Limiting Social Media Screen-time: Does Voluntary Reduction Impact Mental Health?

by

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Abstract

In recent decades, social media have become immensely popular, with the majority of young adults regularly using at least one platform. Some have claimed that heavy use of social media may adversely affect the wellbeing of young adults, but the evidence to date is mixed and weak. This has not stopped some researchers from arguing that heavy use of social media plays a meaningful, causal role in depression. To assess the validity of these claims, I conducted an experiment replicating and expanding upon the work of Hunt et al. (2018) to assess whether young adults ($n = 39$; 66.7% female; 66.7% $M_{Age} = 19.54$) who reported symptoms of depression and/or anxiety would experience decreases in these symptoms, the fear of missing out, and increases in well-being after voluntarily reducing their social media screen-time for three weeks. Results indicated that, in comparison to a control group, participants in the experimental group reported marginally significant decreases in both anxiety ($p = .056$, $\eta^2 = .095$) and the fear of missing out ($p = .054$, $\eta^2 = .097$) but no significant changes in depressive symptomology or well-being. Recognizing that the sample was small, the findings suggest that cutting down on heavy use of social media may improve the mental health for symptomatic individuals. Should these results be confirmed in a larger sample, they would provide compelling evidence that heavy use of social media has negative implications for the mental health of individuals with anxiety issues.

Keywords: Social Media, Well-Being, Depression, Anxiety, Fear of Missing Out

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Limiting Social Media Screen-time: Does Voluntary Reduction Impact Mental Health?

In recent decades, the accelerated rate of technological development has contributed to a multitude of radical shifts in daily life. The domain which has, arguably, changed the most is communication; in just over a century, the world has transitioned from being relatively isolated and rural to being connected via phone and radio, to having an entire social circle available online, just a few quick clicks away. Social media has become an integral part of the daily life of many, with Facebook alone maintaining a daily userbase of 1.66 billion people—almost one quarter of the world’s population (Clement, 2020). However, despite the interest which many have in social media, and the possible benefits of greater connectivity, research has yielded surprisingly few conclusions about the psychological outcomes of using these sites, particularly concerning mental health. Several studies have found that depressive symptoms positively correlate with the amount of social media used (e.g., Feinstein et al., 2013; Steers, Wickham, & Acitelli, 2014; Wright et al., 2012) leading some researchers (e.g., Twenge, Joiner, Rogers, & Martin, 2018) to argue that social media may be driving increases in depression rates. Others have argued that the opposite pathway may be at work, and that depression might lead to greater use of social media (e.g., Heffer et al., 2019). And, while these studies have found a correlation between depressive symptoms and the use of social media, other research has failed to find any evidence for this relationship (e.g., Datu, Valdez, & Datu, 2012; Jelenchick, Eickhoff, & Moreno, 2013). To gain insight into the nature of the relationship between social media use and mental health, the current experiment was designed to replicate and expand upon prior work by Hunt, Marx, Lipson, and Young (2018). In the experiment by Hunt et al. (2018), young

adults were tasked with limiting time on social media to thirty minutes or less, and were later assessed to determine whether they experienced a reduction in mental health symptoms. The present research follows the same general methodology, but includes a pre-screening measure to recruit participants with some pre-existing symptoms of anxiety and/or depression, as well as a brief measurement of passive use and screen-time on other devices. As with the study by Hunt et al. (2018), I will attempt to determine whether participants who voluntarily reduce their usage of social media will report decreases in depressive and anxious symptomology, in addition to lower levels of the “fear of missing out” (FoMO—the concern of being excluded or out-of-the-loop), and increases in self-reported well-being. Following this, I will explore whether these benefits can be attributed to declines in upward social comparisons—that upward comparisons may mediate the reductions in symptomology and increases in well-being.

Social Media: Definitions, Sites, and Uses

In order to delve into the literature on how social media relates to mental health, it is first necessary to define what is meant by social media. Social media is the collective term for social networking sites (SNS), which are digital environments where individuals meet, interact, and share personal content with one another (e.g., photos, stories, and news). Common platforms include Facebook, Instagram, Snapchat, and Twitter; however, social media is a broad category, and many other platforms can also be considered SNS. This includes forums such as Reddit, blogs such as Tumblr, professional apps such as LinkedIn, hobby sites such as Pinterest, video-sharing sites such as YouTube, and even basic messaging apps. In essence, social media is defined by how it

enables individuals to connect through the internet and, thus, most forms of electronic interaction can also be considered SNS.

Social media can be further categorized by the functions (behaviors) that they entail, and the user needs they aim to meet, each of which develops the unique environment of the platform. In relation to this, Whiting and Williams (2013) have developed a list of ten uses of social media: social interaction, information seeking, passing time, entertainment, relaxation, convenience utility (e.g., online shopping), communication utility (i.e., learning what to talk to others about), sharing personal information, expressing opinions, and surveying (monitoring) peers. Most SNS specialize in a small number of related behaviors—TikTok, for instance, allows users to share and view short, comedic videos, lending itself well to passing time, entertainment, and relaxation. In other cases, such as Instagram, the emphasis is placed upon sharing personal information (most often through images), seeking information, and monitoring peers.

These use behaviors can also be classified in terms of “active” or “passive” use. The former constitutes engaging directly with the platform, or other uses, while the latter refers to the process of consuming content or browsing the site (Burke, Marlow, & Lento, 2010; Krasnova, Wenninger, Widjaja, & Buxmann, 2013). Typically, when researchers studying the outcomes of social media use have uncovered benefits, these have been linked to active usage. For instance, editing your Facebook profile has been shown in various studies to momentarily increase self-esteem (e.g., Gentile, Twenge, Freeman, & Campbell, 2012; Gonzales & Hancock, 2010). In addition, the use of social media has been connected to higher social capital (Ellison, Steinfeld, & Lampe, 2007) and the

maintenance of relationships (Valenzuela, Park, & Kee, 2009), both of which necessarily involve active use (i.e., interacting directly with your peers). In contrast, research has found that passive use is typically associated with negative outcomes (Verduyn et al., 2015), especially when compared to active use. For instance, a large-scale study in Iceland by Thorisdottir and colleagues (2019) found that passive use of social media was associated with higher levels of anxiety and depression, while active use was associated with lower levels. Likewise, a study by Kross and Chandhok (2020) using experience sampling methods (ESM) found that passive use was associated with declines in well-being by the end of the study period, whereas active use was not. For this reason, the present research focuses on passive use and emphasizes platforms that are conducive to it, which include (but are not limited to) Facebook, Instagram, and Snapchat, as they encourage browsing the posts made by one's peers while making posts about your own life events.

Still, what is it like to browse these platforms and, more importantly, why is passive use associated with these negative outcomes? It has been documented that positive posts are more common on Facebook (Utz, 2011; 2015) and that users often present themselves in a positively skewed manner, such as primarily posting about successes (e.g., promotions, vacations, etc.) or using filters on images to appear more attractive (e.g., Barash et al., 2010). This has led many (e.g., Appel, Crusius, and Gerlach, 2015; Lin & Utz, 2015) to classify social media as presenting idealized versions of our lives, largely due to how easily it is to engage in positive self-presentation. Thus, when browsing social media and engaging in passive use, individuals will make a considerable

amount of upward social comparisons, which have been associated with a variety of negative outcomes.

Outcomes of Social Media Use

For all the potential benefits from actively using social media, there are also a number of downsides which have been associated with its (passive) use. This, of course, includes depression, but to give a full illustration of how social media relates to mental health, findings that relate to quality of life will be briefly explored. In general, social media exert several demands on their users at any given time. Some are relatively small and manageable, such as wishing somebody a happy birthday; others, however, are more burdensome, such as feeling obligated to “friend” a family member or interact with the profiles of romantic partners. As such, Facebook use has been linked to feelings of social overload, which leads to increasing levels of personal distress (Chen & Lee, 2013).

Although social media is commonly perceived as a meaningless activity even in comparison to passively browsing the internet (Sagioglou & Greitmeyer, 2014), users of social media tend to assume that these platforms will meet some of their social needs (Lariscy et al., 2011), suggesting that we expect social media to *feel* meaningful when it does not. Still, social media retain a particularly strong grasp on many, whether this is due to a sense of obligation to remain connected (Turkle, 2011), a growing sense of addiction, or simply a change in hobbies over time. Regardless, this relationship does not appear healthy.

In terms of specific downsides associated with the use of social media, research has shown that using these platforms carries emotional consequences. For instance, Sagioglou and Greitmeyer (2014) found that individuals asked to browse Facebook for

twenty minutes prior to completing a survey reported lower moods than those asked to browse the internet, or to immediately complete the survey; this was mediated by participants feeling that browsing Facebook was a meaningless activity (i.e., it was rated as less meaningful than browsing the internet or doing nothing prior to the survey).

Troublingly, Sagioglou and Greitmeyer (2014) also found that individuals believed that using social media would *improve* their mood, showing a clear case of the affective forecasting error (i.e., predicting emotional outcomes which do not match reality, in intensity or nature). In an experiment similar to Sagioglou and Greitmeyer (2014), Fardouly, Diedrichs, Vartanian, and Halliwell (2015) found that women who browsed Facebook for ten minutes experienced declines in mood. This effect was moderated by the participants' attractiveness orientation, meaning women who placed a greater emphasis on appearance when determining their personal worth experienced this decline in mood, whereas women whose personal worth related to other domains did not (Fardouly et al., 2015). This finding relates to earlier work by Haferkamp and Kramer (2011), who conducted an experiment in which they engineered fake Facebook profiles that participants would later view. After female participants viewed a profile designed to be physically attractive, they reported lower self-perceptions in this domain; likewise, after male participants viewed a profile showing a man with a successful career, they reported less satisfaction with their own career success (Haferkamp & Kramer, 2011). For both men and women, viewing a profile designed to be unsuccessful or unattractive led to increases in self-perceptions for these domains (Haferkamp & Kramer, 2011). To conclude this overview of the emotional consequences of using social media, negative affect has been connected to social media use through both cross-sectional (e.g., Shakya

& Christakis, 2017) and experience sampling methods (Kross et al., 2013). For an alternate pathway to consider, Tromholt (2016) has also demonstrated that using less Facebook led to more reported positive affect. Furthermore, the research presented here suggests that, in some cases, the outcomes of using social media depend on individual differences, such as appearance orientation.

The use of social media has also been connected to declines in many indicators of positive functioning. For instance, Bevan, Gomez, and Sparks (2014) have shown that individuals who report using more social media also report a lower quality of life. Likewise, Krasanova and colleagues (2013) found that ratings of life satisfaction decreased after browsing posts that others have made on Facebook. A plethora of studies have also demonstrated a relationship between social media use and lower well-being (e.g., Chen & Lee, 2013; Chou & Edge, 2012), including a longitudinal study by Kross and colleagues (2013) which suggests that there may be long-term consequences from spending more time on social media. When considering self-esteem, a similar pattern has emerged in the literature: benefits have been found for active use habits, such as editing your own profile leading to momentary increases in self-esteem, (e.g., Gentile et al., 2012; Gonzales & Hancock, 2010) but not for passive and general use. Various studies have shown that social media use and self-esteem are negatively correlated (e.g., Chen & Lee, 2013; Kalpidou et al., 2011; Lee, 2014), with some recruiting over 20,000 (Norwegian) participants (Andreassen et al., 2017). Although some research has suggested that using social media may increase self-esteem for adolescents, this appears to be contingent upon receiving positive feedback on the posts that one makes (Valkenburg, Koutamanis & Vossen, 2017).

Finally, greater use of social networking sites (and electronic interactions, in general) has been connected to various forms of anxiety. It has been found that texting is the favorite means of peer communication amongst young adults and, further, that experimentally restricting texting to three to five days per week results in increases in self-reported anxiety (Skierkowski & Wood, 2012). This finding supports the notion that electronic communication has been integrated into the daily lives of many, which serves as a precursor to the development of a construct known as the “Fear of Missing Out” (FoMO) by Przybylski, Murayama, DeHaan, and Gladwell (2013). This refers to a specific form of anxiety in which individuals worry about being excluded from the activities of their peers (and/or simply out-of-the-loop), which often promotes the overuse of social media (and other forms of electronic interactions) in an attempt to stay well-engaged (Przybylski et al., 2013). Fear of missing out has typically been studied amongst adolescents, as we have a strong need for social interaction at this age, and research has shown that a significant association exists between the use of social media and FoMO (e.g., Barry et al., 2017; Oberst et al., 2018). Similarly, greater use of social media has been associated with anxiety in adolescents (Woods & Scott, 2016), as well as young adults (e.g., Farahani et al., 2011; Vanucci et al., 2017). Woods and Scott (2016) have also found that anxiety is associated with greater levels of self-reported emotional investment in social media, aligning with the themes of FoMO while being indicative of potentially problematic social media use. In the past, FoMO has been found to mediate the relationship between the use of social media and negative outcomes such as depression and anxiety (Oberst et al., 2017), and thus this variable is important to

consider going forward. FoMO and anxiety will be discussed further in the Methods section of this proposal.

Social Media and Depression: State of the Literature

When considering the many negative outcomes associated with the passive use of social media, it is likely that such platforms may also impact mental health. However, evidence on the relationship between social media use and depression is ambiguous. Whereas several studies indicate a significant, positive correlation between the use of social media and depressive symptomology (e.g., Feinstein et al., 2013; Steers et al., 2014; Wright et al., 2012), other research has failed to show any significant relationship (e.g., Datu et al., 2012; Jelenchick et al., 2013; Nesi et al., 2017). Although some researchers suggest that social media use plays a causal role in the increasing rates of depression (e.g., Twenge et al., 2018), the evidence in support of such a claim is quite thin.

Evidence from Cross-Sectional Designs

As far as cross-sectional evidence is concerned, the majority of research suggests that a statistically significant and positive correlation exists between depression and social media use. However, the magnitude of this effect may be quite small. For instance, Twenge and colleagues (2018) collected data from an ethnically representative sample of over 500,000 adolescents within American schools (grades eight to twelve), and found a small, yet significant, correlation ($r = .08$ for females and $r = .04$ for males) between depressive symptomatology and social media use after controlling for in-person social interactions. In addition, Twenge et al. (2018) discovered that this relationship was strongest for individuals with lower levels of in-person social interaction (i.e., this

appeared to moderate the impact of social media use). Likewise, other cross-sectional studies have found a comparable relationship between social media use and depressive symptoms, in terms of both magnitude and direction. Lup, Trub, and Rosenthal (2015) found that more frequent use of Instagram was associated with more depressive symptoms ($r = .08$), though this effect was only marginally significant. Similarly, Steers et al. (2014) published a multi-study paper in which the first cross-sectional study revealed that Facebook use had a positive correlation with depressive symptoms ($r = .32$); but, curiously, their hypothesis that social comparisons mediated this relation was only discovered for men, despite much of the literature finding that females are typically more impacted by social media (e.g., Twenge et al., 2018). However, in the second study by Steers and colleagues (2014), which used a 14-day diary design, this relationship did not emerge; the amount of time spent on Facebook ($r = .02$) and number of times logging in ($r = -.01$) were not significantly correlated with depressive symptoms, and varied considerably from their earlier cross-sectional study. Instead, Steers et al. (2014) only uncovered a significant *indirect* relationship through the number of social comparisons that the participants made on Facebook, in which time spent online predicted engaging in a greater number of comparisons, which subsequently predicted increases in depressive symptomology. In addition, Steers et al. (2014) found that whereas gender acted as a significant moderator in their first study, these effects disappeared during study two. In a different study, Davila et al. (2012) found a non-significant relationship between the time spent on social media and depression ($r = .13$), though one of a higher magnitude than Twenge et al. (2018); they also observed that people who reported more negative (and fewer positive) interactions on social media tended to report more depressive symptoms.

Finally, Tandoc, Ferruci, and Duffy (2015) did not find a significant direct correlation between the time spent on Facebook and depression, though they found an indirect effect for monitoring behaviors (i.e., time spent on Facebook predicted more time spent keeping track of peers which, in turn, predicted depressive symptomatology). In sum, the evidence from cross-sectional studies suggests that the magnitude of the correlation between social media use and depressive symptomatology is quite small, if it exists at all. Further, the small magnitude of this effect could mean that the effect is contingent upon moderating factors, such as the quality of online relationships (as found by Davila et al., 2012).

Evidence from Longitudinal Designs

Even if greater social media use is associated with more symptoms of depression, the above findings tell us nothing about the directionality of the relationship. For this, it is necessary to look at longitudinal and experimental research. In terms of longitudinal data, limited research has been conducted on whether social media use predicts future depression; this is primarily because much of the longitudinal research on social media has focused instead on well-being (e.g., Kross et al., 2013). To my knowledge, there are no studies which have demonstrated that greater social media use predicts depression at follow-up, while controlling for baseline depression. However, Gámez-Guadix (2014) has found that baseline depression symptoms did predict an increased preference for online communication after one year, while also predicting an increase in negative interactions online and a greater reliance on the internet for mood regulation. Over a short $r = .13$

timeframe (of three weeks), Davila et al. (2012) found no association between time spent on Facebook (and the number of times logging in) and depressive symptomology at follow-up ($r = .08$; however, the correlation is of comparable strength to the cross-sectional findings detailed above). Similarly, Jelenchick et al. (2013) found no association between baseline depression and the amount of time spend using social media using a one-week ESM study. In contrast, research using different methodologies has shown a longitudinal relationship between social media use and depression; for example, the work of Feinstein and colleagues (2013) did not use time spent on social media as the predictor variable, and instead used the participant's likelihood of making social comparisons on Facebook. Feinstein et al. (2013) found that individuals who were more likely to make social comparisons on Facebook reported greater depressive symptoms three weeks later, though this was mediated by ruminative behavior and occurred over a relatively short period. At the least, this study suggests that specific online behaviors (i.e., social comparisons) may lead to detrimental offline habits (i.e., rumination) which may thereby foster depression.

Some longitudinal studies have presented evidence for the notion that depression leads to more social media usage. Nesi and colleagues (2017) found that individuals higher in depressive symptomology used electronic devices for feedback-seeking more often at three time points, each one year apart; notably, this feedback-seeking has been conceptualized as a pattern of maladaptive, depressive behaviors, as have social comparisons (Borelli & Prinstein, 2006). Heffer et al. (2019) have also found support for this pathway, though only for adolescent girls.

Evidence from Experimental Designs

It is apparent that research on the relationship between social media use and depression has produced mixed results, with correlation coefficients clustering towards small values in most cases (e.g., Lup et al., 2015; Twenge et al., 2018), but occasionally varying wildly between studies (e.g., Steers et al., 2014). Longitudinal findings appear to lean towards depression causing increases in social media usage, though some studies showing this have not assessed bidirectionality (e.g., Nesi et al., 2017), whereas competing evidence has emerged for the causal role of social media use (e.g., Feinstein et al., 2013). Thus, experimental research is required, as the amount of control such designs offer can provide the best evidence for whether social media use has a causal effect on depression.

Rather than asking “does greater social media use contribute to depression,” Hunt et al. (2018) asked: “does reducing usage of social media *alleviate* depression”? In this experiment, participants in the experimental condition were asked to reduce their usage of social media for three weeks, after which their scores on a depression measure (and other measures of well-being and mental health) were compared to a baseline measure taken prior to the reduction period (Hunt et al., 2018). In order to ensure that participants actually spent less time on social media, Hunt and colleagues (2018) collected screenshots each night from an internal iPhone program (*Screentime*) designed to measure the usage of apps, comparing this to a baseline measure of social media usage collected one-week prior to the reduction period. It was found that after just three weeks of reducing their usage of social media, participants reported lower depressive symptomology, increased well-being, and decreased FoMO (Hunt et al., 2018). Notably,

this experiment overcomes the most common limitation to studying social media: the many issues with measuring usage through time. Although time is the most logical indicator of social media use, it is often affected by a ceiling effect, in which samples are likely to be dominated by daily users of social media (i.e., there are relatively few infrequent users to compare them to), and those who use a considerable amount of social media. Some researchers have attempted to address this issue by adopting “two or more hours per day” as the cut-off for “heavy social media use” (e.g., Sampasa-Kayinga & Lewis, 2015; Tsitsika et al., 2014); however, these distinctions are both arbitrary and unrealistic, as the average person is estimated to spend 144 minutes on social media (and electronic communication services) each day (Statista, 2019). Thus, using *reduction* in time functions as a far better predictor variable, as it retains the most viable means to measure usage of social media (i.e., time) but does not unduly dichotomize the data for analyses. Although this study did not investigate the process or mechanisms through which social media use might contribute to depression, it does provide the best support at present in favor of the social media to depression pathway. In addition, it serves as an elegant framework to assess this relationship in future studies, allowing research to better explore such mechanisms.

Depression as a Moderating Factor: Is Social Media worse for those who are depressed?

When studying the association between social media use and depression, researchers will typically use depressive symptomology as the outcome variable. However, they rarely consider depression (and/or depressive symptoms) as a moderator. Depression is a pervasive condition that affects a multitude of life domains at any given time. Thus, it is likely that individuals experiencing many symptoms of depression

interact differently with social media when compared to those with fewer symptoms; consequently, they are likely to have different outcomes from using these sites. Past research has shown that some individual differences do moderate the outcomes of interactions online, such as the longitudinal study by Kraut et al. (2002) which assessed changes in well-being amongst adolescents over a one-year period. In this study, it was found that individuals who were low in social support and extraversion (i.e., introverts) experienced declines in well-being from using online chatrooms more frequently; conversely, individuals high in extraversion and social support experienced increases in well-being if they used online chatrooms more frequently (Kraut et al., 2002). This led Kraut and colleagues (2002) to coin the “rich get richer” phenomenon, which describes how individuals who were socially thriving prior to the internet (presumably individuals with greater social skills) will benefit from using it for communication, whereas those who were already struggling will not. This study is one of the first to suggest that individual differences can affect the outcomes of internet use, showing that personal factors clearly affect the quality of how we interact online.

Some support for the idea that people who are depressed use social media differently than those who are not comes from Reece and Danforth (2017). Reece and Danforth (2017) analyzed the posting habits of Instagram users with depression and compared them to the posting habits of those without depression. The authors found that individuals with depression tended to post images with darker colours (i.e., blues, blacks, and greys) and used fewer filters to enhance their photos (save for the greyscale filter, which they used more often) and that these images were rated as being sadder and less-pleasing by independent raters (Reece & Danforth, 2017). These habits were so

pronounced that a machine-learning program tasked with scanning for these themes was able to correctly identify whether a profile belonged to an individual with depression 70% of the time (a rate higher than practicing clinicians), and identified one-third of participants who would later go on to receive a diagnosis (Reece & Danforth, 2017). Notably, it is concerning that individuals with depression tend to post images which are not preferred by their non-depressed peers (i.e., they do not post images with vibrant colours, and do not enhanced images with filters), as this may translate to receiving less positive feedback while using Instagram.

As many social media platforms emphasize sharing and browsing personal information, it is important to consider how this content may relate to individuals with depression or anxiety. Whenever an individual is exposed to information about others, he or she is likely to make social comparisons. This is especially true if the information concerns a personally relevant domain and, since social media emphasizes sharing life updates, and users primarily follow individuals similar to them (i.e., peers; Krasnova, Koroleva, & Veltri, 2010), discovering posts about these domains is quite likely. Research has shown that individuals with depression make more upward social comparisons (e.g., Butzer & Kuiper, 2006; Swallow & Kuiper, 1992; Wood et al., 2000) in general, and that they are more negatively impacted by them (Albright & Henderson, 1995). When considering that social media is dominated by positive (Utz, 2015) and often self-flattering (Barash et al., 2010; Pempek, Yermolayeva, & Calvert, 2009) posts, which are likely to result in upward comparisons, it is logical to conclude that individuals with depression or anxiety may have a more harmful relationship with social media. Furthermore, more troubling evidence suggests that individuals with depression may

exclusively make upward comparisons when using social media (at least in some domains), even when a mentally healthy person would make a downward comparison. Using a quasi-experimental design, Appel et al. (2015) presented participants with fake Facebook profiles and asked them to rate the “owner” of these profiles in terms of general happiness when compared to themselves (i.e., “how happy are they compared to you”?). Appel et al. (2015) engineered some profiles to be attractive (i.e., high status, good-looking, etc.), while others were designed to be unattractive. They found that, while most participants considered the owners of the attractive profiles as being happier than themselves and the owners of the unattractive profiles to be less happy, individuals with depression rated *both* profile owners as being happier than they were (Appel et al., 2015). At best, this suggests that individuals with depression simply feel that they are leading unhappy lives; at worst, however, this implies that they are likely to experience considerably more negative affect from using social media, owing to the influx of negative self-evaluations with respect to their peers. At least in terms of envy, Appel and colleagues (2015) confirmed that the latter was the case, as individuals with depression who viewed an unattractive profile reported as much envy as non-depressed individuals who viewed the *attractive* profiles.

This research does not explain why individuals with depression or anxiety may be drawn to use more social media, despite the additional negative effects they may receive. Sagioglou and Greitmeyer (2014) suggest that people typically use social media because they believe that it will increase their mood, even if the opposite is more likely to occur. However, Kross et al. (2013) have found that lower moods during the day did not predict using more social media, suggesting that mood alone does not tell the entire story. It may

be the case that individuals with depression and anxiety use social media because they believe that these platforms will meet some of their needs: specifically, the need for social information. Prior research suggests that individuals with mild depression make more social comparisons, and that such people are more impacted by making these comparisons (Albright & Henderson, 1995), than are people who report no symptoms. In more recent research, Butzer and Kuiper (2006) have suggested that individuals with depression make more upward social comparisons because they have lower self-concept clarity (i.e., a relative unstable sense of self) and a higher intolerance of uncertainty. Thus, individuals with depression may spend more time on social media *precisely* because it allows them to make social comparisons and tackle their low self-concept clarity; similarly, individuals with anxiety may use social media as a means to reduce the sense of unease which stems from being unaware of peer activities, and the resultant worries about being excluded (i.e., FoMO). In addition, while individuals with anxiety and depression certainly use social media for social interactions (as do many others), it is possible that these individuals are more prone to developing an unhealthy relationship with these platforms (i.e., a dependency in which social media is used to meet *all* social needs). Dependency upon the internet has been theorized to be more common among those predisposed to psychosocial distress, those who feel they have poor social skills, and those high in social anxiety (Caplan, 2003; 2007), as they are more comfortable with online interactions (see also, Shaw and Gant, 2002). In support of this theory, van den Eijnden et al. (2008) have found that depression was associated with more frequent use of instant messaging, and that greater use of instant messaging after six months accounted for 6% of the variance in depressive symptoms.

Upward Social Comparisons: A Proposed Mechanism

Throughout this literature review, frequent allusions have been made to the importance of upward social comparisons. In terms of social media, many platforms are particularly conducive to making upward comparisons (i.e., comparing oneself to others who are better off). When using a platform such as Facebook, individuals are more likely to post positive things (Utz, 2015). These posts can be made for a variety of reasons, such as impressing peers, cheering up friends, sharing new developments with family, or simply entertaining others. Humans want to be accepted by their peer groups and, thus spend time editing and self-selecting to ensure that their posts are well-received (Appel, Gerlach, & Crusius, 2016). However, this process of positive self-presentation has an unfortunate side effect in which the realistic ups-and-downs of life are often ignored, which can then lead some users of social media to develop biased perceptions about how happy others are when compared to themselves, or about how fair the world is (e.g., Chou & Edge, 2012).

Historically, upward social comparisons have been connected to many negative outcomes, including declines in motivation, and increases in negative affect and depression (e.g., Allan & Gilbert, 1995; Gibbons & Gerrard, 1989; Tesser, Millar, & Moore, 2000). Some have argued that upward comparisons serve as a means by which individuals with depression maintain (or reinforce) their negative worldviews and thereby exacerbate their condition (Wood & Lockwood, 1999). Although upward comparisons can certainly be motivating in nature, or result in positive affect such as shared pride, there are various factors which make this more (or less) likely. For instance, Collins (1996) found that upward social comparisons are more likely to result in negative

outcomes if the individual making them has low self-esteem. Low self-esteem has frequently been associated with both anxiety (e.g., Rosenberg, 1962) and depression (e.g., Battle, 1978), and is often identified as a predictor of later developing either of these disorders (e.g., Sowislow & Orth, 2013). Thus, it is likely that the population of interest in the current research (i.e., individuals with some symptoms of depression and/or anxiety) are more apt to engage in upward social comparisons, while also experiencing more severe consequences from doing so.

Returning to the prior discussion of passive use, and the fact that social media is a repository of social information, upward social comparisons are a likely mechanism to explain how the use of social media may contribute to declines in mental health. When browsing these platforms, an individual will inevitably find a post about a life domain that he/she finds personally relevant, following which a social comparison will occur; if he/she is high in depressive symptomology, the comparison made is more likely to be upward in nature and, therefore, to result in negative affect. For example, envy has been identified as a common outcome of upward social comparisons (Smith & Kim, 2007), which has been found to mediate declines in well-being from passively using social media (e.g., Tandoc et al., 2015; Verduyn et al., 2015).

Present Study and Hypotheses

The purpose of this study is to determine whether voluntarily reducing social media screen-time will reduce symptoms of depression and/or anxiety, amongst a sample of young adults who are regular users of social media, and who have some pre-existing symptoms of depression and/or anxiety. To test this, participants were randomly assigned to either an experimental or control condition: participants in the experimental condition

were asked to limit their social media screen-time to 60 minutes each day for a period of three weeks, and were compared to a control group that was not given any constraints on their social media use. With this in mind, the following hypotheses were tested during this study:

1. Individuals in the experimental condition will experience a greater reduction in anxiety and depressive symptoms (and a greater increase in well-being) when assessed at follow-up in comparison to the control group.
2. In replication of Hunt et al. (2018), individuals in the experimental condition will report lower levels of FoMO at follow-up in comparison to the control group.

To the extent that decreasing social media screen-time reduces symptoms of depression and anxiety, I will consider potential mediating mechanisms. One possibility is that reducing use of social media may lead people to make fewer upward social comparisons, and this change in upward social comparisons will lead to the reduction in anxiety and depressive symptoms. Relatedly, I will consider whether reductions in social media use also reduce feeling of envy and jealousy, which are associated with upward social comparisons, and whether such reduced feelings in turn help alleviate the symptoms of anxiety and depression. As noted previously, the passive use of social media has also been associated with symptoms of depression and anxiety. Thus, I will determine whether individuals higher in baseline depression and anxiety report higher passive use during the pre-test period, and whether attempts to reduce one's use of social media are associated with a decrease in self-reported passive use at follow-up.

Methods

Participants

For this study, a convenience sample of 47 undergraduate students was recruited using Carleton University's Psychology Department SONA subject pool during the 2020 winter semester, which was marginally smaller than the planned sample of 50 students. This proposed sample size was based on a power analysis, which considered both the strong correlation among the repeated measures of interest (i.e., the stability of depression and anxiety), and pilot study data ($n = 14$) which found small-to-medium effect sizes ranging from $d = .23$ (depression) to $d = .60$ (anxiety). To be eligible to participate, students had to identify as a regular (i.e., daily) user of social media, and report that they experienced two of the following symptoms of anxiety and depression:

1. "Over the past two weeks, I have not been able to stop worrying"
2. "Over the past two weeks, I have been worrying too much"
3. "Over the past two weeks, I felt depressed"
4. "Over the past two weeks, I had trouble keeping my mind on what I was doing"

In addition, participants were required to own a phone with an internal app-tracking system, which was determined to be the most reliable means of measuring screen-time, including iPhones with iOS 12 or greater and Androids with 9 Pie or greater. The full recruitment notice can be found in Appendix A.

The 47 students were randomly assigned to either the experimental (i.e., reduction) group ($n = 20$) or control group ($n = 27$). Six participants withdrew during the course of the study, and an additional two participants failed to complete the final questionnaire, which left a final sample of 39. Both groups experienced similar attrition

rates, with 17 remaining in the experimental condition (attrition rate of 15%) and 22 remaining in the control condition (attrition rate of 19%). The final sample of 39 was 33% male and 67% female, with the majority of participants falling within the 17-19 (67%) and 20-22 (23%) age ranges.

Materials

All instruments described below were assessed at both the beginning and at the conclusion of the study. The full questionnaire package is provided in Appendix C.

Mental health and quality of life. The assessment of mental health included a measure of depressive symptoms, anxiety, and well-being. Depression was measured using the revised version of the Center for Epidemiological Studies Depression scale (CESD-R-10), which is a reduced form of the initial CES-D created by Radloff (1977), revised to reverse-score half of the questions. Each item on the questionnaire is rated on a 4-point scale, asking participants how many days during the past week he/she experienced a given sentiment, with 0 = < 1 day, 1 = 1-2 days, 2 = 3-4 days, and 3 = 5-7 days. An example of a depressive sentiment includes “I felt that everything I did was an effort,” while an example of a positive (i.e., reverse-scored) sentiment includes “I felt hopeful about the future.” The CES-D has been shown to be a valid and reliable measure of depressive symptoms in a variety of samples including students (see Saracine, Cham, Rosenfeld, & Nelson, 2018 for a review), and the shortened form has been found to accurately assess severity of depressive symptoms (Björgvinsson et al., 2013). The CES-D is measured by adding together the scores of each item after reverse-scoring, with scores of ten or higher likely indicative of depression.

Anxiety was measured using the GAD-7, created by Spitzer, Kroenke, Williams, and Löwe (2006), who noted that the scale had strong internal consistency ($\alpha = .92$) and test-retest reliability ($r = .83$), which was assessed by comparing results on the questionnaire when administered by psychologists during an appointment to when completed as a self-report. The GAD-7 operates much like the CES-D, but asks participants how often they have been bothered by particular problems over the last two weeks. The GAD-7 uses a comparable 4-point scoring system, where 0 = “not at all sure,” 1 = “several days,” 2 = “over half the days,” and 3 = “nearly every day.” Examples of items on the GAD-7 include “feeling nervous, anxious, or on edge” and “feeling afraid as if something awful might happen.” Items are summed to yield a total anxiety score.

In addition to general anxiety, I also assessed the fear of missing out (FoMO). The FoMO scale, developed by Przybylski et al. (2013), measures the extent to which one is concerned that one is not part of the friend group to which one hopes to belong, and is worried that one is failing to experience rewarding experiences (that their friends are experiencing). Each of the 10 statements is rated on a five-point scale where 1 = “not at all true of me” and 5 = “extremely true of me”. The original authors report internal consistency in the range of .87 to .90. Examples of items on this scale include “I fear my friends have more rewarding experiences than me,” “I get worried when I find out my friends are having fun without me,” and “when I have a good time it is important for me to share the details online.”

Finally, well-being was measured using the Scales of General Well-Being (SGWB) by Longo, Coyne, and Joseph (2017). To develop the SGWD, Longo et al. (2017) conducted three studies: in the first study they identified common themes within

the various definitions of well-being (e.g., positive affect, pleasure, thriving) and consulted academics outside of their own lab to establish fourteen sub-components of general well-being; the second study identified the most predictive questions for each of the fourteen sub-components, from which they developed a sub-scale for each component of well-being, in addition to a 14-item general questionnaire; the final study focused on testing the general questionnaire by comparing it with similar constructs (e.g., happiness) and assessing validity through the heterotrait-monotrait method (where values below .85 indicative discriminant validity), which confirmed the validity of the general scale. The current study used the 14-item general questionnaire, otherwise referred to as the SGWD-14. This scale asks participants how true a series of statements are in regard to their overall life experiences. Responses range from 1 = “not at all true” to 5 = “very true,” and examples of some items includes “I feel happy,” I’m optimistic,” and “I feel appreciated.”

Social comparisons. To measure social comparisons, I used the Social Comparisons and Feedback Seeking subscale (SCFS) contained within the Motivations for Electronic Interaction Scale (MEIS) by Nesi and Prinstein (2015). The MEIS is intended to assess general motivations behind adolescents’ electronic interactions. The subscale of interest to the present study (the SCFS) explores the degree to which individuals are motivated to make social comparisons while online, how concerned they are with peer judgements, and how likely they are to seek feedback from peers (e.g., “I use electronic interactions to see what others think about my photos”; Nesi & Prinstein, 2015). The scale is rated on a 5-point Likert scale where 1 = “not at all true” and 5 = “extremely true.” Nesi and Prinstein (2015) reported that the SCFS had strong internal

consistency ($\alpha = .92$; Nesi & Prinstein, 2015). In their article, Nesi and Prinstein (2015) provided an in-depth description of the item-selection process, which provides confidence for the internal validity of the scale itself; however, I was unable to find any attempts to compare results of the SCFS to other scales of social comparison (or feedback-seeking).

Emotional experiences. As emotional experiences on social media were of interest to the current study, I created an eighteen-item questionnaire in the style of the Positive and Negative Affect Schedule (PANAS) by Watson, Clark, and Tellegen (1988) to explore how frequently the participants believed they experienced various emotions while browsing social media. Each item was rated on a 5-point Likert scale, with response options ranging from “never” (1) to “all the time” (5). Items of interest for this questionnaire were feelings of envy, jealousy, desire, admiration, and love as these feelings have been identified by Krasnova and colleagues (2013) as common responses to using social media. Due to the frequent conflation of the feelings of “envy” and “jealousy,” scores on each of these items was averaged to determine a general measure of “enviousness” while using social media (Cronbach’s alpha at baseline = .82). To explore the frequency of positive emotions in response to social media, the items “inspired,” “love,” and “happy” were averaged for each participant (Cronbach’s alpha at baseline = .65). The additional 13 items were selected from emotions which are partially associated with the emotions of interest (e.g., “desire” is similar to envy, but lacks the negativity associated with enviousness) or general emotions to mask which experiences were important to the study (e.g., “surprised” and “sad”). In order to determine whether any emotions similar to envy should be included in the measure of “enviousness,” several

reliability analyses were conducted. Ultimately, all additional emotions decreased the Cronbach alpha coefficient calculated for just envy and jealousy and, therefore, were not included in the measure (e.g., inclusion of “desire” lowered α to .75). Envy is frequently related to upward social comparisons (Smith & Kim, 2007), and more frequent experiences of envy might therefore be indicative of such comparisons. As upward social comparisons were the primary mechanism to be explored in this experiment, a measure of enviousness was included to provide an additional variable to compare to scores on the SCFS, and to be included in all mediational analyses.

Passive use and posting habits. To measure the extent to which participants tended to use social media actively (contributing material) or passively (scrolling or browsing without contributing), we developed two questions. The first asked participants to estimate the percentage of their social media time which was devoted to passive (versus active) use. When asked using a paper questionnaire, participants were given two boxes to input a percentage (one for passive and one for active use); when asked using the electronic questionnaire, this option was replaced with a slider moving between passive (left) and active (right). The second question asked participants how often they posted on social media, where 1 = “almost never” and 5 = “frequently (more than once per day).” For participants who posted frequently on social media, a subsequent question asked them to provide an estimate of how many posts they made during an average day.

Participants were also asked to estimate how much time they spent engaging in various activities online using their smartphone during an average weekday (and weekend). These activities were centered around social media usage, asking participants to approximate their daily screen-time (in hours per day) on specific apps (e.g.,

Facebook, Instagram, Snapchat), as well as an aggregate “social networking” time. Additional activities included playing electronic games, browsing news sources, and watching television shows (or YouTube videos). Afterwards, participants were also asked to approximate how much time they spent on these activities each day using other screens, such as a laptop, other personal device, or devices that are owned by others. In order to compare these responses to the observed screen-time collected during the course of the study, participants were asked to respond to these questions both during the baseline and follow-up questionnaires.

Several other concepts were assessed in this study, but are not described here because they are not relevant to this thesis. The full battery of questionnaires is included in Appendix C, and identifies the questions not posed during the follow-up questionnaire: demographics collected at baseline (e.g., age), and disordered social media use (due to the timeframe being yearly).

Procedures

Eligible participants attended an in-person meeting at the laboratory where they were informed about the purpose of the research, shown how to obtain screen-time information from their iPhone or Android smartphone using the internal app-tracker (*Screentime* for iPhones and *Digital Well-being* for Androids), told which apps would be considered as “social media” for the purposes of the study (i.e., browsing-based platforms and not communication-based platforms), and asked to review and complete an informed consent form. After these points were covered, participants were asked to send a test-screenshot to the shared mailbox for the experiment. Once a screenshot was successfully received, participants were instructed to complete the first set of questionnaires and were

given a choice between the electronic or paper version. Before leaving, participants were told they would begin receiving a nightly reminder email at approximately 9 pm, which would ask them to reply with a screenshot of their social media usage for that day. For this evening, and for the remainder of the week, each participant was asked to use their phone as they normally would. On the seventh day following their enrollment, participants assigned to the experimental condition received an email requesting that they limit their total screen-time to no more than sixty minutes per day, whereas those in the control condition received the same email as the night prior. Participants were asked to send in a screenshot each evening for four weeks, with a three-week experimental period for those placed in this condition. After receiving a screenshot, the total screen-time value was manually calculated by adding each of the social-media times; manual calculation was necessary as *Digital Well-being* does not have categories of apps, *Screentime* fails to include TikTok under its social media category, and the times for all communication-based apps were to be excluded from the screen-time total.

Overall, the 39 participants who completed the entirety of the study had a high response rate, with the research team receiving 92.49% of the total possible screenshots. In general, participants who sent relatively few screenshots eventually withdrew from this study, and are therefore denoted in the attrition statistics. Out of the retained participants, only five failed to send in at least 80% of the possible screenshots; of these participants, two were in the experimental condition and three were in the control condition. Conversely, the majority of participants (77%) sent in over 90% of the possible screenshots, which corresponds to missing no more than two screenshots throughout the entire study. With regards potential differences in responding between groups, both the

experimental ($M = 92.44$, $SD = 9.52$) and control ($M = 92.53$, $SD = 12.85$) groups provided a comparable number of screenshots.

At the conclusion of each participant's four-week period (as participants began the study at varying times), he or she was sent a link to complete the final set of questionnaires electronically. Participants had until the end of the winter semester (April 7th) to complete the questionnaires and were sent up to two reminder emails before this date if they had not yet finished the survey. One month after the end of the experiment, all participants were sent a debriefing email which provided them with all of the information necessary to learn more about the results of the study in the future. A collection of the nightly email reminders, as well as the final debriefing email, are included in Appendix E.

Results

Before detailing the results of this experiment, it is important to highlight what values I am using to refer to “statistical significance” and “marginal significance” throughout this paper. For the former, I have used the conventional cut-off of $p < .05$, keeping with standards within psychology. As “marginal” significance” lacks a conventional cut-off, I have opted to use $p < .10$ for the purposes of this study. To explain this, I will first note that all of my hypotheses are *unidirectional* in nature—they indicate a clear expectation that participants in the experimental group will show greater improvements than those in the control group. Therefore, it would have been justified to use one-tailed tests for my analyses, rendering $p < .10$ in a two-tailed test equal to $p < .05$ for a one-tailed test. However, the results from my pilot study indicated that some participants responded negatively to the intervention—specifically, those who used social

media two (or more) times the American average of 120 minutes per day—though most reported improvements. As it would be impossible to predict the baseline social media usage of any participants for the full experiment, two-tailed testing was ultimately retained to capture any potential repercussions of the intervention itself.

Baseline Screen-time and Correlations

Preliminary analyses of the correlations between variables of interest and pre-intervention screen-time use revealed that screen-time (averaged over the first seven days) correlated weakly and not significantly with baseline depression ($r = .10, p = .558$), anxiety ($r = .17, p = .300$), fear of missing out ($r = .12, p = .483$), and well-being ($r = -.06, p = .730$) for the total sample. The observed averages for daily screen-time using phones during the first week of the study (prior to the intervention) also had a fairly weak correlation with how often participants claimed to use social media on their phones during the baseline questionnaires ($r = .25, p = .127$). Although screen-time observed during the baseline week (through screenshots) was not significantly correlated with any of the variables of interest, self-reported daily screen-time using social networking sites on phones was somewhat more strongly correlated with depression ($r = .28, p = .081$), fear of missing out ($r = .31, p = .056$), and well-being ($r = -.16, p = .335$), but not anxiety ($r = .10, p = .552$). Curiously, the strength of baseline correlations varied considerably between the experimental and control groups. For example, in the experimental group baseline anxiety was significantly correlated with observed screen-time during the pre-intervention period ($r = .568, p = .017$), but in the control group this correlation was weaker and non-significant ($r = .107, p = .644$). In addition, self-reported use of social media (on phones) during the *weekend* displayed stronger correlations than both observed

and approximated weekday screen-time, with significant correlations emerging between estimated weekend use of social media with baseline depression ($r = .433, p = .007$), anxiety ($r = .51, p = .001$), and fear of missing out ($r = .51, p = .001$), but not for well-being ($r = -.15, p = .362$). Unexpectedly, baseline depression was uncorrelated with participants' self-reported passive use of social media ($r = .09, p = .593$), as was baseline anxiety ($r = .177, p = .287$), though both groups reported that the majority of their time on social media was spent using the platforms passively ($M = 75.11\%, SD = 21.15\%$). Finally, and in contrast to the theory behind this project, baseline depression was not significantly correlated to scores on the SCFS ($r = .15, p = .350$). However, the self-reported frequency of experiencing envy on social media (a common outcome of upward social comparisons) was significantly associated with baseline depression ($r = .41, p = .009$), and therefore is consistent with the theoretical basis of this experiment. Baseline SCFS scores were significantly associated with FoMO ($r = .37, p = .022$) and the frequency of experiencing envy on social media ($r = .57, p < .001$).

Manipulation Check

As part of the manipulation check for this experiment, it was important to determine whether participants in the experimental condition actually spent less time on social media in total (following the intent of the experiment), or simply used their *phone* less when browsing social media and instead used other devices (following the directions as written, but not the intent of the experiment). As both the baseline and follow-up questionnaires asked participants to approximate their usage of social media with both phones and other devices (for both weekends and weekdays), I used these values to calculate how many hours (on average) each participant reported spending on social

media in total, between both phones and other devices. Afterwards, I determined the percentage of total social media use reported on other devices, calculating both an average weekday and weekend value. After weighting these values to consider the number of days in each week (i.e., 5 weekdays and 2 weekend days), I conducted a mixed ANOVA to determine whether participants in the experimental condition spent more time using social media on other devices at follow-up, and whether this change, if present, could be attributed to the intervention. This analysis revealed that the main effect of time was non-significant, $F(1, 37) = .012, p = .915$, as was the main effect of condition, $F(1,37) = 1.04, p = .316$. Likewise, the interaction term was not statistically significant, $F(1,37) = .93, p = .341$. Overall, participants tended to spend relatively little time using social media on other devices, averaging 17.20% ($SD = 18.90\%$) of their time using other devices at baseline, and 16.28% ($SD = 20.71\%$) at follow-up. Participants in the experimental condition experienced only a 3.41% increase in social media use on other screens during the course of the study, reflecting a relatively small amount of change.

Initial analyses revealed that participants in the reduction condition were generally successful in limiting their use of social media, reducing their screen-time from an average of 119.18 ($SD = 53.50$) minutes per day in the first week (prior to instruction to reduce) down to an average of 61.20 minutes per day ($SD = 25.07$) after being asked to limit their time to 60 minutes per day. In contrast, participants in the control condition had a slight increase in screen-time, moving from an average of 137.47 ($SD = 74.63$) minutes per day at baseline to 161.08 minutes per day ($SD = 83.68$) in the last three weeks (while those in the experimental group were told to cut down). A representation of the means for each group can be found in Figure 1. A mixed ANOVA run as a

manipulation check showed that the main effect of time was not statistically significant, $F(1, 33) = 2.70, p = .110, \eta^2 = .076$, although the main effect of the condition was, $F(1, 33) = 9.27, p = .005, \eta^2 = .219$. The interaction term was significant, $F(1, 33) = 15.19, p < .001, \eta^2 = .315$, which suggested that the experimental manipulation was successful. This was supported by the assessment of the simple effects, which confirmed that participants in the experimental condition changed significantly in average screen-time between the time points, $F(1, 33) = 14.13, p = .001, \eta^2 = .300$, while those in the control condition did not, $F(1, 33) = 2.78, p = .105, \eta^2 = .078$.

Figure 1. *Average Daily Screen-time at Baseline and Follow-up*

The Effect of Reducing Screen-time on Mental Health

To determine the effects of voluntarily reducing social media use, I conducted a series of 2 (time: pre/post intervention) x 2 (group: reduction/control) mixed ANOVAs

on four variables related to mental health: depression, anxiety, FoMO, and well-being.

The analysis on depression indicated that there was not a statistically significant main effect of time, $F(1, 37) = 1.22, p = .277, \eta^2 = .032$ or group, $F(1, 37) = 2.78, p = .104, \eta^2 = .070$, and the interaction term was non-significant, $F(1, 37) = 2.68, p = .110, \eta^2 = .067$.

However, this analysis also revealed that the reduction group ($M = 15.35, SD = 4.80$) scored significantly higher on depressive symptoms than the control group ($M = 11.18, SD = 5.12$) at baseline ($t(37) = 2.59, p = .014$). Due to this difference at baseline, analysis of the simple effects for the reduction group is quite informative. At follow-up, the reduction group scored an average of 12.78 ($SD = 5.55$) on the depression measure, though the change was only marginally significant, $F(1, 37) = 3.33, p = .076, \eta^2 = .082$. Comparatively, the control group experienced no change between the two time points, $F(1, 37) = 0.16, p = .689, \eta^2 = .004$. Changes in depressive symptomology between baseline and follow-up are shown in Figure 2.

Figure 2. *Changes in Depression by Condition*

The ANOVA for anxiety revealed that the main effect of time was significant, $F(1, 37) = 8.25, p = .007, \eta^2 = .182$, while the effect of the group was marginally significant, $F(1, 37) = 3.91, p = .059, \eta^2 = .093$. Similarly, the interaction between group and time was found to be marginally significant, $F(1,37) = 3.91, p = .056, \eta^2 = .095$. Due to the baseline differences and the clear trend in the direction of my hypothesis, I continued to analyze the simple effects of anxiety. In doing so, I found that participants in the reduction condition displayed a significant decrease in anxiety symptoms, $F(1,37) = 10.42, p = .003, \eta^2 = .220$, while those in the control group did not, $F(1,37) = 0.46, p = .501, \eta^2 = .012$. The changes in anxiety over time are represented in Figure 3.

Figure 3. *Changes in Anxiety by Condition*

The ANOVA on changes in FoMO yielded a significant main effect of time, $F(1, 37) = 11.73, p = .002, \eta^2 = .241$, a non-significant main effect of group, $F(1, 37) = 0.22, p = .645, \eta^2 = .006$, and a marginally significant interaction, $F(1,37) = 3.97, p = .054, \eta^2 = .097$. Simple effects indicated that participants in the reduction group had a significant

decline in FoMO between baseline and follow-up, $F(1,37) = 13.00$, $p = .001$, $\eta^2 = .260$, whereas those in the control group did not, $F(1,37) = 1.18$, $p = .285$, $\eta^2 = .031$. These results are shown in Figure 4.

Figure 4. *Changes in FoMO by Condition*

The analysis on well-being indicated primarily null findings. The main effect of time was not statistically significant, $F(1, 37) = 2.64$, $p = .113$, $\eta^2 = .066$, although the effect of the group was, $F(1, 37) = 4.92$, $p = .033$, $\eta^2 = .117$. Still, the interaction term was found to be non-significant, $F(1,37) = 0.89$, $p = .352$, $\eta^2 = .023$. The reduction group did experience a marginally significant increase in well-being between baseline ($M = 2.87$, $SD = 0.53$) and follow-up ($M = 3.13$, $SD = 0.63$), $F(1,37) = 2.92$, $p = .096$, $\eta^2 = .073$, though their average well-being response was still lower than the control group at both times ($M = 3.43$, $SD = 0.85$ at baseline, and $M = 3.50$, $SD = 0.76$ at follow-up). Self-reported well-being scores are reported in Figure 5.

Figure 5. *Changes in Well-being by Condition*

Additional analyses were conducted to determine if the same pattern of effects occurred for only “compliers” in the experimental condition. Participants in the reduction condition were considered to be compliant if they sent screenshots on at least 5/7 (71%) days during the baseline week, and sent screenshots indicated a screen-time of 70 minutes or less for at least 15/21 days (71%).¹ Of the 17 participants in the reduction condition who were retained for the study’s full duration, 7 met this compliance criteria (41%). Although 13 participants (76%) successfully reduced their average daily use of social media (with 1 showing no change, and 3 showing an increase), and 16 of the 17 participants (94%) sent screenshots on at least 15 occasions, relatively few met both of the strict criteria for high compliance. Including only the seven participants with high

¹ A more lenient value of 70 minutes per day was used to determine compliance as this allowed for deviation around the requested 60-minute average and would thus include participants whose average daily screen-time was within the 60-minute limit, even if they occasionally exceeded this limit by a few minutes.

compliance, and all of those within the control group, I repeated the mixed ANOVAs described above. In the case of depression, anxiety, and FoMO, a similar pattern was found, though effect sizes were slightly larger in each case. However, for the analysis on well-being, the interaction effect became significant, $F(1, 27) = 4.23, p = .050, \eta^2 = .14$. Similarly, the simple effect analyses revealed that highly compliant participants in the reduction condition showed a significant increase in well-being between baseline and follow-up, $F(1,27) = 7.12, p = .013, \eta^2 = .209$.

As much of the literature suggests that the effects of social media might be particularly strong for adolescent females (e.g., Orben, Dienlin, & Przybylski, 2019), I re-ran each of the mixed ANOVA with only female participants ($n = 26$, with 13 in each condition). In general, the results were of a comparable magnitude, though slightly weaker. For example, the analysis on depression indicated that, like the base ANOVA, there was not a statistically significant main effect of time, $F(1, 24) = .539, \eta^2 = .016$, group $F(1, 24) = .055, p = .467, \eta^2 = .022$, or the interaction term, $F(1, 24) = 2.14, p = .157, \eta^2 = .082$. As with the previous analysis, the simple effect for the experimental group was non-significant, $F(1, 24) = 2.18, p = .153, \eta^2 = .083$, though the effect size was nearly identical to the base ANOVA ($\eta^2 = .082$). In these female-only ANOVAs, there was only one substantial difference relative to the full sample: the interaction effect of FoMO was non-significant and considerably weaker, $F(1, 24) = .80, p = .380, \eta^2 = .032$ (compared to $\eta^2 = .097$) even though the simple effects for the experimental group was comparable, $F(1, 24) = 7.76, p = .010, \eta^2 = .244$.

I also hypothesized that any mental health improvements might be mediated by changes in participants' self-reported tendencies to make social comparisons (and

feedback-seeking behaviors) when viewing social media, and/or their experience of envy/jealousy while using social media. Prior to these analyses, I conducted two additional mixed ANOVA to determine whether participants reported any change in these variables between baseline and follow-up. In terms of social comparisons, these analyses revealed that the main effect of condition was non-significant, $F(1, 37) = 0.00, p = .992$, the main effect of time was significant, $F(1, 37) = 5.12, p = .030, \eta^2 = .121$, and the interaction term was marginally significant, $F(1, 37) = 3.27, p = .079, \eta^2 = .081$. According to the simple effect analyses, participants in the experimental condition reported a significant decrease in scores on the SCFS, $F(1, 37) = 7.34, p = .010, \eta^2 = .166$ and participants in the control condition did not, $F(1, 37) = 0.12, p = .733, \eta^2 = .003$. In terms of frequency of envy/jealousy, the main effect of time was significant, $F(1, 37) = 9.32, p = .004, \eta^2 = .201$, although the neither the effect of condition, $F(1, 37) = 2.12, p = .154, \eta^2 = .054$, nor the interaction term, $F(1, 37) = 0.25, p = .875, \eta^2 = .001$ were statistically significant. The absence of a significant interaction term was, thus, explained by both the experimental (baseline $M = 1.74, SD = 0.94$, follow-up $M = 1.38, SD = 0.85$) and control (baseline $M = 1.25, SD = 1.19$, follow-up $M = 0.93, SD = 1.12$) groups reporting comparable, significant decreases in how often they reported experiencing envy while using social media, although the experimental group did report experiencing more envy than the control group at either time.

To test the mediational hypotheses, I conducted three regression analyses using only participants in the experimental group, as only the simple effects were statistically significant for anxiety and FoMO (and marginally significant for depression). In each of these analyses, I entered the baseline score on the measure of mental health to be tested

(i.e., anxiety, FoMO, depression) as a predictor and the follow-up score as the dependent variable. After this, I entered changes in envy/jealousy and social comparisons as additional predictors using the stepwise method to see how this affected the regression results. However, none of these analyses found evidence to support the hypothesis that changes in social comparisons or envy/jealousy accounted for the observed changes in depression, anxiety, or FoMO. Curiously, of the variables included for these analyses only two sets shared a statistically significant correlation: changes in the scores on the SCFS and the experience of envy/jealousy ($r = .562, p = .019$), and the changes in anxiety and depression ($r = .44, p = .074$; though the correlation is only marginally significant in this study, the strength of this relationship is expected due to the strong association between anxiety and depression).

Additional Hypotheses and Results

To test the hypothesis that participants in the reduction condition would show a greater decrease in passive use than those in the experimental condition, an additional mixed ANOVA was conducted using each participants self-reported percentage of passive use at baseline and follow-up. This analysis revealed that the main effect of condition was non-significant, $F(1, 36) = 0.61, p = .439, \eta^2 = .017$. In contrast, the main effect of time was large, $F(1, 36) = 28.31, p < .001, \eta^2 = .440$, though the interaction effect itself was not statistically significant $F(1, 36) = 2.95, p = .095, \eta^2 = .076$. As changes in passive use was an *a priori* hypothesis, and the marginal significance of the interaction term, I continued to assess the simple effects for these analyses. Doing so revealed that those assigned to the reduction condition reported a somewhat larger reduction in passive use, as detailed in Figure 6. The ANOVA results for the

experimental condition, $F(1, 36) = 22.40, p < .001, \eta^2 = .384$, featured a much larger effect size than those for the control condition, $F(1, 36) = 7.26, p = .011, \eta^2 = .168$. The extremity of this change was unexpected, as was the significant change observed by participants in the control condition.² However, participants' self-reported percentage of passive use was not significantly correlated with how often they reported posting on social media at either time ($r = -.189, p = .256$ at baseline; $r = -.014, p = .933$ at follow-up) and, thus, I was unable to validate the single-item measurement of passive use within this study. Therefore, the results of the analyses involving passive use should be viewed with caution.

Figure 6. *Changes in Passive Use by Condition*

² Due to the extremity of this change, I re-ran the three regression analyses described above to determine whether passive use mediated the changes observed in the experimental group. However, the results were unchanged and changes in passive use did not mediate changes in anxiety, depression, or FoMO.

General Discussion

In recent years, there has been significant debate concerning whether heavy use of social media can affect mental health. Some researchers, such as Twenge et al. (2018), argue that heavy social media use has both a meaningful and negative impact on mental health, to such a degree that it may be driving the increasing rates of depression. Conversely, other researchers, such as Orben and Przybylski (2019), claim that the frequent use of social media accounts for a trivial amount of variance in mental health. In order to further assess the strength of the relationship between these two variables, I conducted an experiment expanding upon previous work by Hunt et al. (2018), asking young adults who reported pre-existing symptoms of depression and/or anxiety to voluntarily reduce the amount of time they spent on social media for three weeks. Analyses suggested that reductions in social media use may contribute to decreases in anxiety and the fear of missing out, with both ANOVA reaching marginal significance, while these reductions did not impact the participants' depressive symptomology and well-being. The trends revealed by these analyses thus provides partial support for my hypotheses concerning reductions in anxiety and the fear of missing out, but fail to support my hypotheses concerning reductions in depression and improvements in well-being. Notably, the lack of a significant reduction in depressive symptoms does not align with the findings of Hunt et al. (2018) and, similarly, it is unusual that there was no significant change even when participants in both groups reported a considerable increase in the percentage of their time spent actively using social media. In the case of well-being, significant effect only emerged amongst participants who were highly compliant with the demands of the study, which made up less than half of the initial experimental

sample. Additionally, although the results comparing changes in passive use between the groups only resulting in a marginally significant interaction, the fact that participants in both groups reported a considerable decrease in passive use (presumably due to self-monitoring) is an interesting result which reveals what may be an unintentional effect of the experiment which could be studied further. Previously, Hunt et al (2018) have even suggested that increases in self-monitoring could explain why participants in the *control* group of their experiment reported lower levels of anxiety and FoMO and, thus, this variable may warrant future investigation.

When comparing the baseline correlations found in this study to those of past research, the relation between depression symptoms and self-reported frequency of social media use ($r = .10$) was of a similar magnitude to what many others have found, such as Davila et al. (2012; $r = .13$), and is consistent with recent meta-analyses suggesting that the relation between frequency of social media use and depressive symptoms is both small and nuanced (e.g., Orben, 2020; Orben et al., 2019). Results also indicated that baseline depression had a stronger correlation with participant approximations of their daily use of social media ($r = .28$), suggesting that differences in the results of studies may emerge based on how social media usage was measured. Similar results to mine have been reported by Steers et al. (2014): when asking participants to approximate the time they spent on Facebook each day, they found that approximated time spent on Facebook correlated $r = .32$ with symptoms of depression, but during the course of a 14-day diary study following the same participants, the correlation of the sum of daily reports of screen-time with symptoms of depression dropped to $r = .02$. The disparity between these correlations may suggest that depression symptoms are associated

positively with the *perception* of spending too much time on social media, in that it might interfere with activities of daily life. Alternatively, this disparity may simply suggest that individuals are relatively poor at approximating how much time they spend on social media (note that observed and approximated screen-time correlated $r = .20$ at baseline and $r = .38$ at follow-up, suggesting that regularly sending screenshots led to increased accuracy of approximating screen-time). Another possibility to explain this disparity is the sheer number of platforms which can be considered social media, as participants may have given an approximation based on platforms excluded in the current research (i.e., primarily texting and messenger apps). However, all participants were told what platforms the researchers considered to be social media during their initial meeting, prior to completing the baseline survey which asked them to approximate their total social media screen-time.

The current research also revealed unusual results when considering the theoretical framework of this experiment, as well as much of the literature studying social media use as it relates to mental health. Despite past research demonstrating that upward social comparisons are associated with symptoms of depression, and that individuals high in depressive symptomology make more social comparisons in general (e.g., Butzer & Kuiper, 2006), the results of my experiment did not align with this notion. Self-reported tendency to engage in social comparisons (and feedback-seeking) while browsing social media was not significantly correlated with depressive symptoms at baseline within this experiment. However, this may be due to the difficulties in measuring social comparisons and, more specifically, providing concrete evidence that upward social comparisons have occurred. The current research hypothesized that upward social comparisons would

mediate changes in depressive symptomology following a reduction in social media use. To support that hypothesis, much of my literature review has thus emphasized how social networking sites are particularly conducive to upward social comparisons. However, when asking participants to limit their time on social media, the experiment only establishes the conditions for them to make fewer social comparisons; thus, the experiment measures social comparisons indirectly, rather than actively manipulating the behavior. To experimentally manipulate social comparisons, it would be necessary to use considerably different methodology, such as those employed by Appel and colleagues (2015), in which participants were shown fake profiles designed to be attractive/unattractive. Therefore, future studies employing methods similar to the current research (i.e., a reduction/intervention approach) may benefit from exploring moderators, rather than mediators, as specific cases of social comparisons or experiences of envy (i.e., behaviors that could be mediators) will never be measured in the lab. Possible alternative variables might include the quality of online interactions (a focal point of Davila et al., 2012), quality of peer feedback (identified by Volkenburg et al., 2017 as a contingency for increases in social self-esteem following social media use), or a more in-depth exploration of specific aspects of passive use (e.g., “feed” quality – whether individuals receive updates from peers that could be enviable, or self-select so that only positive and humorous posts are shown to them).

When considering alternative explanations for the results of this study, the main point of concern is the difference in baseline function between the experimental and control groups. As the experimental group scored higher in symptoms of depression, anxiety, and FoMO (and lower in well-being) than the control group at baseline, and both

groups had comparable scores at follow-up, it could be argued that the observed changes were due to an unrelated and unmeasured event. For example, the randomization process used during this study resulted in the majority of participants in the experimental group (10 out of 17) being recruited prior to reading week (and midterm exams), while the majority of participants in the control group (17 out of 22) were recruited after reading week, during the last week of February and the first week of March. As exams are a major stressor which could account for a temporary spike in symptomology, I proceeded to further examine the data based on when participants were recruited, using anxiety as the dependent variable due to its more pronounced change at follow-up. After plotting the pre-and-post anxiety scores for each participant in the experimental condition by the date they had completed the baseline and follow-up questionnaires, I found no difference in changes in anxiety as a function of when they began the study (before or after midterm exams). Interestingly, participants in the experimental group who were recruited earlier did tend to report slightly more symptoms of anxiety ($M = 14.56$, $SD = 6.46$) than those recruited later ($M = 12.29$, $SD = 4.8$), but both groups experienced comparable changes with the early recruits decreasing to $M = 9.78$ ($SD = 6.44$) and later recruits decreasing to $M = 7.86$ ($SD = 4.56$). In other words, participants recruited at both times experienced an average decrease of approximately 5 points on the GAD-7 at follow-up. Overall, this suggests that the observed changes in anxiety scores are not due to extreme scores regressing towards the mean, as all participants had comparable (average) changes during the course of the study. However, it may be true that the time of recruitment did have a minor influence on the anxiety levels of participants at baseline, though not to a degree that the results of my analyses were impacted. In support of this, a set of related t-tests,

conducted to determine whether finishing the experiment before or after the COVID-19 shutdown had an influence on participant scores, found no significant differences based on these times among both the control, $t(20) = 0.05, p = .960$, and experimental group, $t(15) = 1.37, p = .190$. Additionally, it is worth noting that the observed decreases in anxiety did occur despite the early stages of a pandemic, although it remains to be seen what effect such an event has on mental health.

Given the results of my analyses, I cannot fully dismiss the null hypothesis that reductions in social media use has *no* reliable impact on well-being, depressive symptoms, anxiety, and the fear of missing out. However, it should be noted that, despite many of these analyses failing to reach statistical significance, the effect sizes observed are of a remarkable magnitude when considering the stability of anxiety and depression. When converting to Cohen's d , the simple effects analyses of both anxiety ($d = 1.06$; $d = .65$ for the interaction term) and the fear of missing out ($d = 1.19$; $d = .66$ for the interaction term) reveal changes greater than one standard deviation. Even the changes observed in symptoms of depression correspond to non-trivial effect sizes, with both the simple effects analyses ($d = .60$) and interaction term ($d = .54$) approximating over half a standard deviation in difference. As psychologists routinely publish small effect sizes which are found to be statistically significant, it is clear that there is value in the results of the current study. Still, these findings do present another curiosity, as participants experienced a more considerable decrease in anxiety than depressive symptoms, though anxiety is rarely studied in the literature. As these concepts are highly correlated, the results of this study may indicate that *anxiety* is a more common outcome of using social media and that this, alongside the fear of missing out, might be a more pressing variable

to research. To this degree, if a reduction in social media use relates to a subsequent decrease in negative functioning, anxiety may be driving such changes. Thus, it is vital to study how anxiety relates to social media in greater detail, particularly in terms of developing theories to explain how social media use can lead to anxiety.

Limitations and Future Directions

The current research has several limitations which must be acknowledged. Of immediate concern is the small sample, resulting in low power. An earlier power analysis, based on the outcome of a pilot study, suggested that a sample size of 50 would be sufficient to detect an effect size of approximately $d = .38$ 80% of the time. However, I did not reach this sample size as recruitment could not extend beyond the first week of March, as the experiment had a four-week duration and had to be completed before the end of classes in early April.³ Although the use of pre-screening for symptoms of depression and anxiety was successful in recruiting a sample that was somewhat depressed or anxious (i.e., averaging a score of greater than 10 on the CESD-R, which is sometimes used as a threshold for possible depression), this process could have deterred some students from enrolling. As the study was advertised as concerning mental health, it is possible that students who experience some symptoms of depression and/or anxiety, but do not view themselves as having poor mental health (e.g., individuals not currently diagnosed with depression who receive a diagnosis in the future), may have believed they would be unsuitable for the study. Additional deterrents to recruitment included the need

³ Participants in a pilot study were asked to complete a second follow-up questionnaire eight weeks after enrollment, but due to the nature of SONA were granted course credit prior to this time point, ultimately resulting in an extreme attrition rate and dropping the eight-week follow-up from the current study.

to own a recent iPhone or Android⁴ (to ensure objective measures of screen-time), and the willingness of participants to voluntarily reduce their time on social media (i.e., students who may display a problematic relationship with social media but *refuse* to reduce their usage would not volunteer, though they represent a population of interest as they may have a problematic relationship with social media). In the future, it would be preferable to conduct an experiment over multiple semesters (if recruiting a convenience sample in a university), or to recruit a non-university sample using different incentives. It can also be noted that, as the present research failed to find a significant association between passive use and depressive (or anxious) symptoms, which would have aligned with prior work (e.g., Kross & Chandhok, 2020), this may be due to the brevity of the measure used or the lack of variation in passive use at baseline.

The current research also has several limitations which are of interest for future experiments. Firstly, the experimenters ultimately lacked the ability to control for social media use on other devices, such as a laptop or the phone of a friend. Although analyses revealed that participants in neither group reported significant changes in general social media use on other screens, it is possible that participants simply neglected to report how much social media they used on other screens at follow-up. However, it should be noted that it is impossible to fully overcome this limitation without invasive methods, with the exception of studies conducted in highly regulated environments such as summer camps. Still, results of these analyses suggest that participants remain relatively stable in how much social media they use on other devices and, thus, baseline use of social media on other devices could be used as a covariate or a moderator in future research. Secondly,

⁴ This is likely not a major disqualifier for participation, though only polling the student body about phone ownership would fully discount this as a potential limitation.

the current study is limited by the potential for “missing” time in the data. As participants were contacted at around 9 PM each evening, many replied with a screenshot within the hour. Although prompt responses are admirable, in this circumstance it made the remaining hours before midnight unmeasurable, as the internal app resets at this time. In the future, this limitation could be overcome by further restricting which participants are recruited, such that each must own a phone capable of accessing screenshot data for previous days. While this may reduce the available sample, it would solve the issue of missing data and ease the demands on participants, as they could simply send a batch of screenshots once per week, rather than every evening. Thirdly, this study is limited by being unable to determine the precise reasons why a participant fails to send a screenshot on a particular evening. Although participants may have forgotten or been unavailable, it is also possible that a participant in the experimental group who fails to adhere to the daily limit may simply neglect to send a screenshot for that day. However, this limitation is countered by the remarkably high rate of responses during the study (92.49%), which was true of both the experimental and control group. Regardless, such a limitation can also be overcome by using the methodological change mentioned above, as participants would be unable to avoid sending in specific screenshots without exiting the study.

Although this experiment featured a small sample, it does provide considerable insight into the directions for future research. To begin, this study highlights the importance of assessing mental health in a much broader manner than has typically been done. Much of the literature has focused on well-being and depression, though these are just two aspects of mental health which fail to capture its full scope. If the current study had considered only the two most well-studied variables (i.e., depression and well-being),

it would have produced nothing of interest as the results of anxiety and the fear of missing out were much stronger. The present research also highlights the value in selecting particular social media platforms to examine, in which each site should be connected through similarities of use and past theory. Much of the follow-up data was collected following the closure of Carleton University (and much of Ottawa) in response to COVID-19. Understandably, this resulted in a significant increase in the use of communication apps—video-based messenger platforms, such as *Facetime*. If such platforms were not excluded from the total measure of “social media” on an *a priori* basis, most measures of screen-time would have been artificially inflated at follow-up, thus rendering the data unusable. Future research would thus do well to focus on specific platforms of interest, rather than social media in its broadest sense. In doing so, it may become easier to untangle the specifics of *how* social media use may affect mental health, beyond even the beneficial categories of passive/active use, as different platforms are likely to involve unique experiences and emotional responses.

Another element of the current study which holds promise for future research is the use of pre-screening procedures or, when possible, clinical samples. As noted previously, Hunt et al. (2018) found that individuals who were high in baseline depression experienced decreases in symptomology after they reduced their use of social media, but the same was not found for participants comparatively low in baseline depression. From this, we can conclude that such individuals may have a unique relationship with social media itself—a notion present in the theory surrounding this experiment, and one which is supported by the results found. To determine whether this notion is correct, future research should seek to compare clinical and non-clinical

samples using similar experimental designs, ideally over a longer timeframe.

Furthermore, the relatively small effect sizes discovered by cross-sectional research suggests that perhaps efforts should be focused on experimental methods and therapeutic applications. Although the current research did not find full support for its hypotheses, when considered alongside Hunt et al. (2018) it does suggest that social media are environments to which those with mental illnesses react differently. More research should be conducted in this area to determine whether there is value in the development of therapeutic interventions based on the amount of time young adults spend on social media, in addition to the behaviors and interactions they may experience on these platforms. In the meantime, however, social media may certainly be a factor that therapists would be wise to consider when dealing with young clients, as doing so might reveal a pattern of problematic behaviors or interactions online which mirror real-life struggles.

Conclusion

In a body of literature which has been dominated by cross-sectional research, this study is one of the few experimental approaches to determining how social media use affects mental health. Although results indicated only marginal support for the hypotheses concerning anxiety and the fear of missing out, analyses did reveal fairly strong effect sizes for the observed decreases in these variables. Thus, the current study supports the conclusions reached by Hunt et al. (2018), suggesting that decreasing the amount of time one spends on social media may improve mental health. Notably, the failure of the study to find significant effects for either depression or well-being provides strong evidence that future research should broaden how it assesses mental health,

potentially focusing on symptoms of anxiety. In addition, the magnitude of the effects discovered for a relatively small sample suggest that there is value in recruiting clinical samples in future research, and comparing these individuals to the general population to more adequately study how social media may affect mental health. Although recent meta-analyses have found that social media use has a relatively weak correlation with depression (e.g., Orben & Przybylski, 2019), the current study suggests that this association may be stronger amongst individuals with poor mental health and for other indicators of negative functioning, such as anxiety.

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Appendix A

Recruitment Notice:

Study Name:

- Limiting Social Media Screen-time on Personal Devices

Description:

- For this study, you have a 50-50 chance of being asked to limit your social media (e.g., Facebook, Snapchat, Instagram) screen-time. Participants will be asked to email daily screenshots of their screen-time usage for a period of four weeks. Participants will also be asked to complete questionnaires and attend an initial laboratory session where instructions will be provided.
- Eligibility Questions:
 - We are looking for participants who answer "Yes" to at least two of the following four statements:
 - 1) Over the past two weeks, I have not been able to stop worrying.
 - 2) Over the past two weeks, I have been worrying too much.
 - 3) Over the past two weeks, I felt depressed.
 - 4) Over the past two weeks, I had trouble keeping my mind on what I was doing.
- Risks:
 - We realize that limiting social media screen-time is hard for many people to do. In the first few days of limiting your screen-time, you may feel some distress. You are participating in this study voluntarily, so if you feel that you do not wish to continue, you may quit the study without penalty.

- Duration and Locale:
 - One hour in-lab in the Social Sciences Research Building (SSRB 304), 2-5 minutes daily for four weeks via email, and one 30-minute questionnaire at the end of the four-week period.
- Compensation:
 - You will receive up to 3.5% towards your course (PSYC 1001, 1002, 2001, or 2002) for your time, based on the following:
 - Attending the initial meeting where the study is described, consent form is reviewed, and the initial questionnaires are completed will be compensated with 1% grade-raising credit.
 - Sending in daily screenshots of social media usage will be compensated with a further 0.5% per week ($4 \times 0.5 = 2\%$).
 - Completing the survey four weeks after you begin the study will be compensated with 0.5% credit.

Appendix B

Informed Consent Form

Name and Contact Information of Researchers: Dr. Chris Davis, Professor, Dept of Psychology, Carleton U. (613-520-2600x2251) email: chris.davis@carleton.ca; Niall Stewart, MA student, Dept. of Psychology, Carleton U., 613-520-2600x1448) email: niallstewart@cmail.carleton.ca ; and Helen Thai, undergraduate student, Dept of Psychology, Carleton U., email: helenthai@cmail.carleton.ca

Project Title

Limiting Social Media Screen-time on iPhones and Androids

Project Sponsor and Funder (if any)

Unfunded

Carleton University Project Clearance

Clearance #: 111107 Date of Clearance: June 30, 2020

Invitation

You are invited to take part in a research project because you 1) tend to feel stressed or distressed at least occasionally; 2) use an iPhone running on iOS 12 or later, or an Android running on 9 Pie or later and 3) are a regular social media user. The information in this form is intended to help you understand what we are asking of you so that you can decide whether you agree to participate in this study. Your participation in this study is voluntary, and a decision not to participate will not be used against you in any way. As you read this form, and decide whether to participate, please ask all the questions you might have, take whatever time you need, and consult with others as you wish.

What is the purpose of the study?

The purpose of the study is to assess the effect that limiting social media screen-time has on one's level of emotional health.

What will I be asked to do?

If you agree to take part in the study, we will ask you to: 1) send us daily (by email) screen-shots showing the amount of time you have been using social media on your iPhone or Android every day for four weeks; 2) complete some questionnaires at an initial meeting and after 4-weeks; and 3) for a random half of participants, you will be asked to limit your social media screen-time for a period of three weeks. There is a 50-50 chance that you will be asked to limit your screen time.

Risks and Inconveniences

We realize that limiting social media screen-time is hard for many people to do. In the first few days of limiting your screen-time, you may feel some distress. You are participating in this study voluntarily, so if you feel that you do not wish to continue, you may quit the study without penalty.

Possible Benefits

You may find that by limiting your social media screen-time, you have more time for other activities that you enjoy or for school assignments.

Compensation/Incentives

You will receive course credit based on the extent of your participation. Attending the initial meeting where the study is described, consent form reviewed, and initial questionnaires completed will be compensated with 1% grade-raising credit for PSYC 1001/1002/2001/2002. Sending in daily screen-shots of social media usage will be compensated with a further 0.5% per week ($4 \times 0.5\% = 2\%$). Completing a follow-up survey after a few weeks of trying to cut back on social media screen-time will be compensated with .5% credit, totaling 3.5%

No waiver of your rights

By signing this form, you are not waiving any rights or releasing the researchers from any liability.

Withdrawing from the study

If you withdraw your consent during the course of the study, all information collected from you before your withdrawal will still be used, unless you request that it be removed from the study data. Once data have been rendered anonymous at the end of the study, it will not be possible to withdraw your data.

Confidentiality

We will remove all identifying information from the study data as soon as possible, which will be after you have submitted the follow-up survey 4 weeks after you started the study.

We will treat your personal information as confidential, although absolute privacy cannot be guaranteed. No information that discloses your identity will be released or published. Research records may be accessed by the Carleton University Research Ethics Board in order to ensure continuing ethics compliance.

The results of this study may be published or presented at an academic conference or meeting, but the data will be presented so that it will not be possible to identify any participants unless you give your express consent.

You will be assigned a code [or pseudonym] so that your identity will not be directly associated with the data you have provided. All data, including coded information, will be kept in a password-protected file on a secure computer and/or on a secure cloud. Data, with all identifiers removed, will be maintained for five years after publication of findings, as required by the American Psychological Association.

Because you will be granted course credit for taking part in the study, identifying information will be retained using a code until the course credit is granted.

Data Retention

After the study is completed, your de-identified data will be retained and used in aggregate (with other participants' data) for research and teaching purposes. Screen-shots of your social media usage will be destroyed (deleted) within 24-hours of each submission.

New information during the study

In the event that any changes could affect your decision to continue participating in this study, you will be promptly informed.

Ethics review

This project was reviewed and cleared by the Carleton University Research Ethics Board – B. If you have any ethical concerns with the study, please contact the REB Chair, Carleton University Research Ethics Board (by phone at 613-520-2600 x 4085 or by email at ethics@carleton.ca).

Statement of consent – print and sign name

I voluntarily agree to participate in this study. ☐ Yes ☐ No

I agree to submit daily screen-shots of social media usage ☐ Yes ☐ No

Signature of participant

Date

Research team member who interacted with the subject

I have explained the study to the participant and answered any and all of their questions. The participant appeared to understand and agree. I provided a copy of the consent form to the participant for their reference.

Signature of researcher

Date

Appendix C**Study Materials**

Please provide the following information so that we can link your data.

All identifying information will be deleted once you have been credited:

Name:

Age:

Gender:

Student Number:

Email that we should use to communicate with you:

Note: Neither student number nor communication email were asked during follow-up.

1. a) On a typical WEEKDAY in the past week, how much time did you spend using electronic devices for the following purposes (separate columns for smartphone and all other screens):

	Smart Phone	Other Screens
1. Using Social Media <i>(Count time spent on things such as Facebook, Snapchat, Instagram, Musically, Tumblr, Twitter, WhatsApp, Pinterest, Myspace)</i>	_____ hours _____ min	_____ hours _____ min
2. Using the specific social media apps		
Facebook:	_____ hours _____ min	_____ hours _____ min
Snapchat:	_____ hours _____ min	_____ hours _____ min
Instagram:	_____ hours _____ min	_____ hours _____ min
Twitter:	_____ hours _____ min	_____ hours _____ min
Pinterest:	_____ hours _____ min	_____ hours _____ min
TikTok:	_____ hours _____ min	_____ hours _____ min
3. Reading news or other educational content <i>(Count time spent on things such as Reddit, Foursquare, and other news apps)</i>	_____ hours _____ min	_____ hours _____ min
4. Watching television or videos	_____ hours _____ min	_____ hours _____ min

<i>(Count time spent watching YouTube, Vimeo, or music videos)</i>		
5. Playing video games or online games <i>(Count time spent playing Candy Crush, PUBG, Clash of Clans, Pokémon Go, etc.)</i>	_____ hours _____ min	_____ hours _____ min

1. b) On a typical **WEEKEND DAY** in the past week, how much time did you spend using electronic devices for the following purposes (separate columns for smartphone and all other screens):

	Smart Phone	Other Screens
1. Using Social Media <i>(Count time spent on things such as Facebook, Snapchat, Instagram, Musically, Tumblr, Twitter, WhatsApp, Pinterest, Myspace)</i>	_____ hours _____ min	_____ hours _____ min
2. Using the specific social media apps		
Facebook:	_____ hours _____ min	_____ hours _____ min
Snapchat:	_____ hours _____ min	_____ hours _____ min
Instagram:	_____ hours _____ min	_____ hours _____ min
Twitter:	_____ hours _____ min	_____ hours _____ min
Pinterest:	_____ hours _____ min	_____ hours _____ min
TikTok:	_____ hours _____ min	_____ hours _____ min

3. Reading news or other educational content <i>(Count time spent on things such as Reddit, Foursquare, and other news apps)</i>	_____ hours _____ min	_____ hours _____ min
4. Watching television or videos <i>(Count time spent watching YouTube, Vimeo, or music videos)</i>	_____ hours _____ min	_____ hours _____ min
5. Playing video games or online games <i>(Count time spent playing Candy Crush, PUBG, Clash of Clans, Pokémon Go, etc.)</i>	_____ hours _____ min	_____ hours _____ min

2. a) When you use social media apps such as Facebook and Instagram, approximately how much of your time is spent **passively** (scrolling, browsing, etc.) versus **actively** (commenting, posting, etc.) using the app? Please record an approximate percentage of each in the boxes provided.

Passive:	<div></div>
Active:	<div></div>

2. b) How frequently do you post on the social media apps that you use?

- Almost Never ☐
- Rarely (Once per month) ☐
- Occasionally (Once per week) ☐
- Often (Once per day) ☐
- Frequently (More than once per day) ☐

2. c) If you answered “Frequently,” to question b), how many posts do you make each day, on average?

- 2-4 ☐
- 5-7 ☐
- 8-10 ☐
- 11-13 ☐
- 14-16 ☐
- 17-19 ☐
- 20+ ☐

3.) I use Electronic Interaction (texts, Facebook, etc.):

	1	2	3	4	5
	Not at all true	A little bit true	Somewhat true	Very True	Extremely True
1. To check out the way others look.	☐	☐	☐	☐	☐
2. To compare the way I look with other people's looks.	☐	☐	☐	☐	☐
3. To try and get support when I am sad/upset.	☐	☐	☐	☐	☐
4. To get feedback from others on the things I send/post.	☐	☐	☐	☐	☐
5. To see what others think about how I look.	☐	☐	☐	☐	☐
6. To feel less lonely.	☐	☐	☐	☐	☐

7. To compare my body/shape with other people's bodies/shapes.	☐	☐	☐	☐	☐
8. To see what others think about the things I send/post	☐	☐	☐	☐	☐
9. To see if others think I am cool, funny, or popular.	☐	☐	☐	☐	☐
10. To ask my friends how they are doing.	☐	☐	☐	☐	☐
11. To see what others think about my photos.	☐	☐	☐	☐	☐
12. To see how my friends are doing.	☐	☐	☐	☐	☐
13. To see what the "popular" people think about me.	☐	☐	☐	☐	☐
	1 Not at all true	2 A little bit true	3 Somewhat true	4 Very True	5 Extremely True
14. To let someone know I'm mad at them.	☐	☐	☐	☐	☐
15. To try and feel better when I'm sad/upset.	☐	☐	☐	☐	☐
16. To compare my life with other people's lives.	☐	☐	☐	☐	☐
17. To make social plans with my friends.	☐	☐	☐	☐	☐

4.) How often do you feel the following emotions after seeing the posts of personal friends and followers on social media (e.g., status updates, snapchats)?

	Never	Rarely	Sometimes	Often	All the time
Interest	☐	☐	☐	☐	☐
Angry	☐	☐	☐	☐	☐
Inspired	☐	☐	☐	☐	☐
Envious	☐	☐	☐	☐	☐
Sad	☐	☐	☐	☐	☐
Happy	☐	☐	☐	☐	☐
Hatred	☐	☐	☐	☐	☐
Surprised	☐	☐	☐	☐	☐
Irritated	☐	☐	☐	☐	☐
Shame	☐	☐	☐	☐	☐
Bitter	☐	☐	☐	☐	☐
Longing	☐	☐	☐	☐	☐
Anxious	☐	☐	☐	☐	☐
Frustrated	☐	☐	☐	☐	☐
Hostile	☐	☐	☐	☐	☐
Love	☐	☐	☐	☐	☐
Desire	☐	☐	☐	☐	☐
Jealous	☐	☐	☐	☐	☐

5.) During the past year, have you:

1. Regularly found that you can't think of anything else but the moment that you will be able to use social media again?	YES ☐	NO ☐
2. Regularly felt dissatisfied because you wanted to spend more time on social media?	YES ☐	NO ☐
3. Often felt bad when you could not use social media?	YES ☐	NO ☐
4. Tried to spend less time on social media, but failed?	YES ☐	NO ☐
5. Regularly neglected other activities (e.g., hobbies, sports) because you wanted to use social media.	YES ☐	NO ☐
6. Regularly had arguments with others because of your social media use?	YES ☐	NO ☐
7. Regularly lied to your parents or friends about the amount of time you spend on social media?	YES ☐	NO ☐
8. Often used social media to escape from negative feelings?	YES ☐	NO ☐
9. Had serious conflict with your parents, brother(s), or sister(s) because of your social media use?	YES ☐	NO ☐

Note: Due to the timeframe denoted by the wording of the prompt (the past year), this survey was not asked at follow-up.

6.) Sleep Questionnaire:

- a) During the past week, what time have you usually turned out the lights to go to sleep _____ on _____ **weekdays?**

□□: □□ AM/PM (circle AM or PM)

- b) During the past week, what time have you usually woken up on **weekdays?**

□□: □□ AM/PM (circle AM or PM)

- c) During the past week, what time have you usually turned out the lights to go to sleep _____ on _____ **weekend** **days?**

□□: □□ AM/PM (circle AM or PM)

- d) During the past week, at what time have you usually woken up on **weekend** **days?**

□□: □□ AM/PM (circle AM or PM)

- e) During the past week, how would you rate your sleep **quality** overall (how **well** you sleep)?

Very Bad	Fairly Bad	Fairly Good	Very Good
□	□	□	□

- f) During the past week, how would you rate your sleep **quantity** overall (how **much** you sleep)?

Very Bad	Fairly Bad	Fairly Good	Very Good
□	□	□	□

7.) Tobacco Use Questionnaire:

Do you smoke any tobacco products?

- a) No
- b) Yes

How many cigarettes do you smoke each day?

- a) None
- b) 10 or fewer
- c) 11 to 20
- d) 21 to 30
- e) 31 or more

On average, how many days per week do you vape tobacco products?

- a) 0 (I do not vape)
- b) 1-2 days per week
- c) 3-4 days per week
- d) 5-6 days per week
- e) 7 (every day)

8.) We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

- a) During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

_____ **days per week**

- ☐ No vigorous physical activities (*Skip to question 3*)

- b) How much time did you usually spend doing **vigorous** physical activities on one of those days?

_____ **hours per day**

_____ **minutes per day**

- ☐ Don't know/Not sure

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

- c) During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

_____ **days per week**

- ☐ No moderate physical activities (*Skip to question 5*)

- d) How much time did you usually spend doing **moderate** physical activities on one of those days?

_____ **hours per day**

_____ **minutes per day**

- ☐ Don't know/Not sure

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

- e) During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

_____ **days per week**

- ☐ No walking (*Skip to question 7*)

- f) How much time did you usually spend **walking** on one of those days?

_____ **hours per day**

_____ **minutes per day**

- ☐ Don't know/Not sure

The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

- g) During the **last 7 days**, how much time did you spend **sitting** on a **week day**?

_____ **hours per day**

_____ **minutes per day**

- ☐ Don't know/Not sure

9.) In addition to the physical activities described above, **during the last 7 days**, how much time did you spend per day (on average):

a) Working at a job for which you received pay:

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

b) Doing school-related work (e.g., attending class, studying):

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

c) Doing things **by yourself** that you enjoy doing (other than school or work-related things, such as reading for pleasure, shopping, hobbies):

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

d) Doing things **with friends or family** that you enjoy doing (other than school or work-related things):

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

e) Learning new skills or in personal development (learning an instrument or new language, etc.):

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

10.) Below, you'll find eighteen statements about your experiences. Please indicate how true each statement is regarding the **experiences in your life overall**. There are no right or wrong answers. Please choose the answer that best reflects your experience rather than what you think your experience should be.

	Not at all True	A Bit True	Somewhat True	Mostly True	Very True
1. I feel happy.	☐	☐	☐	☐	☐
2. I feel energetic.	☐	☐	☐	☐	☐
3. I feel a strong friendship with the people I regularly interact with.	☐	☐	☐	☐	☐
4. I feel calm.	☐	☐	☐	☐	☐
5. I'm optimistic.	☐	☐	☐	☐	☐
6. In my activities, I feel absorbed by what I'm doing.	☐	☐	☐	☐	☐
7. I feel close and connected with the people around me.	☐	☐	☐	☐	☐
8. I'm in touch with how I really feel inside.	☐	☐	☐	☐	☐
9. I feel appreciated.	☐	☐	☐	☐	☐
10. I accept most aspects of myself.	☐	☐	☐	☐	☐
11. I feel great about myself.	☐	☐	☐	☐	☐

	Not at all True	A Bit True	Somewhat True	Mostly True	Very True
12. I am highly effective at what I do.	☐	☐	☐	☐	☐
13. I feel I am improving.	☐	☐	☐	☐	☐
14. I really like the people in my life.	☐	☐	☐	☐	☐
15. I have a purpose.	☐	☐	☐	☐	☐
16. What I do in my life is worthwhile.	☐	☐	☐	☐	☐
17. What I do is consistent with what I believe I should do.	☐	☐	☐	☐	☐
18. There are people who truly care about me.	☐	☐	☐	☐	☐

11.) Indicate how often you agree with the following statements about yourself by checking the appropriate box.

	1 Never	2 Not Often	3 Sometimes	4 Often	5 Always
1. I wish I looked better.	☐	☐	☐	☐	☐
2. I really like what I weigh.	☐	☐	☐	☐	☐
3. There are lots of things I'd change about my looks if I could.	☐	☐	☐	☐	☐
4. I'm pretty happy about the way I look.	☐	☐	☐	☐	☐
5. My weight makes me unhappy.	☐	☐	☐	☐	☐
6. I am satisfied with my weight.	☐	☐	☐	☐	☐
7. My looks upset me.	☐	☐	☐	☐	☐
8. Weighing myself depresses me.	☐	☐	☐	☐	☐
9. I'm looking as nice as I'd like to.	☐	☐	☐	☐	☐
10. I am preoccupied with changing my body weight.	☐	☐	☐	☐	☐

12.) Over the last **two weeks**, how often have you been bothered by the following problems?

	Not at all	Several days	Over half the days	Nearly every day
1. Feeling nervous, anxious, or on edge.	0	1	2	3
2. Not being able to stop or control worrying.	0	1	2	3
3. Worrying too much about different things.	0	1	2	3
4. Trouble relaxing.	0	1	2	3
5. Being so restless that it's hard to sit still.	0	1	2	3
6. Becoming easily annoyed or irritable.	0	1	2	3
7. Feeling afraid as if something awful might happen.	0	1	2	3

If you circled any problems, how difficult have these made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all	Somewhat difficult	Very difficult	Extremely difficult
☐	☐	☐	☐

13.) 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.

	Not at all true of me (1)	Slightly true of me (2)	Moderately true of me (3)	Very true of me (4)	Extremely true of me (5)
1. I fear others have more rewarding experiences than me.	☐	☐	☐	☐	☐
2. I fear my friends have more rewarding experiences than me.	☐	☐	☐	☐	☐
3. I get worried when I find out my friends are having fun without me.	☐	☐	☐	☐	☐
4. I get anxious when I don't know what my friends are up to.	☐	☐	☐	☐	☐
5. It is important that I understand my friends "in jokes."	☐	☐	☐	☐	☐
6. Sometimes, I wonder if I spend too much time keeping up with what is going on.	☐	☐	☐	☐	☐
7. It bothers me when I miss an opportunity to meet up with friends.	☐	☐	☐	☐	☐
8. When I have a good time it is important for me to share the details online (e.g. updating status).	☐	☐	☐	☐	☐
9. When I miss out on a planned get-together it bothers me.	☐	☐	☐	☐	☐
10. When I go on vacation, I continue to keep tabs on what my friends are doing.	☐	☐	☐	☐	☐

14.) Indicate how often each of the statements below is descriptive of you.

Statement:	1 Never	2 Rarely	3 Sometimes	4 Often
1. I feel in tune with the people around me.	☐	☐	☐	☐
2. I lack companionship.	☐	☐	☐	☐
3. There is no one I can turn to.	☐	☐	☐	☐
4. I do not feel alone.	☐	☐	☐	☐
5. I feel part of a group of friends.	☐	☐	☐	☐
6. I have a lot in common with the people around me.	☐	☐	☐	☐
7. I am no longer close to anyone.	☐	☐	☐	☐
8. My interests and ideas are not shared by those around me.	☐	☐	☐	☐
9. I am an outgoing person.	☐	☐	☐	☐
10. There are people I feel close to.	☐	☐	☐	☐
11. I feel left out.	☐	☐	☐	☐
12. My social relationships are superficial.	☐	☐	☐	☐
13. No one really knows me well.	☐	☐	☐	☐
14. I feel isolated from others.	☐	☐	☐	☐
15. I can find companionship when I want it.	☐	☐	☐	☐
16. There are people who really understand me.	☐	☐	☐	☐
17. I am unhappy being so withdrawn.	☐	☐	☐	☐
18. People are around me but not with me.	☐	☐	☐	☐
19. There are people I can talk to.	☐	☐	☐	☐
20. There are people I can turn to.	☐	☐	☐	☐

15.) Please indicate how often you have felt this way during the past week by checking the appropriate box for each question.

	Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	All of the time (5-7 days)
1. I was bothered by things that usually don't bother me.	☐	☐	☐	☐
2. I had trouble keeping my mind on what I was doing.	☐	☐	☐	☐
3. I felt depressed.	☐	☐	☐	☐
4. I felt that everything I did was an effort.	☐	☐	☐	☐
5. I felt hopeful about the future.	☐	☐	☐	☐
6. I felt fearful.	☐	☐	☐	☐
7. My sleep was restless.	☐	☐	☐	☐
8. I was happy.	☐	☐	☐	☐
9. I felt lonely.	☐	☐	☐	☐
10. I could not "get going."	☐	☐	☐	☐

Thank you! The survey is now completed. Thank you for your efforts. ☺

Appendix D

Modification of the MEIS

Motivations for Electronic Interaction Scale (MEIS)

Comparison and Feedback-Seeking Subscale (MEIS-CF) in **bold**⁷

1 = Not at all true	2 = A little bit true	3 = Somewhat true	4 = Very true	5 = Extremely true
I use Electronic Interaction (text, Facebook, etc.) ...				
1. ...to check out the way others look.				
2. ...to compare the way I look with other people's looks.				
3. ...to try and get support when I am sad/upset.				
4. ...to get feedback from others on the things I send/post.				
5. ...to see what others think about how I look.				
6. ...to feel less lonely.				
7. ...to compare my body/shape with other people's bodies/shapes.				
8. ...to see what others think about the things I send/post				
9. ...to see if others think I am cool, funny, or popular.				
10. ...to ask my dating partners how they are doing.				
11. ...to see what others think about my photos.				
12. ...to see how my dating partners are doing.				
13. ...to see what the "popular" people think about me.				
14. ...to let someone know I'm mad at them.				
15. ...to try and feel better when I'm sad/upset.				
16. ...to compare my life with other people's lives.				
17. ...to make social plans with my dating partners.				
18. ...to talk to my dating partners about using condoms.				
19. ...to talk to my dating partners about using birth control (like the pill).				
20. ...to talk to my dating partners about sexually transmitted diseases (STDs).				
21. ...to talk to my dating partners about my sexual limits (what I will/will not do).				
22. ...to talk to my dating partners about risk of pregnancy.				

Note: The term "dating partners" was changed to "friends" in questions 10, 12, and 17. Questions 18 to 22 were excluded from the survey itself as sexuality was not relevant to the current study.

Appendix E

Nightly Email Reminders and Debriefing Form

Days 1-6 – Subject Line: Social Media Screen-time (Day X)

Hi,

Just a quick reminder to take a screenshot of your social media use for today. Please send it in by midnight tonight, or first thing tomorrow morning. If you have any questions or concerns, please reply to this email with your question.

Thanks,

Social Media Research Team

Participants randomly assigned to the control group continue to receive the same message.

Day 7 – Subject Line: Limiting your Social Media Screen-time! (Day 7)

Hi,

Starting tomorrow morning, we want you to limit your social media screen-time to **60 minutes per day**. We recognize that this may be hard for some people to do, especially the first few days, but we think you can do it. If you exceed this limit, that is ok. We realize that some days will be harder than other days to stick within this limit. **Try your best, but don't get upset with yourself if you exceed this limit.**

Remember to send in your screenshot tonight!

If you have any questions or concerns, feel free to reply to this email.

Thanks,

Social Media Research Team

Day 8 – Subject Line: Limiting your Social Media Screen-time (Day 8)

Hi,

Congratulations for successfully limiting your screen-time! We hope it wasn't as hard as you thought it would be. Please remember to send in your screenshot tonight. If you have any questions or concerns, please reply to this email with your question.

Thanks,

Social Media Research Team

Overuse reminder email

Hi,

We noticed you have exceeded your social media smartphone time limit on one or more days. We would like to remind you to try your best to meet the 60 minute per day limit. Thank you for trying so hard to comply with our study requirements.

Thanks,

Social Media Research Team

Days 9-13 – Subject Line: Limiting your Social Media Screen-time (Day X)

Hi,

Please remember to send in your screenshot tonight. If you have any questions or concerns, please reply to this email with your question.

Thanks,

Social Media Research Team

Day 14 – Subject line: Limiting your Social Media Screen-time – 1 week in! (Day 14)

Hi,

Congratulation on getting through the first week limiting your screen-time. Please remember to send in your screenshot tonight. If you have any questions or concerns, please reply to this email with your question.

Thanks,

Social Media Research Team

Days 15-25 – Subject line: Limiting your Social Media Screen-time (Day X)

Hi,

Please remember to send in your screenshot tonight. If you have any questions or concerns, please reply to this email with your question.

Thanks,

Social Media Research Team

Day 26 – Subject line: Limiting your Social Media Screen-time – almost done! (Day 26)

Hi,

Only two days left of limiting your screen-time. Hang in there!

Please remember to send in your screenshot tonight. If you have any questions or concerns, please reply to this email with your question.

Thanks,

Social Media Research Team

Day 27 – Subject line: Limiting your Social Media Screen-time – almost done! (Day 27)

Hi,

Only one day left of limiting your screen-time!

Please remember to send in your screenshot tonight. If you have any questions or concerns, please reply to this email with your question.

Thanks,

Social Media Research Team

Day 28 (Experimental) – Subject line: You Made it! Last Night Limiting your Social Media Screen-time! (Day 28)

Hi,

Today is the last time we will ask you send in your screenshot! Please send your screenshot by the end of the night.

The study is almost done. When you get the chance in the next day or so, could you please complete this online survey?

https://carletonpsych.co1.qualtrics.com/jfe/form/SV_51KRaSbK7PTuBuJ

As a reminder, your participation is voluntary, and you may quit the study at any time without penalty. If you withdraw your consent during the course of the study, all information collected from you before your withdrawal will still be used, unless you request that it be removed from the study data. Once data have been rendered anonymous at the end of the study, it will not be possible to withdraw your data.

We will remove all identifying information from the study data as soon as possible, which will be after you have submitted the follow-up survey. We will treat your personal information as confidential, although absolute privacy cannot be guaranteed. No information that discloses your identity will be released or published. Research records may be accessed by the Carleton University Research Ethics Board in order to ensure continuing ethics compliance. All data, including coded information, will be kept in a password-protected file on a secure computer and/or on a secure cloud. Data, with all identifiers removed, will be maintained for five years after publication of findings, as required by the American Psychological Association.

By completing and submitting this survey, you will receive a .5% grade raising credit towards your PSYC 1001/1002/2001/2002 final grade, which is part of the 3.5% grade raising credit promised for completing all parts of the study.

If you have any questions or concerns, please reply to this email with your question.

Thanks,

Social Media Research Team

Day 28 (Control) – Subject Line: You Made it! Last Night Monitoring Social Media Screen-time (Day 28)

The same email was sent to the control group with a different subject line.