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# The Effects of Cognitive Stimulation of Instagram on Anxiety, Fear of Missing Out, Memory, and Self-Esteem

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Effects of Cognitive Stimulation of Instagram on Anxiety, Fear of Missing Out, Memory, and  
Self-Esteem

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Abstract

## Abstract

With the increasing use of social media in the daily lives of undergraduate college students, it is important to investigate the effects of social media on psychological well-being and cognitive function. Lillard and Peterson (2011) found that overstimulating children's television shows, such as *SpongeBob*, negatively impacted children's impulsive behaviors and attention. The current research focused on emerging adults and considered the effect of overstimulation of social media, specifically Instagram, on anxiety level, self-esteem, fear of missing out (FoMo), and memory. Participants were randomly assigned into either the control (coloring on an iPad) or experimental (Instagram stimulation) group and after a set of pre-test questions regarding self-esteem and anxiety, participants were exposed to cognitive stimulation for 10 minutes. Then participants completed a post-test questionnaire of self-esteem, anxiety, memory recall, and fear of missing out (FoMo). Researchers hypothesized that the Instagram stimulation group would have lower levels of self-esteem, higher anxiety, higher levels of FoMo, and lower memory recall than those in the coloring group. Effects of exposure to Instagram has not been thoroughly researched, therefore it is an important avenue to study as emerging adults have an increasing habit of looking at Instagram on a regular basis. An independent samples t-test and a mixed-model ANOVA found that those exposed to Instagram had heightened levels of FoMo. In addition, participants, regardless of condition, experienced a significant increase in self-esteem from pre- to post-test. Future research may consider examining the effects of stimulation of Instagram regarding short-term memory and self-esteem.

*Keywords:* Instagram, emerging adulthood, anxiety, self-esteem, fear of missing out, memory

## The Effects of Cognitive Stimulation of Instagram on Anxiety, Fear of Missing Out, Memory, and Self-Esteem

With the rise of social media use over the past decade, researchers have studied the correlation between the effects of the media and mental health (Lillard & Peterson, 2011; Rajanala, Maymone, & Vashi, 2018). Social media has become a popular way for emerging adults to connect with one another especially through the social media platform known as Instagram; in fact, 78% of 18 to 24-year-olds use Instagram (Smith & Anderson, 2018). Emerging adulthood is a crucial age where researchers have demonstrated the negative effects of social media on daily mood, thought patterns, and sense of self (Smith & Anderson, 2018). With research suggesting negative implications of social media use and the popularity of social media among emerging adults on a regular basis, it is important to further study the effects of social media use on memory and psychological well-being.

Emerging adulthood is a period of development around ages 18 until 25 where young adults are in an exploration phase of life (Arnett, 2000). This period of development is a newly researched period of development due to the increasing population of individuals attending and staying in college longer than previous generations. The identification of emerging adults as a separate period of development is because of broader cultural shifts in society that have affected the development. These cultural shifts include being financially linked to a parent, not being able to find a job right out of college, being in significant amounts of debt, and job requirements demanding more schooling than they did 20 years ago. In being financially dependent on their parents in one way or another, emerging adults are usually not fully self-sufficient which leads to more time for exploration, creativity, and identity formation. Emerging adulthood is a time of cognitive development where new ideas, theories, and world perspectives are available because

of exposure to new experiences (Arnett, 2000). Emerging adults experience significant changes in this period of development due to leaving home and gaining new knowledge through work, education, and interactions with different populations. Cognitive stimulation in relation to social media use should be considered in terms of cognitive and psychological health. Social media is an incredibly prevalent catalyst that can influence the sense of self and can affect the development of one's identity (Burrow & Rainone, 2017). Stimulation to Instagram must be considered in analyzing its effects on cognition and psychological well-being because Instagram is a social media platform that provides extensive amounts of cognitive stimulation in a short period of time.

Cognition can be defined by many different parameters such as memory, impulse control, problem-solving speed, and executive functioning tasks (Lillard & Peterson, 2011). Emerging adults are susceptible to external stimuli, like social media, that may affect their brain development. Previous research on the effects of social media on executive functioning and cognition have shown that media negatively affected short-term memory, yet increased working memory acquisition (Lillard & Peterson, 2011; Alloway & Alloway, 2012). In contrast to the negative cognitive effects of media, coloring appeared relaxing and to enhance short-term memory (Lillard & Peterson, 2011; Eaton & Tieber, 2017). Eaton and Tieber (2017) found that after participants colored for 30 minutes, their anxiety decreased, and mood significantly increased. Exposure to social media and the fast pacing of social media sites, like Instagram, may impact the emerging adult's memory and psychological well-being because of the pacing of the information. Examining the effects of cognitive stimulation, whether that is through social media, and its effect on anxiety and memory must be considered to better understand the potential negative influences of social media use.

### **Cognition in Emerging Adulthood**

To better grasp how social media may affect cognition, it is important to understand other types of media such as television watching (Lillard & Peterson, 2011) have been shown to negatively affect cognition. Memory is a particularly important variable to assess when considering the effects of social media use on cognition because of the increased amount of research on the negative effects of social media on short-term memory. Short-term memory has been shown repeatedly to be negatively affected by social media, television, and stimulation on a computer (Lillard & Peterson, 2011; Alloway & Alloway, 2012; Hollis & Was, 2016). In contrast, working memory, which is the ability to be working on a task while pulling information from other stimuli, has been shown to be reinforced for Facebook users (Alloway & Alloway, 2012). Memory is an aspect of cognition that is important to analyze when researching social media stimulation because of the significant increase in students using social media prior to classes, tests, or other important activities that require their use of short-term memory.

Past research has focused primarily on executive functioning in early to middle childhood, but it is a new phenomenon in psychology to analyze the general executive function of emerging adults in relation to social media use. Executive functions are various skills that allow all ages to execute various tasks through memory, attention, self-regulation, and alertness (Lillard & Peterson, 2011). Jarrett (2016) studied the deficit in executive functioning among emerging adults, specifically those with ADHD and anxiety. College students participated in the study and completed a total of six scales assessing anxiety, ADHD, and general psychological distress. Jarrett (2016) found that participants who reported decreased executive functioning significantly exhibited heightened anxiety and inattention. Specific to memory, Jarret (2016) found that emerging adults with increased anxiety and ADHD had decreased working memory

abilities. Memory is an important executive function that is crucial in development during emerging adulthood. It is important to understand the potential deficits in memory among emerging adults because of the increasing prevalence of Instagram use before and after college classes to see if cognition is affected by short spurts of social media use.

Most research on short-term memory has concluded that there is a negative effect on memory because of heightened anxiety and decreased self-esteem, but it is important to understand the relationship between executive functioning and social media use (Jarret, 2016). Regarding social media, Alloway and Alloway (2012) examined the effects of social media use on working memory. After evaluating the amount of social media that participants used, participants were given several cognition tasks where they were asked to recall a number and then execute a skill on the computer. Researchers found that individuals who used Facebook had higher working-memory scores which are conclusive with the idea that on Facebook users must remember information from a Facebook page and then searching for someone or something else from that page. Alloway and Alloway (2016) research on short-term memory and the positive effect of social media on working-memory may be a result of remembering what other people on social media are doing because of constant social comparison. There are various perspectives to whether different types of memory are enhanced or inhibited by social media, therefore it is important to further study memory in relation to social media use. Furthermore, Instagram is different than Facebook in that the pacing of Instagram is much faster which requires more attention shifts, much like a fast-paced television show. Therefore, Instagram may have a negative effect on memory from the fast pacing of the social media platform.

### **Use of Social Media in Emerging Adulthood**

The false presentation of self on social media is a popular phenomenon that often is an unspoken trend amongst emerging adults; this indirect tendency can be detrimental to emerging adult's self-esteem and anxiety (Elhai, Hall, & Erwin, 2018). Often, social media users portray positive life events, rather than negative, not for their own satisfaction but to appear more favorably to others. According to the availability heuristic, Facebook users remember what is readily available to them and if that means their friends are posting about positive experiences, then Facebook users may believe everyone else is having fun without them. Chou and Edge (2012) discovered that Facebook users with a lot of friends they were not familiar with were more likely to believe that others had better lives than their own. Chou and Edge (2012) also found that those who were long-time users of Facebook were more likely to believe that others were happier than themselves and believed that life was unfair. Perception of other people's happiness is a phenomenon associated with the fear of missing out (FoMo). FoMo is a feeling of being left out because of seeing friends/followers on social media engaging in behavior that one wishes they were a part of (Alt, 2015; Elhai, Hall, & Erwin, 2018).

Engaging in social comparison is a concept of looking to peers and other influential figures and equating one's worth to their idol; this can have both positive or negative outcomes but understanding the purpose social comparison serves in one's sense of self (Shin, Kim, Im, & Chong, 2017). Social comparison is the core reason why emerging adults falsely present themselves on social media as well as why seeing other individuals on social media may result in heightened anxiety and insecurities in self-esteem. Comparing one's appearance, abilities, activities, likability, and sociability to others via social media may result in social media users questioning their own appearance and personality based on the way other individuals present



themselves on social media. Instagram is a popular platform of social media that emerging adults especially engage in social comparison because posting pictures that are the most adventurous or flawless beauty are in constant competition. Jackson and Luchner (2017) researched the effects of self-esteem on the presentation of self. Researchers found that participants were falsely portraying themselves on social media to appear more likable with the intent of deceiving their friends/followers. Comparing oneself to others on social media may result in a false portrayal of oneself through one's own posts, who they follow, and how many followers they must appear as desirable as possible to other social media users; such comparisons to others through social media could potentially negatively impact self-esteem.

Rajanala et al. (2018) discussed the growing trend to remodel and modify one's body based on specific filters that are available to social media users. Built into the Instagram and Snapchat applications there are many ways to enhance one's appearance by whitening and straightening teeth or elevating the face. Previously, only celebrities had the ability to alter their appearance in the media; it is only in recent years that the average person can change basic features in seconds on a free application (Rajanala et al., 2018). The ability to change appearance so regularly may alter one's sense of self by feeling as if one must continue to change their appearance constantly. Their unedited version of themselves is no longer enough to present to the world. Anxiety and self-esteem are affected by readily changing appearance; there has been an increase in facial plastic surgeries where the patient requests to change their appearance to improve their selfies based on the way filters on Instagram or Snapchat (Rajanala et al., 2018). False presentation of self is a growing trend for social media users and can result in negative mental health implications such as increased anxiety and decreased self-esteem. Such

false presentations lend itself to comparison to other friends or followers on social media platforms which can also negatively impact mental health and psychological well-being.

### **Anxiety in Emerging Adulthood**

Anxiety can be a factor that is influenced using social media. Emerging adults are expected to be instantly accessible throughout the day with increased pressure to perform and appear as an idealized version of themselves. Anxiety can manifest itself in FoMo or poor self-esteem (Jackson & Luchner, 2017; Burrow & Rainone, 2017). Symptoms of wanting to be always connected and worrying about the proportion between the number of followers and likes is a phenomenon that emerging adults grapple with regarding their social media accounts. Anxiety due to social media has been shown to not only affect the social interactions of emerging adults but also their sleeping patterns (Woods & Scott, 2017).

It is crucial to understand the prevalence and importance of the role anxiety plays in the executive functioning and psychological well-being of emerging adults. In Riggs and Han (2009) research on predicting the major factors of anxiety and depression in emerging adult's college students were presented with six scales that assessed the participant's attachment style, traumatic life experiences, self-esteem, irrational beliefs, chronic anxiety, and depressive symptoms. Findings suggested that traumatic life events and attachment style of the parent played a significant role in college student's self-esteem and irrational beliefs which were then a predictor of anxiety and depressive symptoms. With the growing anxiety rate in emerging adults, it is important to consider the role that external stimuli may have on anxiety amongst emerging adults in their daily lives as social media use becomes increasingly popular.

Woods and Scott (2017) hypothesized that heightened social media use would correlate with poorer quality of sleep. Researchers discovered that their hypothesis was supported and that

heightened anxiety also correlated with heightened social media use, nighttime social media use, and emotional investment in social media. Furthermore, heightened anxiety correlated with general social media use, nighttime social media use, and emotional investment in social media. Increased social media use resulting in interference with sleep patterns may in turn indirectly affect anxiety from both sleep deprivation.

Kross et al. (2013) were interested in examining the effects of the daily wellbeing of Facebook users relative to more immediate exposure to social media. The researchers performed a longitudinal study of the effects of daily Facebook use on young adult's well-being. Researchers hypothesized that the use of Facebook would affect the participant's emotional wellbeing (throughout the day and how satisfied they are with their lives). Well-being was evaluated using depression, anxiety, self-esteem, satisfaction with life, loneliness, and support scales. Researchers found that the more that participants used Facebook, the worse they felt afterward and were usually feeling lonely. In addition, participant's satisfaction with life decreased the more they used Facebook (Kross et al., 2013). Emotional well-being is influenced by self-esteem and anxiety which may be manipulated by controlling the exposure to social media.

### **Fear of Missing Out in Emerging Adulthood**

A new phenomenon in the field of psychology known as FoMo is a type of social anxiety where social media users see their social media friends engaging in desirable behaviors on social media, but then it makes them think they might be missing out on those desirable behaviors which in turns leads to specific feelings of anxiety (Alt et al., 2018). FoMo can be defined as a sense of anxiety or loneliness because of seeing other friends or followers on social media engaging in behaviors or activities that they wish they were a part of (Alt et al., 2018). There has

been an increasing awareness about the association between the use of social media and increased FoMo. False perception of self can also connect false self-presentation and FoMo; social media users who contrive posts to be perceived as more desirable are creating false experiences, which are then making their followers experience FoMo based on idealized experiences by both parties. Therefore, the cycle of missing out from a contrived experience is detrimental to the well-being of viewers and people posting desirable experiences. FoMo is considered an aspect of anxiety that can be affected when viewing other individuals' statuses on social media (Przybylski, Murayama, DeHaan, & Gladwell, 2013). Anxiety and fear of missing out may increase in an individual when they are viewing a friend's profile and wishing they too were part of a certain experience. Other emotions such as jealousy, anger, or low self-esteem may arise when viewing posts where the viewer experiences FoMo.

Przybylski et al. (2013) were interested in evaluating the different aspects of fear of missing out (FoMo) in the social media and emotional/behavioral realm. Researchers created three studies where the first evaluated self-report general levels of FoMo. The second evaluated the general age demographic of those experiencing FoMo as well as researching the link between emotional state and social media use. The final study was specific to university aged students who used social media regularly to evaluate their own FoMo (Przybylski et al., 2013). Researchers discovered that the most prevalent age associated with high levels of FoMo are young adults, specifically young adult males. Furthermore, participants who experienced decreased psychological needs (such as competence, autonomy, or relatedness) reported higher levels of FoMo. Researchers also found that among college students, those who had high levels of FoMo were more likely to engage in social media more often throughout the day, during university lectures, and while driving. Przybylski et al. (2013) identified important information

about the prevalence of FoMo among emerging adults and the temptation to turn to social media in times of deficits in psychological well-being. It is important to study whether brief exposure to social media, such as Instagram, could temporarily increase feelings of FoMo from seeing Instagram friends accounts.

Alt's (2015) research was able to find significant results for their hypotheses that as the intrinsic motivation for learning increases there is a decrease in the use of social media, and as students are psychologically needier/more unstable the higher their sense of FoMo. Specifically, the extrinsic motivation of college students positively correlated with social media engagement and higher levels of FoMo (Alt, 2015). Furthermore, FoMo was found to significantly correlate with social media engagement overall. Alt's (2015) research on FoMo provides an example of how a psychological deficit of connectedness with other individuals manifests itself through increased use of social media.

Often, FoMo is related to the inability to access social media for a reason, which demonstrates a heightened sense of anxiety, stress, and depressive symptoms. Elhai et al. (2018) examined the effects of losing access to social media due to the inability to access one's phone or social media account. Participants were asked to imagine what their perceived anxiety surrounding the loss of their smartphone or loss of social media accounts and rate their anxiety-related symptoms. Researchers found that participants who were more emotionally involved with social media experienced a greater sense of missing out without their social media accounts (Elhai et al., 2018). Individuals may experience feelings of FoMo while they are viewing or immediately after viewing social media.

### **Self-Esteem in Emerging Adulthood**

Self-esteem is a critical part of psychological well-being that is responsible for the general attitude towards one's appearance, behavior, and personality. Previous research on the effects of social media use on self-esteem has evaluated self-esteem longitudinally while other researchers have focused on the current state of self-esteem (Chung, Robins, Trzesniewski, Nofhle, Roberts, & Widaman, 2014; Leary, Tambor, Terdal, & Downs 1995). State self-esteem assessed at different points in time that is gathered to assess changes in self-esteem are critical to understanding the immediate effects of social media use on self.

Low self-esteem is an outcome of negative social comparison but can also be positive if one feels better than others after viewing social media. Leary et al. (1995) were interested in investigating the effects of self-esteem as a major developmental component of personality. Specifically, Leary et al. (1995) researched the effects of self-esteem and how the participant's perception of inclusion or exclusion encouraged or discouraged their sense of self. Researchers found that participants with higher self-esteem felt more included and more connected, while participants with lower self-esteem felt more excluded and less connected. One's connectedness can be heavily influenced by the increasing use of social media. Social media is a platform that can exacerbate social comparisons because of the constant stimulation to followers and friend's experiences that may result in negative self-esteem. If people perceive other's lives as more desirable, which is likely because people highlight the positive portions of their life on social media, then they may be less satisfied with their own lives. The relation between social comparison, self-esteem, and social media use are especially relevant among emerging adults.

Understanding that during the age of 18 until 25, emerging adult development period, self-esteem is fluid and forming is crucial to understanding the effects that social media can have

on one's sense of self. Chung et al. (2014) conducted a longitudinal study on emerging adults on the continuity and change of self-esteem during college. Participants completed six self-esteem questionnaires throughout their undergraduate experience to track changes and continuity of self-esteem over a four-year period. Researchers were interested in tracking changes in self-esteem and the changes to self-esteem for college students as well as the student's projection of their future self-esteem (from freshman to senior year) and on how students think their self-esteem has changed (from senior to freshman year). Furthermore, student academic achievement, measured through their grade point average, was tracked to evaluate if there was a connection between self-esteem and grades. Chung et al. (2014) discovered that participant's self-esteem was relatively constant throughout college, but during the participant's freshmen year they experienced significant changes in self-esteem from the beginning to the end of the year. Moreover, students that had a higher-grade point average long-term had more positive self-esteem and seniors believed their self-esteem increased over their time in college. Chung et al. (2014) research provide insight into the critical period of life that is emerging adulthood, specifically during the freshman year of college, where young adults are easily influenced by external stimuli such as social media.

Self-esteem is also relevant in the formation of an individual's purpose; social media can negatively influence individuals who are not driven or find little purpose in life. Burrow and Rainone (2017) created two studies that examined the relationship between the number of likes participants received on their Facebook profile pictures with self-esteem. The first study found a positive association between likes on Facebook and self-esteem. Study 2 replicated these findings experimentally by manipulating the number of likes individuals received on self-photographs posted to a mock Facebook site. Burrow and Rainone (2017) found that participants

that were assigned to the above average amount of likes condition reported significantly higher self-esteem than those in the average or below average condition. The researcher's hypothesis was supported in that there was a significant correlation between more likes on Facebook and self-esteem. Furthermore, having a more concrete sense of purpose is less likely to be disrupted by the number of likes on Facebook. "Likes" on social media and its effects on self-esteem is an important concept to consider because it demonstrates how easily manipulatable self-esteem may be for people more emotionally invested in social media.

### **Present Study**

The present research examined the cognitive stimulation of social media, specifically Instagram, and its effect on self-esteem, anxiety, FoMo, and memory. Lillard and Peterson (2011) studied the effects of watching fast-paced cartoons on children's Executive Function (EF), memory and problem-solving abilities. The independent variable in Lillard and Peterson (2011) was the pacing of television shows with three levels (fast, moderate-pace, and neutral/coloring). Lillard and Peterson (2011) research found a difference in executive function due to varying paces of television shows for children. The current study uses the independent variable of cognitive stimulation by evaluating time and condition to better assess the effects of the pacing of social media since that is a measure more relevant to present-day college students.

With the increasing popularity of Instagram use amongst emerging adults, the current study assessed the effects of stimulation to either the cognitive stimulus of Instagram or a control, coloring task. The current research extends on Lillard and Peterson (2011) by using social media exposure as the type of media stimulation instead of tv and several psychological well-being variables that have not been considered together in a single study. After completing pre-test scales of anxiety and self-esteem, participants listen to a 5-minute presentation about the



researcher's trip to Italy followed by either the control (coloring task) or experimental condition (Instagram stimulation) based on randomization. Because Lillard and Peterson (2011) found that exposure to fast-paced television shows affected children's short-term memory, it is expected that those in the experimental condition would recall less than those in the control condition due to the differences in cognitive stimulation and pacing. It was hypothesized that participants in the Instagram stimulation group will have lower levels of self-esteem and higher anxiety than those in the coloring group which is consistent with Alt (2015) and Woods and Scott (2017). Participants in the Instagram stimulation group were to be expected to also have higher levels of FoMo, consistent with Chung et al. (2014) findings.

## **Method**

### **Participants**

Students that attended a small private undergraduate university were recruited to participate in the study. Participants were recruited through various emails sent out to the psychology students, honors program students, and students in a leadership program. There were 90 participants (11 males, 79 females, 1 other) from diverse communities within the university. The mean age of participants was 19.24 (SD= 1.12) and ranged from 18 to 25. Sixty-seven students identified as white, 10 Black/African American, 2 Asian/Pacific Islander, and 11 others. Participant's relationship status was also recorded (48 single; 42 dating). Other demographic questions pertaining to the specific details of the study considered whether the participant had ever visited Italy (14 yes; 76 no) and if they have an active Instagram account (90 yes; 0 no). Lastly, participants were asked to record how many hours per week they used Instagram (M=

6.67; SD= 4.87) and how many times per day the participant opens or checks Instagram (mean 9.87 and standard deviation 9.06).

## **Materials**

Four different scales were used to assess memory, fear of missing out, anxiety, and self-esteem. Participants completed both a pre- and post-test State Self-Esteem Scale (SSES) (Heatherton & Polivy, 1991) and Hospital Anxiety and Depression Scale (HADS) (Bjelland, Dahl, Haug, & Neckelmann, 2002) adapted to only assess anxiety. Participants completed a post-test Fear of Missing Out Scale (FoMo) (Przybylski Murayama, DeHaan, & Gladwell, 2013) and Memory Scale. Lastly, the experimental group was given a general attitude about the perception of social media use scale only post-experimentation. To maintain standardization amongst experimental groups, the researcher wrote a script for instructions and the presentation about Italy (see Appendix A). Furthermore, the researcher devised a presentation to accompany the verbal presentation (see Appendix B).

**Fear of missing out.** Fear of Missing Out was assessed using the FoMo scale (Przybylski et al., 2013). After the experimentation phase of the current study, participants in both the experimental and control groups completed a FoMo scale (see Appendix C). The FoMo scale was scored on a five-point Likert scale where a five indicated “extremely true for me” (Cronbach’s alpha .82). FoMo questions asked about comparing experiences to peers, the perception of happiness, inclusivity, and obsession with peers’ lives. Lower scores indicated lower levels of FoMo while higher scores indicated higher levels of FoMo.

**Memory.** Memory was assessed using the Memory Scale created for the present study. Memory was measured using a delayed recall task based on the presentation about studying abroad in Italy. The memory scale was a 10-item multiple choice scale and was evaluated such

that the more questions the participant answered correctly, the better their memory was for this task (see Appendix D). The questions assessed basic questions about the researcher's study abroad experience as well as specific details such as, "Which course did Anna take while studying abroad?" Questions required participants to pay attention to both verbal and visual cues from the presentation as some of the questions regarding the pictures from the presentation (see Appendix B).

**Self-esteem.** Self-esteem was assessed using the State Self-Esteem Scale (SSES) (Heatherton & Polivy, 1991). The SSES assessed participant's self-esteem in social situations and regarding appearance. The scale was a 5-point Likert scale where a 5 indicated that the statement extremely pertained to the participant's situation. The SSES was adapted for the current study to only include appearance and social self-esteem and disregarded questions asking about performance self-esteem (see Appendix E). Appearance and social self-esteem scores are scored together for a total state self-esteem score (Cronbach's alpha for Pre-SSES total of .83 and for Post-SSES total of .84). Appearance questions asked about the participant's satisfaction with weight, looks, and general feeling about outward presentation (Cronbach's alpha for Pre-Appearance SSES total of .86 and Post-Appearance SSES of .84) (with the exclusion of question four for both Pre and Post-SSES totals because it affected internal consistency). The questions regarding social self-esteem asked about the way participants, view their emotions, sociability, and perceptions of other ideas of them (Pre-Social SSES total of .85 and Post-Social SSES total of .88). Participants completed the same pre- and post-test SSES.

**Anxiety.** Anxiety was assessed using the Hospital Anxiety and Depression Scale (HADS) (Bjelland et al., 2002). The HADS asked participant seven questions on a four-point Likert scale where a lower score indicated lower levels of anxiety. The HADS was modified to include only

anxiety questions as the current research was not interested in evaluating depression (see Appendix F). Lower scores indicated little to no anxiety. Anxiety questions assessed general anxiety, physical symptoms of anxiety, and ability to relax (Cronbach's alpha for Pre-HADS total of .79 and for the Post-HADS total of .83).

**Manipulation check for the perception of Instagram experience.** Participants in the experimental condition, those exposed to Instagram, completed a four-question Perception of Instagram Experience Manipulation Check created by the researcher. This manipulation check was designed to evaluate the experience that the researcher had when viewing Instagram by asking how much time the researcher spent on their friends, followers, or other people's pages as opposed to their own. This information was for the researcher to gather general quantitative information regarding the amount of stimulation the participant experienced and to gather general quantitative information regarding possible stimulation to determine whether there was indeed shifts in attention occurring. For example, one question asked, "how many times where you interrupted by a text message or notification other than Instagram" (see Appendix G). See Table 1 and Table 2 for descriptive statistics. Although most participants did not seem to be distracted by text messages, the majority reported shifting their attention to something new every 10-20 seconds which demonstrates fast-paced stimulation. These questions were designed to understand the amount of stimulation those in the experimental condition experience to mimic real-world stimulation.

### **Design and Procedure**

The research design was a 2 (time) x 2 (stimulation) mixed ANOVA. The independent variable was cognitive stimulation and the dependent variables were self-esteem, anxiety, FoMo, and memory. Research sessions took place in a classroom setting for approximately 30 minutes

with approximately 15 students per session. As participants entered the classroom they took a colored stick with one color signifying experimental condition and the other signifying control, but participants found out their assigned condition later. Participants were told which group they were in after completing the pre-test scales (SSES and HADS) and before the presentation. After reading and signing an informed consent form, participants filled out a demographic's questionnaire, the Hospital Anxiety Scale, and an SSES. Then the researcher gave a five-minute, scripted presentation about their study abroad experience in Italy. The presentation also included a presentation with pictures and captions. Immediately following the presentation, participants in the control group will be given an iPad to use the Colorfy app to color while the experimental group looked at their own Instagram accounts on their own smartphones. Both groups were simultaneously on their designated devices for 10 minutes. Participants were told to stay on task and try to ignore any notifications as well as turn off any sound notifications. After the 10 minutes of stimulation to either Instagram or a coloring application, participants completed the HAS and SSES again. They also completed a delayed recall memory task and the FoMo Scale. Participants in the experimental group also completed a Perception of Instagram Experience scale. Participants were debriefed following questionnaire completion. Finally, participants were given a research credit slip signed by the researcher that denotes they have completed the research to receive credit for the research assignment or extra credit, when applicable.

### **Data Analysis**

Researchers used both a mixed-model ANOVA and an Independent Samples T-Test to analyze the findings of the current study. A mixed-model ANOVA was used to analyze the repeated measures results for the within subjects and between subjects' assessments of anxiety and self-esteem. An analysis using a mixed-model ANOVA was used for the within-subjects pre-

and post-test results for anxiety and self-esteem as well as for the between subjects in the control and experimental groups level of anxiety and self-esteem. An independent sample T-Test was used to analyze the between-subjects results for the fear of missing out and memory data.

## Results

Two independent samples t-tests were run to analyze the difference between the experimental (Instagram condition) and control (coloring condition) for 10 minutes, groups to see if the Instagram group experienced higher levels of FoMo and decreased memory recall.

It was hypothesized that participants who were stimulated to Instagram for 10 minutes would experience more feelings of FoMo than those exposed to coloring for 10 minutes. Whereas the Instagram stimulation group ( $N = 44$ ) had a mean of 27.61 ( $SD = 7.53$ ), the coloring group ( $N = 46$ ) had a mean of 23.88 ( $SD = 7.20$ ). See Figure 1 for a bar graph for this data. Using an alpha level of .05 results demonstrated a significant difference between the means,  $t(88) = -2.40$ ,  $p = .018$ , and supported the hypothesis.

Participants who were stimulated to Instagram for 10 minutes were hypothesized to have lower memory recall than those exposed to coloring for 10 minutes. Whereas the Instagram stimulation group ( $N = 44$ ) had a mean of 8.84 ( $SD = 1.24$ ), the coloring group ( $N = 46$ ) had a mean of 9.15 ( $SD = .87$ ). Using an alpha level of .05, results demonstrated no significant difference between the means,  $t(88) = 1.39$ ,  $p = .17$ , and did not support the hypothesis.

A series of 2 (time) x 2 (condition) mixed model ANOVAs were used to examine group differences for anxiety and self-esteem. Self-Esteem was analyzed on two different subscales known as social self-esteem and appearance self-esteem.

It was hypothesized that participants who were stimulated to Instagram for 10 minutes would have higher levels of anxiety than those exposed to coloring for 10 minutes. The mixed-model ANOVA revealed that the main effect for Condition was not significant  $F(1,88) = .002, p = .96, \eta^2 = .01$ . Thus, there was no overall difference in the condition for Instagram group ( $M = 8.64, SD = 3.89$ ) compared to the coloring group ( $M = 8.67, SD = 4.08$ ). The main effect for Time was not significant,  $F(1,88) = 1.38, p = .24, \eta^2 = .02$ . Time scores from pre-test ( $M = 8.76, SD = 3.82$ ) were not significantly higher than the post-test ( $M = 8.56, SD = 4.26$ ). Finally, there was no significant interaction for condition and time,  $F(1,88) = .85, p = .36, \eta^2 = .01$ . See Table 3 for descriptive statistics. The hypothesis was not supported because all participants, regardless of condition, had no significant change in anxiety level.

Participants who were stimulated to Instagram for 10 minutes were hypothesized to have lower self-esteem than those exposed to coloring for 10 minutes. The mixed-model ANOVA revealed that the main effect for Condition was not significant  $F(1,88) = .20, p = .66, \eta^2 = .001$ . Thus, there was no overall difference in the condition for Instagram, Instagram group ( $M = 42.49, SD = 8.13$ ) compared to the coloring group ( $M = 43.25, SD = 8.13$ ). The main effect for Time was significant,  $F(1,88) = 14.04, p = .001, \eta^2 = .14$ . Time scores from pre-test ( $M = 42.13, SD = 8.28$ ) were significantly lower than the post-test ( $M = 43.62, SD = 8.34$ ). Finally, there was no significant interaction for condition and time,  $F(1,88) = .35, p = .56, \eta^2 = .004$ . See Table 4 for descriptive statistics. The hypothesis was not supported although post-test self-esteem was higher than pre-test self-esteem, this was not consistent with the hypothesis which predicted a difference only for the experimental condition and predicted a change in the opposite direction.

It was hypothesized that participants who were stimulated to Instagram for 10 minutes would have lower self-esteem, specifically social self-esteem, than those exposed to coloring for

10 minutes. The mixed-model ANOVA revealed that the main effect for Condition was not significant  $F(1,88) = .72, p = .40, \eta^2 = .008$ . Thus, there was no overall difference in the condition for Instagram group ( $M = 23.40, SD = 5.94$ ) compared to the coloring group ( $M = 24.46, SD = 5.94$ ). The main effect for Time was significant,  $F(1,88) = 18.31, p = .001, \eta^2 = .172$ . Time scores from pre-test ( $M = 23.32, SD = 6.01$ ) was significantly higher than the post-test ( $M = 24.56, SD = 6.17$ ). Finally, there was no significant interaction for condition and time,  $F(1,88) = 2.24, p = .14, \eta^2 = .03$ . See Table 5 for descriptive statistics. The hypothesis was not supported although post-test social self-esteem was higher than pre-test social self-esteem, this was not consistent with the hypothesis which predicted a difference only for the experimental condition and predicted a change in the opposite direction.

Participants who were stimulated to Instagram for 10 minutes were hypothesized to have lower self-esteem, specifically appearance self-esteem, than those exposed to coloring for 10 minutes. The mixed-model ANOVA revealed that the main effect for Condition was not significant  $F(1,88) = .003, p = .96, \eta^2 = .001$ . Thus, there was no overall difference in the condition for Instagram group ( $M = 16.30, SD = 3.86$ ) compared to the coloring group ( $M = 16.34, SD = 3.69$ ). The main effect for Time was not significant,  $F(1,88) = 1.60, p = .21, \eta^2 = .02$ . Time scores from pre-test ( $M = 16.19, SD = 3.90$ ) were not significantly higher than the post-test ( $M = 16.44, SD = 3.85$ ). Finally, there was no significant interaction for condition and time,  $F(1,88) = .09, p = .76, \eta^2 = .001$ . See Table 6 for descriptive statistics. The hypothesis was not supported because all participants, regardless of condition, had no significant change in appearance self-esteem level.



### Discussion

In the present study, researchers examined the effects of cognitive stimulation of Instagram on FoMo, memory, anxiety, and self-esteem. The hypothesis that participants in the Instagram stimulation group will also have higher levels of FoMo was supported. Moreover, the hypothesis was not supported for memory in that participants in the Instagram stimulation group did not have lower memory recall than those in the coloring group. In addition, participants in the Instagram stimulation group did not report higher anxiety than those in the coloring group. Lastly, the hypothesis that participants in the Instagram stimulation group will have lower levels of self-esteem was not supported, but in fact, the null hypothesis was significant in that self-esteem and social self-esteem increased in both the Instagram and coloring groups. Appearance self-esteem did change over time for either group.

Consistent with the hypothesis, the Instagram stimulation group exhibited higher levels of FoMo than the Coloring group. Participants who were exposed to Instagram for 10 minutes were given the opportunity to view social media which may have elicited feelings of FoMo, whereas the coloring group was not stimulated by the events that happened in their follower's lives. Individuals in the Instagram group may have felt that their friends and followers on Instagram were having more fun, which manifests itself in feelings of FoMo. The current findings are consistent with Przybylski et al. (2013) in that emerging adults experience the highest levels of FoMo compared to other developmental stages. Furthermore, Przybylski et al. (2013) were focused on the relationship between social media in general compared to feelings of FoMo, whereas the current study focused on Instagram specifically, therefore the current study provides important findings on the prevalence of FoMo amongst emerging adults after simply viewing Instagram for 10 minutes. The current study's findings on FoMo are important for emerging

adults to be aware of the effect that social media can have on their emotions over a short period of time. In becoming aware of the effects of Instagram on FoMo, emerging adults may benefit in understanding a contributing factor for feelings of loneliness, jealousy, and/or missing out. Future research should potentially study the long-term effects of FoMo on mood, anxiety, or emotions because of the growing prevalence of Instagram amongst emerging adults.

The hypothesis that memory recall would be lower in the Instagram stimulation group was not supported. In the current study, memory recall was the same for both groups and was inconsistent with the findings of Lillard and Peterson (2011). Lillard and Peterson (2011) evaluated executive functioning among children after watching either a cognitively stimulating or slow-paced (less stimulating) and found that the children exposed to the overstimulation television show demonstrated significantly lower memory recall. In contrast to Lillard and Peterson (2011) findings, it may be that viewing Instagram does not cause the same cognitive effect in emerging adults that viewing a fast-paced TV show does in children. Although emerging adults were shifting their attention frequently, it could be that developmentally their brains have adjusted to and cope with shifts in attention better than children. In addition, Instagram may not be as stimulating as the show *SpongeBob* as the television show shifts complete scenes every 11 seconds (Lillard and Peterson, 2011) whereas, the only aspects of Instagram that changes is the pictures, not the entire background. Another possible reason that the current study did not find memory recall to differ whereas Lillard and Peterson (2011) did is that the presentation given about the researcher's study abroad experience could have been more interesting than if the researcher chose to present on a duller topic. If the presentation topic was not about traveling and exciting adventures, the results may have provided a difference in memory recall between the groups and the effects of cognitive stimulation. In addition, the

memory questionnaire only consisted of 10 questions, perhaps if there were more questions the participant's memory could have been more cognitively challenged across both. In the future examination of memory and Instagram use, researchers may consider using a more standardized memory task to more accurately operationally define the variable of memory.

The dependent variable of anxiety did not support the hypothesis where anxiety did not decrease with time for the Instagram stimulation group nor was it greater for the Instagram group over the coloring group. Woods and Scott (2017) found a positive correlation between the use of social media and anxiety which did not match the findings of the current research. Anxiety was examined in the current research in both a between and within subject's design which could have provided such limitations in the study. It may have been more beneficial to evaluate anxiety as a between-subjects post-test item like the memory and FoMo questionnaires. Participants in the current research may have responded in a socially desirable way since they completed a pre and post-test anxiety questionnaires; therefore, they may have wanted to seem more socially desirable by demonstrating lower anxiety levels thus creating participant bias. In the future, the same anxiety measure instead of the same pre- and post-test measure may be more beneficial in understanding the effects of social media on anxiety.

In addition, perhaps general anxiety is not affected by viewing all types of social media. Perhaps the nature of Instagram and seeing pictures of others doing fun things leads to specific types of anxiety (like FoMo) but that other types of social media (like Twitter and/or Facebook) stimulate more generalized anxiety because of their reference to world events, news about friends and loved ones. Future research could examine exposure to different types of social media, not simply Instagram or Facebook, but compare the pre- and post-test general anxiety of various social media platforms.

The hypothesis that participants in the Instagram stimulation group will have lower levels of self-esteem was not supported. In fact, the results were inconsistent with the hypothesis that both groups had an increase in self-esteem from pre- to post-test and appearance self-esteem was unchanged. Leary et al. (1995) found that participants with higher self-esteem felt more included and more connected, while participants with lower self-esteem felt more excluded and less connected. Perhaps the participants in the Instagram group felt more connected to others after viewing Instagram for 10 minutes because they were able to stay in tune with their friend's lives via social media. Thus, feeling connected enabled the participants in the Instagram group to have heightened self-esteem. In addition, those in the coloring group also demonstrated heightened self-esteem which could have been a result of feeling more relaxed. This explanation can be described by the findings of Lillard and Peterson (2011) who found that coloring was relaxing for children and thus could have had the same effect on the participants in the current study. In addition, Eaton and Tieber (2017) found that coloring also enabled participants to relax and therefore helped increase the participant's mood. A similar effect could have occurred in the current study as coloring could have increased mood/self-esteem as well as social self-esteem. The present study hypothesized that those in the Instagram group would experience lowered self-esteem, which was conclusive based on the results, but they did not expect that self-esteem would also increase for the Instagram group. Because the shift in self-esteem was so minimal it may not have been a meaningful difference, self-esteem may be an area in which future research may consider altering the experimental design to solely consider condition.

The current study is important in understanding the effects of Instagram stimulation on memory, FoMo, anxiety, and self-esteem and suggests there may be a more emotional investment in social media than perceived. Because the hypothesis was supported for Instagram

use and FoMo, then there are some serious considerations that Instagram users may want to acknowledge prior to use. If Instagram users are aware of the potential for feelings and emotions that may arise such as increased feelings of FoMo and increased self-esteem, then such feelings may be easier to identify and combat. In recognition of such emotions, Instagram users may be able to establish a healthy social media presence without becoming emotionally involved.

Furthermore, the current research provides helpful information for parents of teens who are interested in getting an Instagram account as parents can be aware of the potentially harmful effects of Instagram on their teen's sense of inclusivity. Being aware of the effects of social media on well-being is important to consider when being involved or considering involvement in social media so one is more aware of the potential benefits and limitations of social media.

In conclusion, it is important to understand the effects of social media use, particularly Instagram, on psychological well-being and functioning because of the popularity of its use amongst emerging adults. By understanding the potential cognitive and emotional repercussions of social media, emerging adults and parents of teens may be more aware of the implications of social media use which may lead to individuals to limit their own use (or the parents to limit their children's use) and to make them consider their own feelings after viewing social media. Future research may consider evaluating self-esteem and anxiety overall rather than considering time (pre- and post-test) as a dependent variable. In contrast, future research may want to consider using different measures of anxiety and self-esteem pre- and post-test instead of repeating the same measures. The following suggestions could potentially limit the likelihood of social desirability in responses. In addition, future research should consider a more demanding task to test participant's memory as well as a longer memory assessment. Perhaps having a topic that is not relative to studying abroad and is more general may be more challenging for participants to

recall in a memory task. The present study suggests that viewing social media can cause individuals to feel like they are missing out in exciting experiences, but that there are many other aspects of psychological well-being and cognitive function that we still need to know more given the continued daily use of social media among individuals of all ages.

### **Application**

Because Instagram is incredibly popular amongst emerging adults, it is important to consider the implications of using Instagram and ways in which to combat increased feelings of anxiety. Instagram is an incredibly popular platform in which emerging adults communicate with one another as well as keep in touch with the world around them. In fact, 78% of 18 to 24-year-olds use Instagram (Smith & Anderson, 2018). Participants in the present study recorded using Instagram on an average of seven hours per week and checking/opening the application an average of 10 times per day. Such reporting is likely an underestimate since the number of time participants spends on Instagram is usually less than perceived. When considering how often emerging adults are opening and checking Instagram and how stimulating Instagram was shown to be for emerging adults in the present study, it is important to examine ways in which Instagram users can be more cognizant of their daily stimulation to Instagram.

As described by Burrow and Rainone (2017), FoMo is a form of anxiety that manifests itself in feelings of anxiety over missing out and jealousy. In the present study, FoMo was found to be higher in participants in the cognitive stimulation group compared with the coloring group after simply 10 minutes of viewing Instagram. It is important to note that such short stimulation can make such feelings of jealousy, loneliness, and anxiety arise as compared to not engaging in social media because it demonstrates how susceptible emerging adults are to the negative psychological effect's social media as well as how invested emerging adults are to social media.

If emerging adults are viewing Instagram four to five times a day for seven hours or more a week, then such feelings of FoMo are much more prevalent than previously known; therefore, it is important to consider the negative psychological effects of Instagram stimulation to better understand the ways in which emerging adults' mood can be so dramatically changed over a short period of time.

To make emerging adults aware of the potential negative effects of Instagram use on mental health it is important for emerging adults to understand the potentially harmful effects of Instagram use as well as limit their stimulation to Instagram. By understanding such feelings of jealousy, anxiety, and loneliness, emerging adults may be better able to identify the reason behind such feelings. Furthermore, by making themselves more aware of the potentially harmful psychological effects of Instagram, emerging adults may find it beneficial to limit their Instagram use and stimulation. By simply being aware of the potentially harmful psychological effects of Instagram use, emerging adults may begin to better understand their emotions associated with FoMo and Instagram are valid and harmonious with other emerging adults. In turn, emerging adults may understand that by limiting their Instagram use it may be beneficial to their psychological well-being.

Ideally, emerging adults would understand the potentially harmful psychological effects of Instagram stimulation and act to combat such feelings, but such ideas are much easier to understand than to apply. As it is unrealistic to suggest to emerging adults that it may be in their best psychological interest to delete Instagram from their phones, it is better to suggest limiting their Instagram stimulation. Because participant reported checking their Instagram around 10 times per day for about seven hours in the week, this is an hour out of their day that is spent not doing their homework, engaging with friends or family members, and/or working. By limiting

stimulation time, emerging adults may also feel less of a sense of FoMo if they were to check Instagram less frequently during a time of day when they are relaxed. If Instagram users chose a time of day where they are relaxed and view Instagram then, perhaps they would not be as susceptible to feelings of FoMo like they would if they were viewing it at a more anxious state (i.e. between classes). By setting an alarm to check Instagram once a day at a time that Instagram users are at a more relaxed state, perhaps Instagram users would be less susceptible to feelings of anxiety. In suggesting a more relaxed state to check Instagram for 10 to 20 minutes, it may seem to replicate the coloring condition in the current study where participants experienced significantly lower levels of FoMo than those in the Instagram group meaning that they were at a more relaxed state.



## References

- Alloway, T. P., & Alloway, R. G. (2012). The impact of engagement with social networking sites (SNSs) on cognitive skills. *Computers in Human Behavior, 28*(5), 1748-1754.  
doi:10.1016/j.chb.2012.04.015
- Alt, D. (2015). College students' academic motivation, media engagement, and fear of missing out. *Computers in Human Behavior, 49*, 111-119. doi:10.1016/j.chb.2015.02.057
- Arnett, J. J. (2000). Emerging adulthood. *American Psychologist, 55*(5), 469-480.  
doi:10.1037/0003-066X.55.5.469
- Burrow, A. L., & Rainone, N. (2017). How many likes did I get?: Purpose moderates links between positive social media feedback and self-esteem. *Journal of Experimental Social Psychology, 69*, 232-236. doi:10.1016/j.jesp.2016.09.005
- Bjelland, I., Dahl, A. A., Haug, T. T., & Neckelmann, D. (2002). The validity of the hospital anxiety and depression scale: An updated literature review. *Journal of Psychosomatic Research, 52*(2), 69-77. doi:10.1016/S0022-3999(01)00296-3
- Chou, H. G., & Edge, N. (2012). "They are happier and having better lives than I am": The impact of using Facebook on perceptions of others' lives. *Cyberpsychology, Behavior and Social Networking, 15*(2), 117. doi:10.1089/cyber.2011.0324
- Chung, J. M., Robins, R. W., Trzesniewski, K. H., Noffle, E. E., Roberts, B. W., & Widaman, K. F. (2014). Continuity and change in self-esteem during emerging adulthood. *Journal of Personality and Social Psychology, 106*(3), 469-483. doi:10.1037/a0035135
- Eaton, J., & Tieber, C. (2017). The effects of coloring on anxiety, mood, and perseverance. *Art Therapy, 34*(1), 42-46. doi:10.1080/07421656.2016.1277113

- Elhai, J. D., Hall, B. J., & Erwin, M. C. (2018). Emotion regulation relationships with depression, anxiety, and stress due to imagined smartphone and social media loss. *Psychiatry Research; Psychiatry Research*, 261, 28-34. doi:10.1016/j.psychres.2017.12.045
- Jackson, C. A., & Luchner, A. F. (2017). Self-presentation mediates the relationship between self-criticism and emotional response to Instagram feedback. *Personality and Individual Differences*, 133 doi:10.1016/j.paid.2017.04.052
- Jarrett, M. A. (2016). Attention-Deficit/Hyperactivity Disorder (ADHD) symptoms, anxiety symptoms, and executive functioning in emerging adults. *Psychological Assessment*, 28(2), 245-250. doi:10.1037/pas0000190
- Kross, E., Verduyn, P., Demiralp, E., Park, J., Lin, N., Shablack, H., . . . Ybarra, O. (2013). Facebook use predicts declines in subjective well-being in young adults. *PLoS One*, 8(8), e69841. doi:10.1371/journal.pone.0069841
- Leary, M. R., Tambor, E. S., Terdal, S. K., & Downs, D. L. (1995). Self-esteem as an interpersonal monitor: The sociometer hypothesis. *Journal of Personality and Social Psychology*, 68(3), 518-530. doi:10.1037/0022-3514.68.3.518
- Lillard, A. S., & Peterson, J. (2011). The immediate impact of different types of television on young children's executive function. *Pediatrics*, 128(4), 644. doi:10.1542/peds.2010-1919
- Przybylski, A. K., Murayama, K., DeHaan, C. R., & Gladwell, V. (2013). Motivational, emotional, and behavioral correlates of fear of missing out  
doi:https://doi.org/10.1016/j.chb.2013.02.014
- Rajanala S, Maymone MBC, Vashi NA. Selfies—Living in the Era of Filtered Photographs. *JAMA Facial Plast Surg*. Published online August 02, 2018.  
doi:10.1001/jamafacial.2018.0486

Riggs, S., & Han, G. (2009). Predictors of anxiety and depression in emerging adulthood.

*Journal of Adult Development, 16*(1), 39-52. doi:10.1007/s10804-009-9051-5

Shin, Y., Kim, M., Im, C., & Chong, S. C. (2017). Selfie and self: The effect of selfies on self-

esteem and social sensitivity. *Personality and Individual Differences, 111*, 139-145.

doi:10.1016/j.paid.2017.02.004

Smith, A., & Anderson, M. (2018, March 5). Social Media Use 2018: Demographics and

Statistics | Pew Research Center. Retrieved October 24, 2018, from

<http://www.pewinternet.org/2018/03/01/social-media-use-in-2018/>

Woods, H., & Scott, H. (2016). #Sleepyteens: Social media use in adolescence is associated with

poor sleep quality, anxiety, depression, and low self-esteem. *Journal of Adolescence, 51*, 41.

Table 1

*Frequencies for Perception of Instagram Use (N=44)*

Question	Quantity	Frequency	Percent
Text Disturbances	None	18	40.91
	1-4 times	25	56.82
	5-9 times	1	2.27
Seconds Viewing Others Posts	10-20 sec.	33	75
	30-50 sec.	11	25

Table 2

*Means and Standard Deviations for Looking at Instagram (N=44)*

Question	Range in Minutes	M	SD
Look at Own Instagram	0-10	.36	.838
Look at Others Instagram	0-10	8.09	2.88

Table 3

*Means and Standard Deviations for Anxiety Scale (N= 90)*

Variable	Factor		M	SD
Anxiety	Condition	Control	8.67	4.08
		Experimental	8.64	3.89
	Time	Pre-Test	8.76	3.82
		Post-Test	8.56	4.26

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Note. The maximum score is 21.

Table 4

*Means and Standard Deviations for Self-Esteem (N= 90)*

Variable	Factor		M	SD
Self-Esteem	Condition	Control	43.25	8.13
		Experimental	42.49	8.13
	Time	Pre-Test	42.13	8.28
		Post-Test	43.62	8.34

---

Note. The maximum score is 65.

Table 5

*Means and Standard Deviations for Social Self-Esteem (N= 90)*

Variable	Factor		M	SD
Social Self-Esteem	Condition	Control	24.46	5.94
		Experimental	23.40	5.94
	Time	Pre-Test	23.32	6.01
		Post-Test	24.56	6.17

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Note. The maximum score is 35.

Table 6

*Means and Standard Deviations for Appearance Self-Esteem (N= 90)*

Variable	Factor		M	SD
Appearance Self-Esteem	Condition	Control	16.34	3.69
		Experimental	16.30	3.86
	Time	Pre-Test	16.19	3.90
		Post-Test	16.44	3.85

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Note. The maximum score is 25.

The Means for Dependent Variable FoMo (N=90)

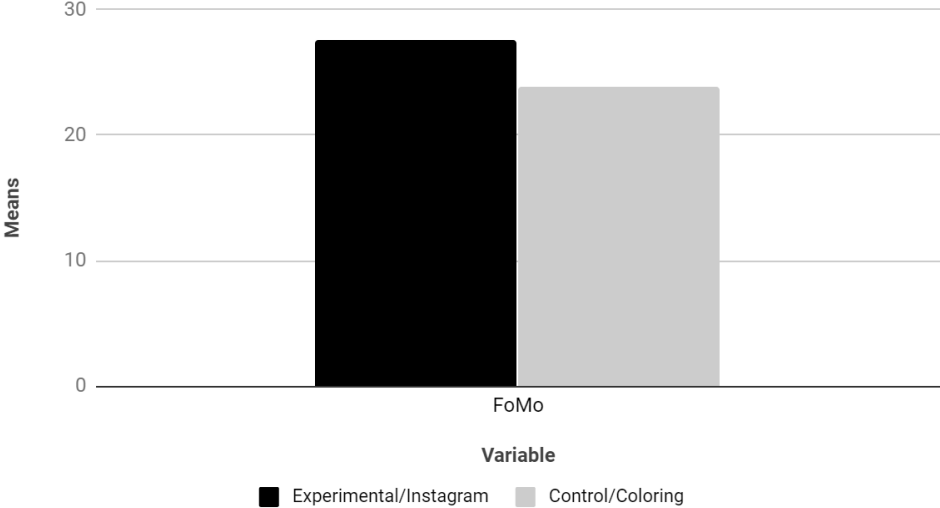


Figure 1

## Appendix A

### Study Abroad Presentation Notes

#### 1. Studying in Italy/Location:

- Summer between my sophomore and junior year of college went to Tuscania, Italy for one month
- Tuscania town about an hour north of Rome
- I didn't know anyone else going because I went through an outside provider
- Did a lot of exploration that I am going to share with you all today

#### 2. Exploration with Class:

- Class called Italian wine and culture
- Studied how wine is made, what Italian regions are known for what wines
- Every week the class went on a field trip which consisted of 3 different place
- First- visited a vineyard where we learned about wine production and bottling
- Second- visited a restaurant that put on a wine and food pairing
- Last- visited an enoteca which is a wine shop or a winery

#### 3. Exploration with School:

- Villa Lante- gardens designed by Italian bishops for the royal family
- Civita di Bagnoregio- the dying city
  - built as a fortress from the Roman empire
  - Known as the dying city because of natural elements like wind, rain, and erosion that have been slowly deteriorating the land
- Parco dei Monstri-
  - Park full of stone structures of monsters and mythical creatures

#### 4. Exploration of my Own:

- 2 of the weekends when I was Italy I traveled to other parts of Italy
- The first trip was to Florence which was a 3-hour train ride north
- Stopped in Pisa to see the leaning tower of Pisa then to Florence
- Florence saw Brunelleschi dome and Michelangelo's original sculpture of David
- The sculpture of David was huge, stood 17 feet tall
- The sculpture has such intricate detail of the human body and is even more incredible because it was carved out of a slab of marble









- Then visited Brunelleschi dome which was the largest freestanding dome at the time of its construction in the early 1400s
- Another weekend, I visited Rome for a day but somehow was able to see most of everything that I wanted to see
- One of my favorite stops was the trevi fountain because of the huge sculptures of the mythical gods and creatures surrounding the statue
- I was surprised by the size of the fountain => in movies it looks much smaller

#### **5. Conclusion:**

- Favorite part of the entire trip was the community of people that I got to know in the small town of Tuscania
- Trying a bunch of different foods
- I also enjoyed learning about my family heritage

**Appendix B**  
**Presentation**

<p>STUDYING IN ITALY</p> 	<p>LOCATION</p> 	<p>EXPLORATION WITH CLASS</p>  <p>FOOD &amp; WINE TASTING / WINERY VISIT</p> <p>VINEYARD VISIT</p>
<p>EXPLORATION WITH SCHOOL</p>  <p>VILLA LANTE</p> <p>FORO DEI MUSEI</p>	<p>EXPLORATION ON MY OWN</p>  <p>MICHELANGELO'S DAVID</p> <p>TREVI FOUNTAIN</p> <p>BRUNELLESCHI'S DOME</p>	

**Appendix C**FoMo Scale

Below is a collection of statements about your everyday experience. Using the scale provided please indicate how true each statement is of your general experiences. Please answer according to what *really* reflects your experiences rather than *what you think* your experiences should be.

Please treat each item separately from every other item.

1. I fear others have more rewarding experiences than me.

1	2	3	4	5
Not at all true	Slightly true	Moderately true	Very true	Extremely true

2. I fear my friends have more rewarding experiences than me.

1	2	3	4	5
Not at all true	Slightly true	Moderately true	Very true	Extremely true

3. I get worried when I found out my friends are having fun without me.

1	2	3	4	5
Not at all true	Slightly true	Moderately true	Very true	Extremely true

4. I get anxious when I don't know what my friends are up to.

1	2	3	4	5
Not at all true	Slightly true	Moderately true	Very true	Extremely true

5. It is important that I understand my friends "in-jokes."

1	2	3	4	5
Not at all true	Slightly true	Moderately true	Very true	Extremely true

6. Sometimes, I wonder if I spend too much time keeping up with what is going on.

1	2	3	4	5
Not at all true	Slightly true	Moderately true	Very true	Extremely true

7. It bothers me when I miss an opportunity to meet up with friends.

1	2	3	4	5
---	---	---	---	---

Not at all true   Slightly true   Moderately true   Very true   Extremely true

8. When I have a good time it is important for me to share the details online.

1                      2                      3                      4                      5

Not at all true   Slightly true   Moderately true   Very true   Extremely true

9. When I miss out on a planned get-together it bothers me.

1                      2                      3                      4                      5

Not at all true   Slightly true   Moderately true   Very true   Extremely true

10. When I go on vacation, I continue to keep tabs on what my friends are doing.

1                      2                      3                      4                      5

Not at all true   Slightly true   Moderately true   Very true   Extremely true

**Appendix D**Memory Scale

1. In what summer did Anna study abroad in Italy?
  - a. Between high school and first-year of college
  - b. Between first-year and sophomore year of college
  - c. Between sophomore year and junior year of college
  - d. Between junior year and senior year of college
2. Where did Anna study abroad in Italy (not the location of weekend adventures)?
  - a. Rome
  - b. Tuscania
  - c. Florence
  - d. Venice
3. What course did Anna study while in Italy?
  - a. Wine and Culture of Italy
  - b. Italian Civilization
  - c. Economies of Italy
  - d. The Roman Empire in Italy
4. All of the following were classroom activities that Anna's class participated in, *except*?
  - a. Food and Wine Pairing
  - b. Vineyard Visit
  - c. Making their own wine
  - d. Visiting a Winery
5. Why is Civita di Bagnoregio known as "the Dying City?"
  - a. Because all of the elderly population is beginning to pass away
  - b. Because of the natural elements that are deteriorating the cities structure
  - c. Because of the history of deaths due to the Black Plague
  - d. Because of the increased use of pesticides on the farms
6. All of the following were trips provided by the school, *except*?
  - a. Villa Lante- Royal Gardens
  - b. Colosseo Romano- Roman Colosseum
  - c. Civita di Bagnoregio- The Dying City

- d. Parco dei Monstri- Park of the Monsters
7. In the Parco dei Monstri, what is the main attraction for visitors?
- Stone structures of monsters and mythical creatures
  - The small animals that children used to call “monsters”
  - Waterfalls where the water appears to be coming out of a monster's mouth
  - Shadows from trees that appear as monsters
8. Where is the location of Michelangelo's *original* sculpture of David?
- Rome
  - Paris
  - Las Vegas
  - Florence
9. What is one of the main attractions that Anna saw while visiting Florence, Italy?
- Roman Colosseum
  - Brunelleschi's Dome
  - Vatican City
  - Spanish Steps
10. What was Anna’s favorite part of the trip
- Learning about her family background/heritage
  - Getting to know the local Italians
  - Trying new foods
  - All of the above

Scoring

- |       |        |
|-------|--------|
| 1. C. | 6. B.  |
| 2. B. | 7. A.  |
| 3. A. | 8. D.  |
| 4. C. | 9. B.  |
| 5. B. | 10. D. |

**Appendix E****State Self-Esteem Scale:**

Using the following scale, place a number on the line to the right of the statement that indicates what is true for you at this moment:

1= not at all

2= a little bit

3= somewhat

4= very much

5= extremely

1. \* I am worried about whether I am regarded as a success or failure. \_\_\_ S
2. I feel satisfied with the way my body looks right now. \_\_\_ A
3. I feel that others respect and admire me. \_\_\_A
4. I am dissatisfied with my weight. \_\_\_A
5. \* I feel self-conscious. \_\_\_S
6. \*I feel displeased with myself. \_\_\_S
7. I feel good about myself. \_\_\_ A
8. I am pleased with my appearance right now. \_\_\_A
9. \*I am worried about what other people think of me. \_\_\_S
10. \*I feel inferior to others at this moment. \_\_\_ S
11. \*I feel unattractive. \_\_\_A
12. \*I feel concerned about the impression I am making. \_\_\_S
13. \*I am worried about looking foolish. \_\_\_S

\*Indicates reversed scored

The letter in the last column indicates the primary factor on which that item loaded in a factor analysis (social self-esteem (S) and appearance self-esteem (A)).

**Appendix F****Hospital Anxiety Scale**

Tick the box beside the reply that is closest to how you have been feeling in the past week. Don't take too long over your replies: your immediate is best.

1.		I feel tense or wound up:
	3	Most of the time
	2	A lot of the time
	1	From time to time, occasionally
	0	Not at all
2.		I get sort of frightened feeling like something awful is about to happen:
	3	Most of the time
	2	A lot of the time
	1	From time to time, occasionally
	0	Only occasionally
3.		Worrying thoughts go through my mind:
	3	A great deal of the time
	2	A lot of the time
	1	From time to time, but not too often
	0	Not at all
4.*		I can sit at ease and feel relaxed:
	0	Definitely
	1	Usually
	2	Not often
	3	Not at all
5.*		I get a sort of frightened feeling like "butterflies" in my stomach:
	3	Not at all
	2	Occasionally



	1	Quite often
	0	Very often
6.		I feel restless as I have to be on the move:
	3	Very much indeed
	2	Quite a lot
	1	Not very much
	0	Not at all
7.		I get sudden feelings of panic:
	3	Very often indeed
	2	Quite often
	1	Not very often
	0	Not at all

Total Anxiety Score: \_\_\_\_\_

\*Indicates reversed scored

**Appendix G**Perception of Instagram Experience

1. *Approximately* how much time did you spend looking at your *own* Instagram profile (likes on your own posts, looking at your own pictures, etc.)?
  - a. No time
  - b. 1-5 minutes
  - c. 6-10 minutes
2. *Approximately* how much time did you spend looking at *other* people's Instagram accounts (scrolling through feed, looking at other people's profiles, etc.)?
  - a. No time
  - b. 1-5 minutes
  - c. 6-10 minutes
3. How many times were you interrupted by a text message or notification other than Instagram?
  - a. No times
  - b. 1-3 times
  - c. 4+ times
4. On average, how many seconds did you spend per post?
  - a. 10-20 seconds
  - b. 30-50 seconds
  - c. More than 60 seconds