebook activities and Facebook intensity,  $\beta = .05$ ,  $t = .74$ ,  $p = .46$ , indicating that engagement in passive or active behaviors on Facebook does not moderate the relation between students' intensity of Facebook use and feelings of FOMO, all at T1.

Finally, two additional hierarchical moderated multiple regression analyses were conducted to examine whether social connectedness moderates the relation between FOMO and depression, and whether degree of social comparison moderates the relation between FOMO and anxiety. For the first analysis, age and gender were entered in step 1, followed by the centered variable of FOMO in step 2. The centered moderator of social connectedness was entered in step 3, and the interaction term between FOMO and social connectedness was entered in step 4. Depression was the dependent variable in the analysis. Results show that social connectedness does have a significant main effect on depression,  $\beta = -.40$ ,  $t = -7.28$ ,  $p < .01$ , such that higher levels of social connectedness are associated with lower levels of depressive symptoms. However, there is not a significant interaction between FOMO and social connectedness,  $\beta =$



.02,  $t = .35$ ,  $p = .72$ , indicating that the degree of students' social connection does not moderate the relation between students' feelings of FOMO and depressive symptoms, all at T1.

For the second analysis, age and gender were entered in step 1, followed by the centered variable of FOMO in step 2. The centered moderator of social comparison was entered in step 3, and the interaction term between FOMO and social comparison was entered in step 4. Anxiety was the dependent variable in the analysis. Regression analyses reveal that social comparison does not have a significant main effect on anxiety,  $\beta = .06$ ,  $t = .83$ ,  $p = .41$ . Further, there is not a significant interaction between FOMO and social comparison,  $\beta = .03$ ,  $t = .58$ ,  $p = .56$ , indicating that the degree of social comparison does not moderate the relation between students' feelings of FOMO and anxiety symptoms, all at T1.

### **Cross-Sectional Analyses: Time 2**

The same cross-sectional analyses were conducted again using all T2 data. Bootstrapping methods were used to examine whether Facebook intensity predicts anxiety, as mediated by FOMO. Students' intensity of Facebook use is neither significantly linked with anxiety,  $\beta = .02$ ,  $p = .76$ , nor FOMO,  $\beta = -.02$ ,  $p = .74$ . FOMO does significantly predict anxiety,  $\beta = .38$ ,  $p < .01$ , such that higher levels of FOMO are associated with higher levels of anxiety. However, FOMO is not a significant mediator for the relation between intensity of Facebook use and anxiety, with a 95% CI (-.07 to .03). Additionally, Facebook intensity neither predicts depression,  $\beta = -.04$ ,  $p = .61$ , nor FOMO,  $\beta = -.02$ ,  $p = .77$ . FOMO significantly predicts depressive symptoms,  $\beta = .27$ ,  $p < .01$ , such that greater FOMO is associated with greater depressive symptoms. However, FOMO is not a significant mediator between intensity of Facebook use and depression, with a 95% CI (-.04 to .03), all at T2.

Next, a hierarchical moderated multiple regression analysis was conducted to examine whether Facebook activities moderate the relation between intensity of Facebook use and FOMO. Age and gender were entered in step 1, followed by the centered variable of Facebook intensity in step 2. Then, the centered moderator of Facebook activities was entered in step 3, and the interaction term between Facebook intensity and Facebook activities was entered in step 4. FOMO was the dependent variable in the analysis. Results indicate that Facebook activities does not have a significant main effect on FOMO,  $\beta = -.06, t = -.85, p = .39$ . Further, the interaction between Facebook activities and Facebook intensity is not significant,  $\beta = -.02, t = -.31, p = .76$ , indicating that the degree of passivity or activity on Facebook does not moderate the relation between students' intensity of Facebook use and feelings of FOMO, all at T2.

Finally, two additional hierarchical moderated multiple regression analyses were conducted to examine whether social connectedness moderates the relation between FOMO and depression, and whether degree of social comparison moderates the relation between FOMO and anxiety. For the first analysis, age and gender were entered in step 1, followed by the centered variable of FOMO in step 2. The centered moderator of social connectedness was entered in step 3, and the interaction term between FOMO and social connectedness was entered in step 4. Depression was the dependent variable in the analysis. Results show that social connectedness does have a significant main effect on depression,  $\beta = -.39, t = -6.84, p < .01$ , such that higher levels of social connectedness are linked to lower levels of depressive symptoms. However, there is not a significant interaction between FOMO and social connectedness,  $\beta = .03, t = .50, p = .62$ , indicating that at T2, the degree of students' social connection does not moderate the relation between students' feelings of FOMO and depressive symptoms.

For the second analysis, age and gender were entered in step 1, followed by the centered variable of FOMO in step 2. The centered moderator of social comparison was entered in step 3, and the interaction term between FOMO and social comparison was entered in step 4. Anxiety was the dependent variable in the analysis. Results show that social comparison does not have a significant main effect on anxiety,  $\beta = .08$ ,  $t = 1.11$ ,  $p = .27$ . Further, the interaction between FOMO and social comparison is not significant,  $\beta = -.01$ ,  $t = -.24$ ,  $p = .81$ , indicating that at T2, the degree of students' social comparison does not moderate the relation between students' feelings of FOMO and anxiety symptoms.

### **Exploratory Analyses**

Prior research has emphasized the cyclical pattern and bidirectional relations among the current study's variables of interest (Abel et al., 2016; Australian Psychological Society, 2015; JWTIntelligence, 2012; Przybylski et al., 2013). Thus, several variations of the original model were tested in exploratory analyses.

*Moderation of Path B.* First, the moderation of Path B was changed so that social connectedness was coupled with anxiety as the outcome (Figure 8), and social comparison was coupled with depression (Figure 9). Two hierarchical moderated multiple regression analyses were conducted to examine whether social connectedness at T2 moderated the relation between FOMO at T2 and anxiety at T2, and whether social comparison at T2 moderated the relation between FOMO at T2 and depression at T2.

For the first analysis, age, gender, and anxiety at T1 were entered in step 1, followed by the centered variable of FOMO at T2 in step 2. The centered moderator of social connectedness at T2 was entered in step 3, and the interaction term between T2 FOMO and social connectedness was entered in step 4. Anxiety at T2 was the dependent variable in the analysis.

Results show that social connectedness at T2 does have a significant main effect on anxiety at T2,  $\beta = -.13$ ,  $t = -2.54$ ,  $p < .05$ , such that higher levels of social connectedness predicted lower levels of anxiety. Further, there is a significant interaction between FOMO and social connectedness, both at T2,  $\beta = -.13$ ,  $t = -2.65$ ,  $p < .01$ , indicating that the degree of students' social connection moderates the relation between feelings of FOMO and depressive symptoms. Probing this interaction through simple slopes illustrates that FOMO positively predicts anxiety more strongly for students with low levels of social connectedness,  $\beta = .32$ ,  $t = 4.23$ ,  $p < .001$ , as compared to students with high levels of connection,  $\beta = .16$ ,  $t = 2.00$ ,  $p < .05$ . Among those with high degrees of social connection, the positive association between FOMO and anxiety was attenuated, and they have overall lower ratings of anxiety than those with low levels of social connection (Figure 10).

For the second analysis, age, gender, and depression at T1 were entered in step 1, followed by the centered variable of FOMO at T2 in step 2. The centered moderator of social comparison at T2 was entered in step 3, and the interaction term between T2 FOMO and social comparison was entered in step 4. Depression at T2 was the dependent variable in the analysis. Regression analyses found that social comparison at T2 does not have a significant main effect on depression at T2,  $\beta = .03$ ,  $t = .73$ ,  $p = .46$ . Further, the interaction between FOMO and social comparison at T2 is not significant,  $\beta = .02$ ,  $t = .42$ ,  $p = .67$ , indicating that the degree of students' social comparison does not moderate the relation between students' feelings of FOMO and depressive symptoms at T2.

Figure 8. Exploratory Analysis: The Moderation of Social Connectedness on the Relation between FOMO and Anxiety

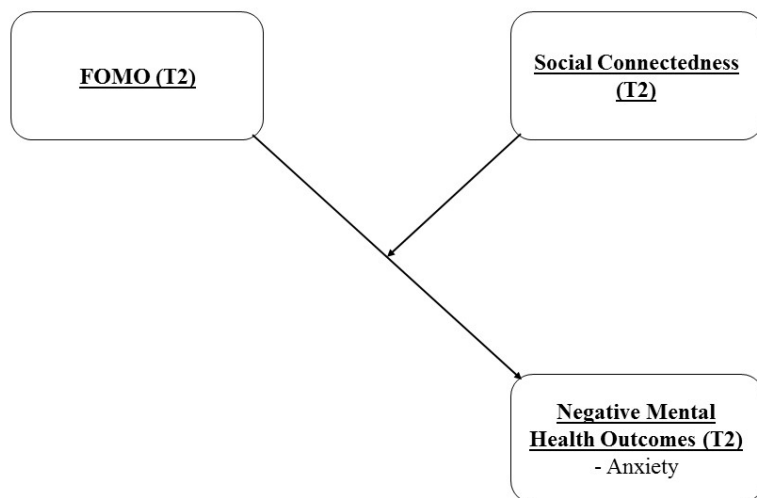


Figure 9. Exploratory Analysis: The Moderation of Social Comparison on the Relation between FOMO and Depression

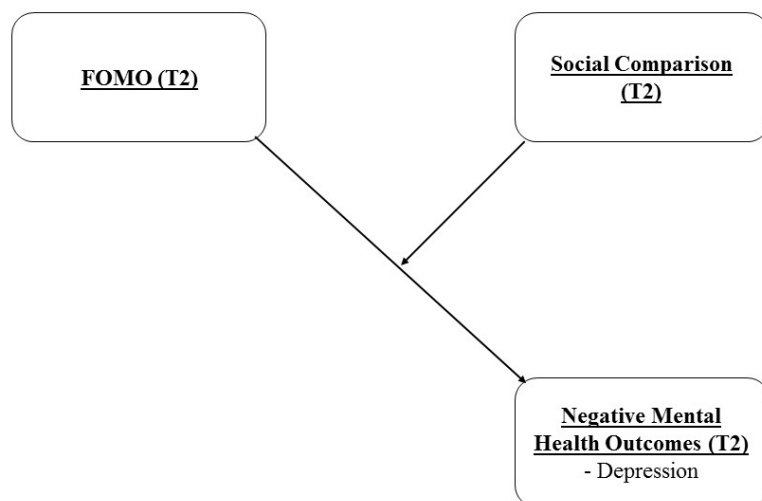
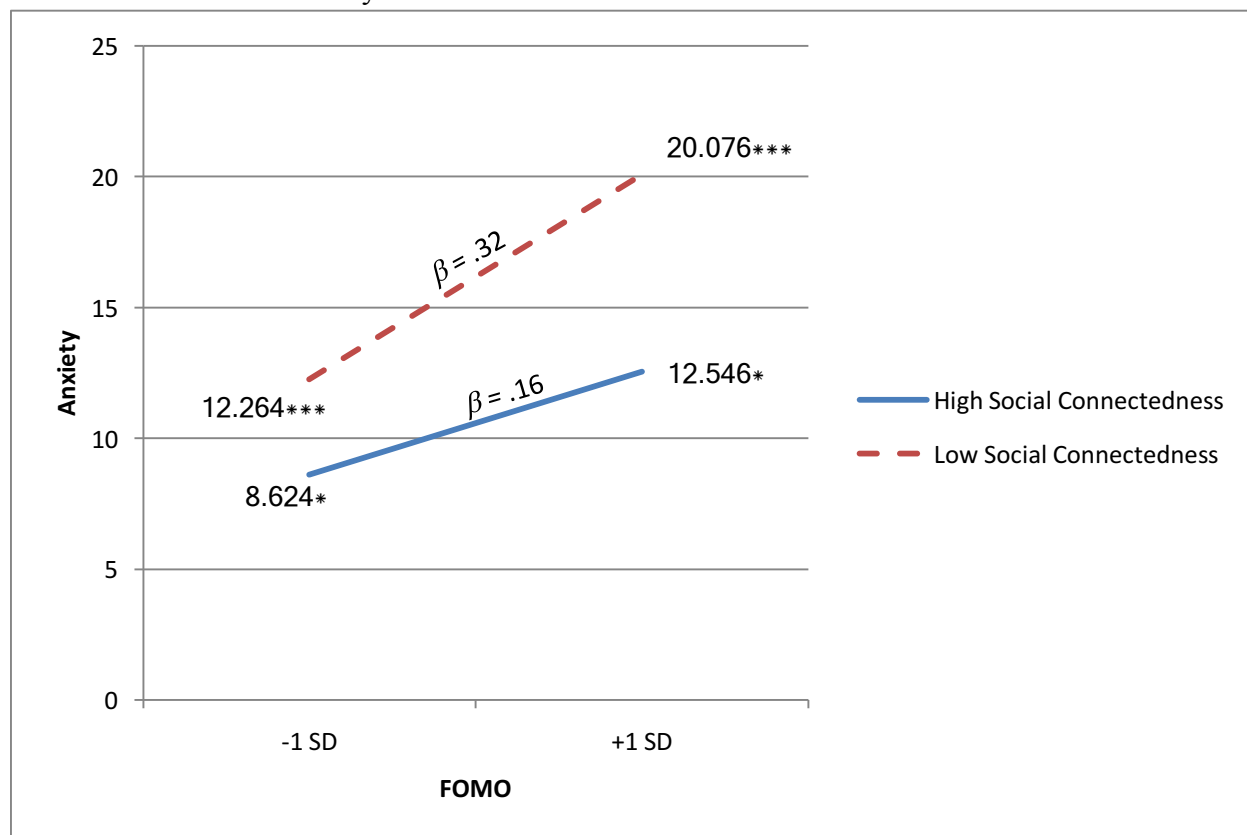


Figure 10. Simple Slopes Probing the Moderation of Social Connectedness on the Relation between FOMO and Anxiety

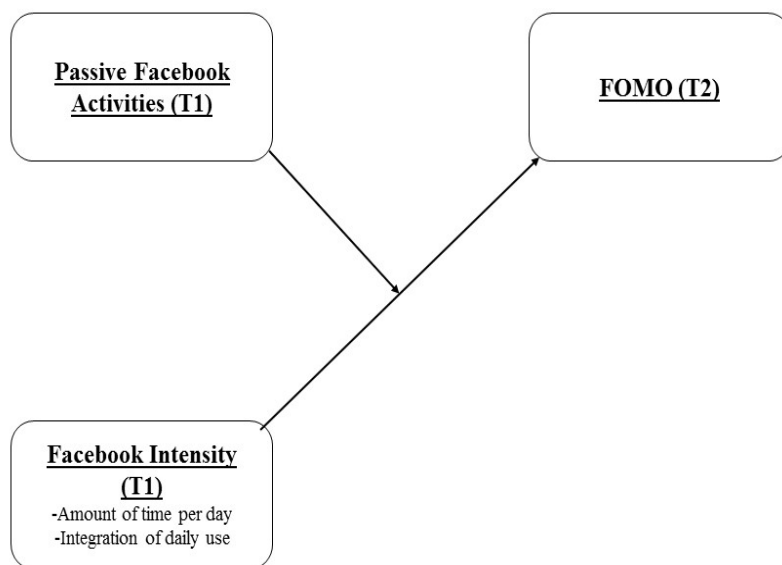


Note. \*  $p < .05$ , \*\*\*  $p < .001$

*Moderation of Path A.* Next, the moderator of Facebook activities on the relation between Facebook intensity and FOMO was re-examined. Given that the variable of Facebook activities was not a significant moderator, it was hypothesized post-hoc that only passive behaviors (e.g., “lurking” on others’ photos; see Appendix A for full list) may generate feelings of FOMO when using Facebook (Figure 11). A hierarchical moderated multiple regression was performed to examine whether students’ level of engagement in passive behaviors on Facebook at T1 moderates the relation between Facebook intensity at T1 and FOMO at T2. Age, gender, and FOMO at T1 were entered in step 1, followed by the centered variable of Facebook intensity at T1 in step 2. The centered moderator of passive activities at T1 was entered in step 3, and the

interaction term between T1 Facebook intensity and passive activities was entered in step 4. FOMO at T2 was the dependent variable in the analysis. Regression analyses indicated that passive activities at T1 does have a marginally significant main effect on FOMO at T2,  $\beta = .10$ ,  $t = 1.89$ ,  $p = .06$ . However, the interaction between Facebook intensity and passive activities at T1 is not significant,  $\beta = -.03$ ,  $t = -.54$ ,  $p = .59$ , indicating that engagement in passive activities on Facebook does not moderate the relation between Facebook use at T1 and FOMO at T2.

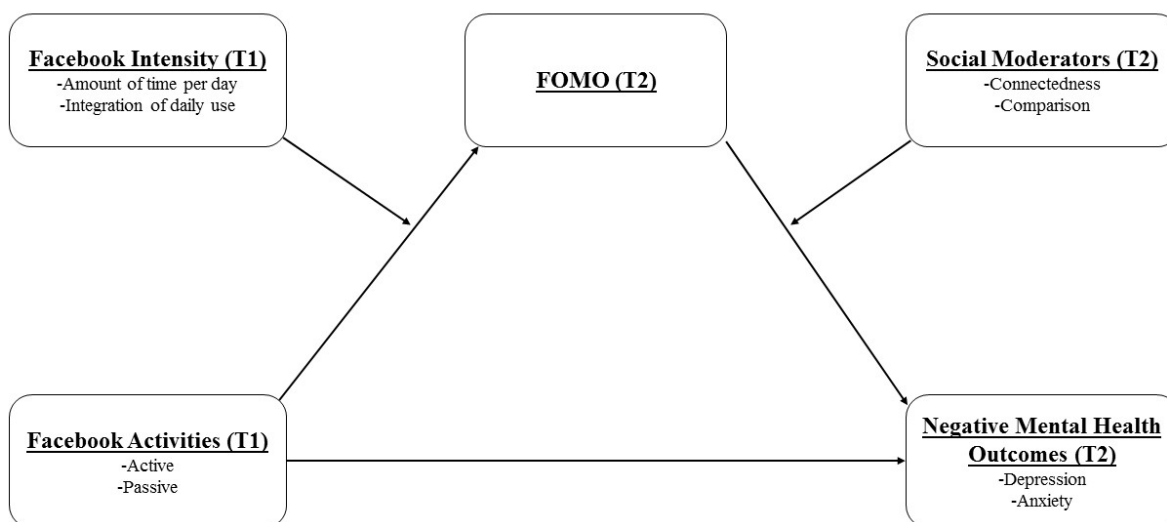
Figure 11. Exploratory Analysis: The Moderation of Passive Facebook Activities on the Relation between Facebook Intensity and FOMO



*Facebook Activities as a Predictor.* An alternative model was examined wherein the original predictor of Facebook intensity and the moderator of Facebook activities were switched. Thus, the model explores whether Facebook activities at T1 predicts depression and anxiety at T2, with FOMO serving as the mediator and Facebook intensity as the moderator between

Facebook activities and FOMO (Figure 12). Bootstrapping methods revealed that Facebook activities at T1 do not significantly predict anxiety,  $\beta = .03, p = .48$ , or FOMO,  $\beta = -.07, p = .12$ , at T2. FOMO at T2 does significantly predict anxiety at T2,  $\beta = .29, p < .01$ , with higher levels of FOMO linking to higher levels of anxiety. However, FOMO does not emerge as a significant mediator for the relation between Facebook activities and anxiety, with a 95% CI (-.05 to .00). Additionally, Facebook activities at T1 neither predicts depression,  $\beta = .05, p = .16$ , nor FOMO,  $\beta = -.06, p = .19$ , at T2. FOMO at T2 predicts depressive symptoms at T2,  $\beta = .15, p < .01$ , such that greater FOMO is associated with greater depressive symptoms, but ultimately FOMO is not a significant mediator between intensity of Facebook use and depression, with a 95% CI (-.03 to .00).

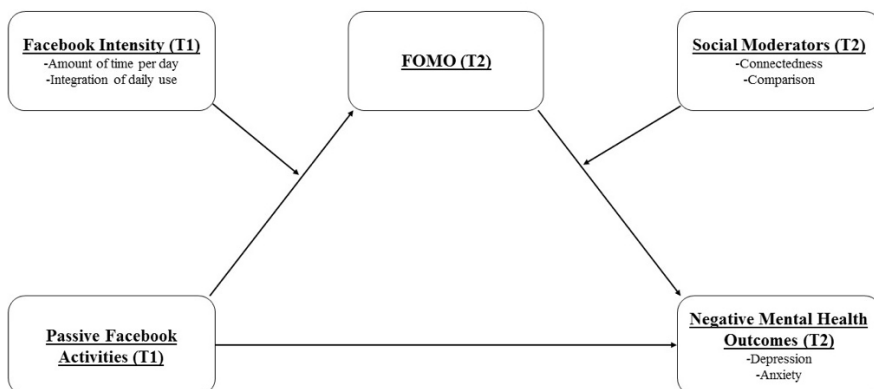
Figure 12. Exploratory Analysis: Full Model with Facebook Activities as the Predictor and Facebook Intensity as the Moderator of Path A





A follow-up model was explored, with passive Facebook activities at T1 predicting depression and anxiety at T2, with FOMO as a mediator (Figure 13). Again, Facebook intensity at T1 served as the moderator for the relation between passive activities and FOMO. Bootstrapping methods reveal that passive activities at T1 do not significantly predict anxiety at T2,  $\beta = -.08, p = .11$ , but do predict FOMO at T2,  $\beta = .13, p < .01$ , with higher levels of passive behaviors contributing to higher levels of FOMO two weeks later. Further, FOMO at T2 positively predicts anxiety at T2,  $\beta = .30, p < .01$ . Overall, FOMO emerges as a significant mediator for the relation between passive activities and anxiety, with a 95% CI (.01 to .09). Additionally, passive activities at T1 do not predict depression at T2,  $\beta = -.05, p = .20$ , but do significantly predict FOMO at T2,  $\beta = .13, p < .01$ , with higher levels of passive behaviors contributing to higher levels of FOMO two weeks later. Further, FOMO at T2 positively predicts depressive symptoms at T2,  $\beta = .16, p < .01$ , and FOMO emerges as a significant mediator between passive activities and depression, with a 95% CI (.01 to .05).

Figure 13. Exploratory Analysis: Full Model with Passive Facebook Activities as the Predictor and Facebook Intensity as the Moderator of Path A



In this new model configuration, a hierarchical moderated multiple regression was performed to examine whether Facebook intensity at T1 moderates the relation between passive behaviors on Facebook at T1 and FOMO at T2. Age, gender, and FOMO at T1 were entered in step 1, followed by the centered variable of passive activities at T1 in step 2. The centered moderator of Facebook intensity at T1 was entered in step 3, and the interaction term between T1 passive activities and Facebook intensity was entered in step 4. FOMO at T2 was the dependent variable in the analysis. Regression analyses find that Facebook intensity at T1 does not have a significant main effect on FOMO at T2,  $\beta = -.04$ ,  $t = -.77$ ,  $p = .44$ . Additionally, there is no significant interaction between Facebook intensity and passive activities at T1,  $\beta = -.03$ ,  $t = -.54$ ,  $p = .59$ , indicating that the degree of students' passive activities on Facebook does not moderate the relation between Facebook use at T1 and FOMO at T2.

## CHAPTER FIVE

### DISCUSSION

Prior research has examined FOMO and its relation to variables of social media use and mental health, but typically within separate, disjointed models. The current study extends previous work by considering the complex inter-relations among SNS use, FOMO, social characteristics, and mental health in a single, comprehensive model. Further, the combination of mediational and moderational analyses in a longitudinal design can help to identify those who may be at risk for problematic SNS use and shed light on the mechanisms by which SNS use leads to negative mental health outcomes. By exploring possible risk factors for negative mental health, especially those that may be addressed through intervention like problematic SNS use, successful prevention and treatment programs can be developed within the college environment where students may be at heightened risk for experiencing adverse effects.

The current study also builds on prior research through its application of a developmental perspective. The majority of those with Facebook accounts are emerging adults and they SNSs can be used to progress on various developmental tasks (Côté & Levine, 2002; Mazzoni & Iannone, 2014). Emerging adulthood oftentimes overlaps with college attendance, a context that independently may contribute to greater SNS use since students use sites to aid in relationship development and maintenance (Ellison et al., 2007; Gemmill & Peterson, 2006; Mazzoni & Iannone, 2014), or to occupy unstructured time (Chak & Leung, 2004). Additionally, both the time period of emerging adulthood and the stress of the college environment can place

individuals at risk for developing mental illness (Burt & Masten, 2010; Masten et al., 2004; Schulenberg & Zarrett, 2006). Therefore, it is critical to consider these contextual factors when examining the potential uses and effects of SNSs; however, this has not yet been done explicitly by researchers.

The findings from this study demonstrate that the time spent on SNSs, in combination with one's attachment to Facebook, does not predict anxiety or depression symptoms in college students. This finding contradicts research indicating that Facebook predicts worsened well-being and mental health in users (Kross et al., 2013), that overuse of Facebook leads to greater feelings of anxiety, depression, and other negative mental health outcomes (Alabi, 2013; Alavi et al., 2011; Rosen, 2011; Zuo, 2014), and that more time spent on SNSs each day is linked to lower self-perceived mental health and higher distress (Sampasa-Kanyinga & Lewis, 2015). The non-significant relation is an important finding since the link between SNS use and mental health has shown mixed and conflicting results within the larger field of research. Though the current study did not include variables of positive well-being, the non-significant findings may be consistent with other research demonstrating that using SNSs has positive effects on well-being, such as by increasing self-esteem (Valkenburg et al., 2006) and helping to regulate negative emotion (Burke et al., 2010; Lampe, Ellison, & Steinfield, 2007).

The transition to college can be a stressful experience for many students (Conley, Kirsch, Dickson, & Bryant, 2014), and each year of college presents its own set of unique stressors and barriers, including financial concerns, changes in friendships, separation from family and home, academic stress, identity exploration, and time management (Bewick, Koutsopoulou, Miles, Slaa, & Barkham, 2010; Kadison & DiGeronimo, 2004; Vaez & Laflamme, 2008). SNS use may be a

way for students to cope with these challenges and progress on developmental tasks, since SNSs allow them to harness pre-existing social support, make new social connections, and tap into creative outlets, such as by posting one's own creative works like photographs or musical performances (Brown, 2006; Burke et al., 2010; Ellison et al., 2007; Kuss & Griffiths, 2011; Lenhart, 2009; Steinfield, Ellison, & Lampe, 2008; Weiser, 2001). Thus, in this specific population, SNSs may actually be beneficial for students who are navigating multiple developmental and environmental changes.

It is also important to note that prior research typically has used a one-dimensional measurement of SNS use, namely time spent on SNSs (Chou & Edge, 2012; Kross et al., 2013; Zuo, 2014). This has been identified as a potential problem since simplistic measures of SNS use may not capture the nuances of social media activity (Valkenburg et al., 2006). The current model sought to include a multidimensional measurement of social media use by combining individuals' time spent on SNS with their level of attachment to Facebook, in order to produce a single score reflecting how intensely they use Facebook. The lack of meaningful connection between SNS use and mental health despite this more complex variable may indicate that other aspects of SNS use are more predictive of mental health. However, neither the ratio of passive to active behaviors on Facebook nor exclusively passive uses of Facebook predicted anxiety or depression in the exploratory analyses. Future research would benefit from examining other aspects of SNS use, such as how many times a user logs on per day and how much time is spent on Facebook per session, and their possible connection to mental health outcomes.

Past research has supported a cyclical relation between FOMO and SNS use, as spending more time on SNSs has been linked to a greater expectation that information will be available

and potentially missed (Przybylski et al., 2013), which in turn motivates individuals to check their SNSs (Abel et al., 2016; JWTIntelligence, 2012). Abel and colleagues (2016) found that individuals experience greater FOMO after using SNSs, which was used to inform the directionality used in the current study's model. Separate studies have linked FOMO to anxiety and depression in younger populations (Australian Psychological Society, 2015), and have found that FOMO predicts symptoms of Internet addiction (Vaidya & Krishnan, 2016). However, to our knowledge, no prior study has examined the relations between SNS use, FOMO, and mental health in a single model. The current study fills this gap by examining whether SNS use positively predicts FOMO, and whether FOMO, in turn, positively predicts depression and anxiety symptoms. Ultimately, FOMO did not emerge as a significant mediator in the present study. Although studies have found FOMO to be linked to SNS use and to mental health separately, it may not be the mechanism by which SNS use negatively impacts well-being.

Given that individual experiences and uses of Facebook can vary considerably, this study accounted for the specific activities that individuals are involved in while using Facebook. Studies have called for the consideration of behaviors on SNSs in order to better understand the consequences of media use (Brandtzæg, 2012; Burke et al., 2010; Ruggiero 2000). However, research addressing this need has employed dichotomous measures of Facebook activity (e.g., passive or active; Chen et al., 2014; Haferkamp & Krämer, 2011; Reich & Vorderer, 2013), which does not adequately capture the complexity of Facebook users' activities. Thus, the current study utilized a continuous variable measuring the overall extent to which one is a passive or active user of Facebook. Results indicate that regardless of the types of activities users engaged in, the relation between intensity of Facebook use and FOMO did not differ and were

consistently unrelated. This suggests that the specific activities that one engages in online, such as “cyberstalking” others’ profiles, does not put them at risk for experiencing FOMO as a result of using Facebook.

Instead of Facebook activities strengthening or weakening the relation between intensity of Facebook use and FOMO, Facebook activities may directly predict FOMO, as moderated by how intensely one uses the site. This alternative model was examined, but intensity of Facebook use neither moderated the relation between Facebook activities and FOMO, nor the relation between only passive behaviors and FOMO. However, when passive behaviors alone were examined as a predictor of mental health, FOMO emerged as a significant mediator for both anxiety and depression outcomes. Thus, passive behaviors on Facebook positively and indirectly predicted anxiety and depression through increases in FOMO, but passive activities did not directly predict changes in mental health. This result is consistent with prior research that finds passive behaviors online to be linked with higher levels of depression (Burke et al., 2010), and extends this research by identifying the mechanism through which this relation occurs. Intuitively, it makes sense that viewing others’ photos and “lurking” on friends’ profiles would lead to increased levels of FOMO, since spending time primarily viewing content on Facebook will make one more aware of what others are doing and of information that may be missed. The connection from FOMO to higher depression and anxiety is consistent with prior research that examined direct relationships between these variables (Alt, 2015; Australian Psychological Society, 2015; Przybylski et al., 2013). Ultimately, it may not be how often individuals use SNSs or how emotionally attached they are to them that leads some to experience consequent feelings of anxiety or depression, but rather how they are specifically using these sites.

Finally, the current study's model also included social characteristics in order to better understand the risk factors for developing feelings of anxiety or depression as a result of experiencing FOMO. Due to the carefully selected and edited content shared by users on Facebook, as well as the quantifiable nature of approval through features such as "likes," it is easy for Facebook users to compare themselves to others online. Given the connection between social comparison and anxiety (Zuo, 2014), it was hypothesized that those who were high on social comparison would be more at risk for experiencing anxiety symptoms in the face of FOMO than those who were low on social comparison. However, this hypothesis was not supported by the data. Meanwhile, loneliness and fewer social connections have been found to predict depression in a wide range of populations, including college students (Kim, 2001; Wei, Russell, & Zakalik, 2005). Further, social capital on SNSs has been found to build on that of in-person relationships (Shapiro & Margolin, 2014), meaning that those who lack face-to-face relationships are likely to also lack virtual social connections. Thus, it was hypothesized that those low in social connectedness would be more likely to experience depressive symptoms as a result of FOMO, as compared to those with high levels of social connectedness. Social connectedness did predict depression, with higher levels of social connection linking to lower levels of depression; however, there was not a significant moderation.

While the association between social comparison and anxiety, as well as between social connection and depression, have been supported by prior research, the opposite pairings were supported by this study's post-hoc exploratory analyses. In these analyses, social connectedness was examined as a moderator for the relation between FOMO and anxiety, whereas social comparison was examined as a moderator for the relation between FOMO and depression.



Interestingly, social connectedness did moderate the relation between FOMO and anxiety, in that those with low levels of social connection were more likely to experience anxiety symptoms in response to FOMO, as compared to those with high levels of social connection. Further, those with high, as compared to low, levels of social connection had lower overall levels of anxiety at both high and low levels of FOMO. Meanwhile, social comparison did not moderate the link between FOMO and depression.

Belongingness Theory provides insight as to why the relation between FOMO and anxiety changes as a function of social connectedness. Feelings of FOMO are typically tied to the perception of being excluded, either from a social opportunity or from information. This sense of exclusion may then produce anxiety symptoms since it signals a potential loss in relationships, support, or status (Baumeister & Leary, 1995). Thus, those low in social connection may be more likely to experience anxiety in the face of FOMO since SNS content can clearly alert the user to social exclusion. The current study's results indicate that online content, and the FOMO it elicits in users, is triggered by a fear of social exclusion that in turn results in greater levels of anxiety. This is a critical finding since researchers have struggled to identify what FOMO specifically taps into, such as whether it is a fear of missing information or of being excluded socially. In this study, the FOMO that is experienced by college students appears to stem from a social fear, which may be a result of the college environment and/or developmental stage of emerging adulthood, both of which cause individuals to be more concerned about social connections and social status (Heier, 2012; Lansu & Cillessen, 2012; LaFontana & Cillessen, 2010; Swenson, Nordstrom, & Hiester, 2008).

It is important to acknowledge that the current study chose to use Facebook as its SNS of interest. This decision was based upon the prevailing popularity of the site among emerging adults (Kittinger et al., 2012), and statistics that indicate that Facebook usership rates have continued to grow in recent years (Statista, 2015). However, it has been noted that the specific uses of the site have shifted over time, which may have implications for the current study and results (Lenhart, et al., 2010). More recent research indicates that college students most commonly use Instagram, followed by Snapchat, and then Facebook, and that this change in preference is driven by the increased desire to use a platform that allows for the sharing of pictures and videos (Knight-McCord et al., 2016). College students have also left Facebook in favor of newer SNSs in order to escape from the surveillance of the large proportions of adults, especially family members, that have come to inhabit Facebook (Lang, 2015). Further, younger users of Facebook perceive it to be less intimate and personal since users have hundreds or even thousands of “friends” (Lang, 2015), which deters their desire to share personal information with a wide audience. Additionally, Facebook has largely become a vehicle for political information, news alerts, and other non-personal content. Thus, the variables and models examined in the current study may not have had significant relations due to Facebook’s lack of relevance to college students, and the site’s shift from predominantly personal to general content (e.g., new stories) for younger users. For example, students may not be experiencing FOMO as a result of using Facebook since they are no longer seeing other users’ personal posts on their newsfeeds, and instead are flooded with article postings and “memes.” Future research should explore the current study’s models using more popular, and perhaps personal, SNSs like Instagram and Snapchat to better elucidate whether connections exist among the variables.

### **Strengths, Limitations, and Future Directions**

The current study answers the call for increased research related to social media use and how it may be related to mental health outcomes, and builds on prior work by examining this question in a comprehensive manner. The more complex investigation of social media use and its effect on mental health is a strength since past examinations have taken simplistic approaches, which may contribute to the mixed, and contradictory, conclusions within the field. As mentioned, the current study included nuanced variables, such as Facebook activities and Facebook intensity, in response to the need for more meaningful measurements of SNS use (Valkenburg et al., 2006). Studies also have shown that the consequences of SNS use are affected by the individual characteristics that users bring to their social media experience (e.g., personality traits; Aboujaoude et al., 2006; Ross et al., 2009), as well as the specific activities they engage in while online (Brandtzæg, 2012; Burke et al., 2010; Ruggiero 2000). Despite these findings, many studies fail to incorporate these recommendations or do so in a way that misrepresents the data, such as by dichotomizing the variable of Facebook activities (Chen et al., 2014; Haferkamp & Krämer, 2011; Reich & Vorderer, 2013). Another strength of the current study is its utilization of a longitudinal design, allowing researchers to explore relationships over time and to support causal conclusions. Finally, research has typically included college student participants as a convenience sample, whereas the current study intentionally selected this sample from a theoretical perspective. It is critical to examine how developmental stage and context may affect the research questions at hand, especially when examining SNS use and mental health, which can vary as a result of these factors.

Despite these strengths, there also are several limitations of the current study that could be addressed in future work. First, although the study employed a longitudinal design, it was only across two weeks, which is a relatively brief timespan and might not be long enough to see any meaningful changes in psychological states such as depression and anxiety, or in habits such as behaviors or use of SNSs. However, the current study did explore this limitation by conducting exploratory cross-sectional analyses at both T1 and T2. Findings from the cross-sectional analyses reiterated what was found longitudinally, suggesting that the conservative nature of the longitudinal design may not be the explanation for the lack of significant results. Despite this, future research should include longitudinal designs with longer timespans.

Further, the current study included a sample that was predominantly female, Caucasian, first-year students; was limited to emerging adults attending college; and was drawn from a single university. Thus, it is possible that the current findings do not generalize beyond this specific sample, making it difficult to extend results to other gender distributions, ages, ethnicities, education levels, and university climates, all of which may affect individuals' experiences with the variables examined. While the current study was specifically interested in exploring how the college context may affect social media use and its relation to mental health, it would be interesting for future researchers to compare the current study questions between emerging adults who are and are not enrolled in higher education. Although attrition analyses revealed no significant demographic differences between those who did and did not complete both timepoints, it is possible that students experiencing greater distress or more problematic SNS use did not participate in the study at all. Thus, it is important for future research to

continue improving recruitment and retention strategies in order to improve overall generalizability.

Finally, the current study was comprised of self-report measures related to SNS use, mental health, and well-being. Combining these types of measures with more complex forms of assessment, such as technology that allows researchers to track participant SNS activity on their smartphone in real-time, would help to bolster the findings. For example, the application QuickTime can be downloaded to any electronic device, and allows researchers to track the time course of individuals' use of SNS on that particular device, along with recording the specific activities one engages in while on different sites (e.g., browsing the newsfeed or writing comments). This would much more accurate data on SNS use and specific activities, and experience sampling methods could be used to obtain a more clear view of the timeline of SNS use and mood states. For example, recording SNS activity and well-being in-real-time and on a more frequent time course would offer insight into whether feelings of FOMO precede or result from SNS use. Alternatively, researchers could monitor SNS use directly within the lab. Several studies have utilized designs wherein participants were asked to view fake Facebook profiles while in the lab in order to examine how using SNS affected various psychological constructs (Haferkamp & Krämer, 2011; Rauch et al., 2014). An interesting addition to such designs would be to employ eye-tracking technologies, which would allow researchers to make more discrete connections between specific Facebook activities (e.g., viewing others' profiles, browsing the newsfeed) and well-being.

Related, the scale that was used to measure FOMO (Przybylski et al., 2013) may not have been appropriate due to its lack of specificity to the SNS context. Items from this scale reflect

broader situations, such as feeling bothered when one misses an opportunity to meet up with friends, and so the items may not translate well to more specific online activity. This lack of mapping onto the SNS domain may have contributed to FOMO's general lack of significance within the study's models and analyses. It is important to note, however, that other studies exploring FOMO in the context of SNS use did find significant relations (Alt, 2015; Przybylski et al., 2013; Riordan et al., 2015). Further, FOMO is still a new concept of interest in the research domain and the FoMOs scale, which was published in 2013, has prevailed as the dominant assessment thus far. However, a limited number of studies have employed this scale, and as research continues to examine the construct of FOMO, these findings will likely inform new conceptualizations of FOMO and iterations of its assessment. Already, other researchers have been developing alternative scales for measuring FOMO, such as Abel, Buff, and Burr (2016) focusing on the psychological components of FOMO in their assessment. The current study also did not include measures of positive mental health, such as optimism or happiness, and so while the current findings do not support a significant connection between SNS use and negative mental health (e.g., depression and anxiety), the results cannot make conclusions as to whether SNS use may have predicted positive mental health. Furthermore, year in college was not included as a covariate, which may be important to adjust for in future studies examining variables related to SNS use in a college sample. It is possible that students use SNSs in different ways or for different purposes across the four years of college, and this may be a confounding factor in the current study's findings.

## Implications and Conclusions

The results of the current study have important implications for considering the ways in which SNSs may intersect with psychological health. Though previous research has found social media use to be linked with negative outcomes, such as increased anxiety and depression, it appears that this was not the case in the current college sample. Given that the majority of participants were first-year students (53%), SNS use may be beneficial for this particular group as they transition to college by supporting the formation of new relationships in the college environment and the maintenance of those from home. Further, students who have positive experiences with SNSs may have been more likely to sign up to participate in this study, whereas those with negative experiences may have been deterred from doing so. Given the negative press that social media use has received in both popular media and in the scientific community (de Vries & Kühne, 2015; Ehmke, 2016; Pantic, 2014; Simmons, 2016; Walton, 2017), the current results give pause in making such sweeping conclusions. While the original mediation model was not significant, FOMO was found to affect both depression and anxiety, and so interventions targeting FOMO in the college-attending emerging adult population could have clinically significant effects for students, especially for those experiencing social anxiety. Additionally, results indicate that for college students, FOMO may be tapping into a social fear, as opposed to worrying that they will miss information. It is also interesting to note that using Facebook in a passive manner, such as “lurking” on others’ profiles, indirectly predicted both anxiety and depression through FOMO. As technology continues to advance and SNS use becomes increasingly prevalent and expansive, it is important that research continues to examine

the effects, both positive and negative, that such media may have on a variety of well-being and mental health outcomes.



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## VITA

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