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Social Media Use and Early Adolescents' Academic Achievement: Variations by Parent-Adolescent Communication and Gender

Introduction

Perhaps no other platform has changed the human experience in such a profound way in recent decades as social media. For the purposes of this study, social media refers specifically to the use of social networking sites, in which persons can create profiles, connect with others primarily through chat, and share photos and videos (Raacke & Bonds-Raacke, 2008). The most notable examples of social media include Facebook, Instagram, Twitter, and Snapchat. Clearly, social media use has changed the ways in which we interact with one another. From communicating and connecting with various persons around the world, to sharing everyday life's moments through pictures and videos; its prolific use has become a dominant entity in present-day society (Lenhart, 2009).

Rightfully, research investigating the effects of social media use on developmental outcomes has been burgeoning, typically focusing on late adolescents and young adults (Barry et al., 2017). However, a growing number of early adolescents are engaging in its use. For example, 93-97% of 13-17 year-olds report using at least one social media platform (Anderson & Jiang, 2018; Barry et al., 2017), with most reporting using three different platforms regularly (Barry et al., 2017). Average daily use, according to a nonprofit organization that collects media and technology data on families, spans nine hours (www.commonsensemedia.org).

Despite an increase in research highlighting the negative effects of social media use (Barry et al., 2017), there are also reported benefits. For example, social media provides individuals with an opportunity to form new relationships and strengthen existing ones (O'Keeffe et al., 2011). Some youth benefit from its ease of communication, and its efficiency in assisting with everyday activities such as making plans, and engaging in discussions about day-to-day issues

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(Subrahmanyam & Greenfield, 2008). Nonetheless, general internet and social media use-especially in excess, has been found to interfere with important developmental tasks, such as academic performance (Skiera et al., 2015). For example, adolescents' general social media use is associated with falling behind in schoolwork (Espinoza & Juvonen, 2011).

Previous studies linking the use of social media to academic performance have typically focused on Facebook (e.g., Skiera et al., 2015). However, according to Anderson and Jiang (2018), there has been significant increases in use of sites such as Instagram and Snapchat (72% and 69%, respectively vs. Facebook, 51%). Adolescents, especially early adolescents, now are relatively more likely to use Snapchat and Instagram than older social media platforms such as Facebook and Twitter (Ohannessian & Vannucci, 2020). Given the exponential growth in popularity of other social media sites, especially among younger users, research examining the impact of sites other than Facebook are warranted. The overarching goal of the present study therefore is to examine the impact of the use of various social media platforms (i.e., Facebook, Twitter, Instagram, and Snapchat) on early adolescents' academic achievement. In this study, we also aim to identify factors that could potentially moderate this association, such as parent-adolescent communication and gender.

Adolescents' Academic Achievement

Perhaps one of the most important developmental milestones for today's American youth is academic achievement (Arnett, 2004). Reports provided by the National Center for Education Statistics show a fairly substantial increase in U.S. graduation rates, from 79% to 85%, with some parts of the country experiencing a 20% increase between 2010 and 2017 (McFarland et al., 2019). Many achievements throughout one's life can be attributed to academic success. For example, achievement at the secondary level predicts subsequent achievement through college

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(Martin et al., 2013). Further, in a comprehensive summary of multiple school-related correlates of life satisfaction from childhood to adulthood compiled by Suldo and colleagues (2006), the authors found a strong, positive association among students' perceptions of their academic abilities, teacher support, and overall satisfaction with school.

Despite the wealth of research suggesting the benefits of academic achievement, there still remains a disproportionate number of youth who will not achieve academic success. In 2017 for example, the overall status rate for those who dropped out of high school was 5.4%, which accounts for approximately 2.1 million U.S. students. Rates were highest among Black and Hispanic students, compared to White students (McFarland et al., 2019). Such findings shed light on the fact that despite efforts to provide all students with the benefits of education, additional research is needed to identify what factors may be most advantageous to student success, as well as those that may hinder efforts aimed to capitalize on its benefits.

Social Media Use

Notably, the prolific use of social media has been one such factor that has been identified as having a potentially negative impact on achievement outcomes. In a study sampling 348 undergraduate students, Lau (2017) reported that use of various types of media, including social networking sites, blogs, and chat platforms, predicted lower academic performance. Similarly, Skiera et al. (2015) reported that Facebook use was negatively associated with lower grades, within a sample of 117 undergraduate students. It is important to note that the aforementioned studies inclusively assessed multiple sources of media (e.g., social networking sites, blogs, chat platforms, etc.), or focused exclusively on Facebook. Additionally, the authors sampled undergraduate students only (e.g. Lau, 2017), despite the insurgence of social media use among

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younger adolescents (Anderson & Jiang, 2018). As such, it is not clear whether social media use similarly negatively influences the academic achievement of younger adolescents.

Today, social media use is arguably one of the most important means of social interaction (Anderson & Jiang, 2018). Its use has seen tremendous growth within a relatively short period, and it continues to gain in popularity. In 2018, a report provided by the Pew Research Center suggested that some 68% of U.S. adults used social media, with Facebook alone accounting for more than 800 million users worldwide (Lenhart, 2009). Though individual differences exist, use spans across various socio-demographic characteristics. For example, Ohannessian and Vannucci (2020) reported racial and ethnic variations in use across Facebook and Twitter. Accordingly, Hispanic adolescents were more likely to use Facebook than Black adolescents, while Black adolescents were more likely to use Facebook than their White peers. Hispanic adolescents also reported more frequent use of Twitter than both their Black and White peers. Regarding gender, girls were more likely to use Instagram and Snapchat in comparison to boys. Additionally, Anderson and Jiang (2018) found that social media use tends to be more prolific among lower-income adolescents than those from higher income households.

Prior studies investigating the impact of social media use often focus on Facebook. Findings on the association between Facebook use and academic outcomes however, are mixed. Kirschner and Karpinski (2010) sampled 102 undergraduate students and 117 graduate students from a large, public Midwestern university who were either Facebook users or non-Facebook users. The authors found that Facebook users had lower grade point averages and spent fewer hours per week studying than non-Facebook users. Interestingly, although Facebook use was significantly predictive of lower academic achievement among younger college students, findings were not significant for students at higher grade levels (Junco, 2015).

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Relative to adult samples, fewer studies have focused exclusively on social media use among adolescents, despite adolescence representing a pivotal developmental period during which individuals are particularly susceptible to deleterious outcomes (Arnett, 2004). Social media platforms provide a context for increased social comparisons and an opportunity for adolescents to explore and shape their identity (Moreno, 2010). Given that adolescence is often also characterized as a period of heightened emotional instability (Arnett, 2004), the feedback adolescents receive, if negative, may greatly hinder the development of healthy self-esteem and a positive sense of self (Correa et al., 2010). In an adult sample, Correa et al. (2010) found that social media use was negatively associated with emotional stability. Such emotional instability may have even greater negative implications on adolescents, as it may cause a disruption in their academic performance, more specifically.

The social media landscape has changed considerably over the past few years. As previously mentioned, use on sites such as Instagram and Snapchat are notably higher than on Facebook, (72% and 69%, respectively vs. Facebook, 51%) (Anderson & Jiang, 2018). One possible reason for the increase in Instagram use may be due to the structure of the platform. Instagram is primarily utilized for sharing images of social activities such as traveling, going to sporting events, and engaging with friends (Sheldon & Bryant, 2016); the need to share in these experiences is fairly common among adolescents.

Some previous studies have assumed a standard use across all social media platforms, when youth do in fact engage with social media for different reasons. In light of the increased use of various other social media platforms among adolescents, and its potential to negatively impact their academic performance, it is important to not only investigate social media platforms other than Facebook (e.g., Instagram, Twitter, and Snapchat), but also to identify factors that

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may alleviate its potentially negative effects. Boniel-Nissim et al. (2015) has identified positive parenting as one factor that may mitigate the negative effect of technology use on adolescents' life satisfaction. As such, it is worthwhile to investigate the buffering effects of parent-adolescent communication on social media use and early adolescents' academic achievement.

Parent-Adolescent Communication as a Moderator

Researchers have long purported the positive effects of varying aspects of the parent-child relationship on outcomes related to adolescents' academic achievement. For example, Jeynes (2005) presented findings suggesting that parents' involvement in their child's schooling was positively related to the child's academic success. Similarly, Kristjansson and Sigfúsdóttir (2009) found that parental support and monitoring were positively associated with academic achievement within a sample of 9th and 10th grade boys and girls.

In addition to its direct positive effects, interactive effects suggesting the importance of positive parenting, specifically, the role of communication with parents, has also garnered empirical support. For instance, Ozdemir (2014) found that parent–adolescent communication moderated the relationship between cyber victimization and self-esteem, such that self-esteem was predicted negatively by cyber victimization; however, when mother–adolescent communication was accounted for, the inverse occurred, in that self-esteem was predicted positively by cyber victimization. Additionally, in an investigation of the impact of an intervention program aimed at reducing internalizing symptoms among youth, Perrino et al. (2014) reported that the intervention was more efficacious in its impact on internalizing symptoms for youth with lower initial levels of parent–adolescent communication compared to those with higher parent–adolescent communication levels.

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To a lesser extent, positive parenting has also been found to moderate the effects of general technology use on adolescent outcomes. Boniel-Nissim et al. (2015) reported that supportive parenting buffered the negative effects of electronic media use on adolescents' life satisfaction. Furthermore, supportive parenting strategies such as parental mediation (e.g., parents' rules regarding the frequency and content of their children's view of digital media) as defined by Livingstone and Helsper (2008), was found to have significant buffering effects on negative consequences associated with cyberbullying victimization.

Additionally, research findings have been consistent in substantiating evidence to suggest that mothers are more involved with their children's academic success than are fathers. For example, Shumow and Miller (2001) reported that fathers of young adolescents were less involved in their child's schooling than were mothers. However, despite empirical support suggesting that mothers and fathers parent differently, researchers often examine parenting effects collectively (e.g., Jeynes, 2005). Significant findings from such studies may reveal positive parenting effects, which may consequently be misleading. Given the importance of positive parenting in impacting adolescent outcomes, and the potential for social media use to disrupt the academic performance of early adolescents, parent-adolescent communication may also mitigate the negative effects of social media use on early adolescents' academic achievement. However, it may be advantageous to examine the impact of mothers and fathers separately, as findings may vary accordingly.

Gender as a Moderator

Use of social media platforms tend to be dominated by younger adolescent girls. According to a 2018 report provided by the Pew Research Center, approximately half of all teenage girls consider themselves "near-constant" online users, while only 39% of teenage boys

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would describe themselves as such. More so for girls than boys, social media allows girls to engage with family members (36% for boys vs. 53% for girls), share their emotions and feelings (29% for boys vs. 40% for girls), and share their personal problems (25% for boys vs. 28% for girls).

Additionally, there are also pronounced gender differences in relation to academic achievement (Wang & Parker, 2011). For example, girls typically outperform boys academically, at both the secondary and post-secondary levels (College Board, 2012; Wang & Parker, 2011). It should be noted however, that although the aforementioned finding is quite common in the literature, some researchers have found that results expressed in effect sizes largely show that such differences are not significant (Driessen & Van Langen, 2013). Some reasons why girls seemingly outperform boys academically include: differentiation in mothers' academic socialization of boys compared to girls (Mandara et al., 2010), teachers' gender stereotypes regarding academic competencies that favor girls (Retelsdorf et al., 2015), and the higher dropout rates among male youth, according to the U.S. Department of Education, National Center for Education Statistics.

Regardless of the reason, there is substantial empirical support to suggest that the association between social media use and early adolescents' academic achievement will vary by gender. In this regard, previous studies have been less consistent as to whether this finding holds true, even under less than ideal circumstances. Therefore, an additional goal of this study is to test whether gender moderates the association between social media use and early adolescents' academic achievement. Lastly, the extant literature suggests there are confounding factors that differentially influence academic achievement among certain demographic groups compared to others. Therefore, in this study, the following variables are included as controls: age

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(Ohannessian & Vannucci, 2020), gender (Driessen & Van Langen, 2013), and race/ethnicity (Ohannessian & Vannucci, 2020).

The Present Study

In sum, the goal of the present study is to test specific hypotheses relating to social media use, parent-adolescent communication, gender, and early adolescents' academic achievement. Based on social cognitive theory which suggest that, given the important role of parents, positive parenting may buffer the negative impact of social media use (Lowe & Dotterer, 2013), and the previous literature, the following hypotheses will be addressed:

Hypothesis 1: Social media use (Facebook, Instagram, Twitter, and Snapchat) is significantly, and negatively associated with early adolescents' academic achievement.

Hypothesis 2: Parent-adolescent communication moderates the association between social media use and early adolescents' academic achievement such that more frequent use of either platform, coupled with low parent-adolescent communication is associated with lower academic achievement among early adolescents.

Hypothesis 3: Gender moderates the association between social media use and early adolescents' academic achievement. More specifically, it is expected that more frequent use of either platform, is associated with lower academic achievement for boys.

This study aims to extend the current literature in several ways. First, previous studies examining the effects of social media use often include other technology uses such as Internet searches, blogging, gaming, etc. However, the inclusion of technology other than social media may confound results. For example, use as it relates to Internet searches could be related to academic purposes, and could in fact be beneficial to academic achievement. Notably, this study exclusively focuses on social media use specific to social networking sites. Second, Facebook is

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often the focus of studies examining social media platforms. Although Facebook continues to be the most commonly used social media platform among adults, other sites such as Instagram and Snapchat are steadily gaining in popularity and have surpassed Facebook use among the younger demographic (Anderson & Jiang, 2018). This study explores use among four of the most popular social media platforms, *at present time*, in an effort to examine if effects differ among them. Third, in contrast to most previous studies focusing on older adolescents and emerging adults, this study focused on early adolescents, a relatively neglected group, despite their exponential growth in social media use. Lastly, several important covariates were included given that evidence suggests that academic achievement during adolescence is influenced by demographic factors such as age, gender and race/ethnicity.

Method

Sample and Procedures

Study participants were drawn from a larger longitudinal study (website blinded for review) which examined factors that protect young people from developing psychological problems. This diverse sample of approximately 1,700 students were recruited from middle and high schools located in the Northeast region of the United States. Data collection took place during the fall of 2016 (T1), spring of 2017 (T2), and spring of 2018 (T2). A third wave of data were collected in the 2018-2019 academic year. Students who were unable to understand the survey due to limited English language skills, and those whose teachers reported the presence of a severe developmental disorder, did not participate during the assent process. Participants completed self-report surveys. The present study utilized data from Time 1 and Time 2. The sample included N=1,459 adolescents, whose ages ranged from 11 to 15 at Time 1 (M_{age}=12.00, SD= 0.68). Approximately 49% were boys, and 51% girls. Regarding race/ethnicity,

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approximately 43% self-identified as non-Hispanic White, 17% as Hispanic/Latino, 7% as Black or African American, and 16% as other races/ethnicities.

Measures

Academic Achievement (e.g., Gordon & Cui, 2014) was based on self-reported grades at Time 2. All other variables were assessed at Time 1. Participants were asked to respond to the following item: *Which of the following best describes the grades you are getting in school this year?* Responses ranged from *1 = Mostly F's* to *9 = Mostly A's*. Items were recoded accordingly: *0 = mostly D's* and *F's*, *1 = mostly C's*, *2 = mostly B's,* and *3 = mostly A's*. Higher values indicated higher academic achievement.

Social media use. Four social media platforms were assessed using the Technology Use Questionnaire (TUQ; Ohannessian & Vannucci, 2020). These included: Facebook, Twitter, Instagram, and Snapchat. Participants were asked: *How often did you typically use the following sites/apps: Facebook, Twitter, Instagram, and Snapchat?* Response categories ranged from *0 = Never* to *8 = Almost Constantly*. Items were recoded such that *0 = no use*, *1 = uses often*, and *2 = frequent use*.

Parent-adolescent communication (Barnes & Olsen 2003). The mother and father-adolescent communication measures assessed adolescents' communication with their mothers and fathers. It was computed using the sum of 20 items. Sample items included "*My mother is always a good listener"* and "*I am very satisfied with how my mother and I talk together*." Responses ranged from 1 = *strongly disagree* to 5 = *strongly agree*. Similar items were asked of fathers. The Cronbach's alpha for the *mother-adolescent communication* measure is considered excellent at 0.88, and 0.89 for the *father-adolescent communication* measure.

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Regarding covariates, age was assessed by asking participants to report their age in years. Adolescent gender was recoded as 0 = *male* (reference category) and 1 = *female*. Regarding race and ethnicity, participants were asked: *Do you think of yourself as…?* Responses were recoded such that 0 = *White* (reference category), 1 = *Black*, 2= *Hispanic*, and 3 = *Other race/ethnicity*.

Analytic Strategy

Analyses were completed using the statistical software package, STATA 13. First, to test the direct effects of each social media platform use on early adolescents' academic achievement, regression models were analyzed separately for each of the social media platforms, on the outcome variable, academic achievement, using STATA's SEM function. For example, the relationship between the independent variable Facebook use, and all covariates: age, gender, and race/ethnicity were tested on academic achievement. Next, to test interaction effects, an interaction term was created for each social media platform along with each parent-adolescent communication variable: mother-adolescent communication, then father-adolescent communication, by multiplying each social media platform, the independent variable, by the moderating variable of interest (e.g., Facebook use X mother-adolescent communication). Separate models tested the moderating effect parent-adolescent communication (i.e., mothers, then fathers) on social media use and early adolescents' academic achievement.

Next, the moderating effect of gender was tested on the association between each of the social media platforms and adolescents' academic achievement. Again, an interaction term was created for each social media platform along with gender. Separate models tested the moderating effect of gender on each social media platform (e.g., Facebook, Twitter, Instagram, and Snapchat) and early adolescents' academic achievement.

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Lastly, significant interactions were probed by plotting estimates at low and high levels (± 1 SD) around the mean of the interaction terms (Aiken & West, 1991). Missing data were handled using full information maximum likelihood (FIML).

Results

Descriptive Statistics

A summary of variable characteristics are shown in Table 1. Regarding the use of each social media platform, 27% of the participants reported using Facebook, 25% reported using Twitter, 72 % reported using Instagram, and 70% reported using Snapchat. As a preliminary test, Chi-square tests were conducted to determine if significant differences existed among social media use and gender, and social media use and race/ethnicity. Facebook use was not found to differ by gender. However, its use differed by race/ethnicity (X^2 (4) = 35.80, $p < .001$), with Hispanic adolescents reporting significantly higher use than all other groups. Similarly, Twitter use was not found to differ by gender. However, Twitter use also differed by race/ethnicity (X^2 (4) = 13.32, $p < .001$). Those reporting significantly higher use were also more likely to self-report as 'other race/ethnicity'. Both Instagram and Snapchat uses differed by gender (X^2 (2) = 17.40, $p < .001$; X^2 (2) = 34.82, $p < .001$, respectively). Among both platforms, girls were more likely to report higher use then boys. Facebook and Twitter uses were significantly and positively correlated with age (r (1146) = 0.10, $p < .001$), (r (1143) = .80, $p < .001$), respectively.

Hypotheses Testing

In testing the direct effects, Hypothesis 1 was supported, as results for each of the social media platform models indicated a significant negative association with use: Facebook (b = -0.19, $p < .01$), Twitter (b = -0.09, $p < .01$), Instagram (b = -0.03, $p < .01$), and Snapchat (b = -0.03, $p < .01$) and early adolescents' academic achievement, controlling for all covariates.

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Regarding covariates, among all social media platform models, only gender was significantly associated with adolescents' early academic achievement, suggesting that, girls reported significantly higher grades than boys (Facebook, $b = 0.15$, $p < .01$; Twitter, $b = 0.15$, $p < .01$; Instagram, $b = 0.16$, $p < .01$; Snapchat, $b = 0.17$, $p < .01$).

Next, in testing the moderating effect of parent-adolescent communication on social media use and early adolescents' academic achievement, Hypothesis 2 was partially supported. Across the social media platforms, results indicated significant interactions between (a) Facebook use and mother-adolescent communication ($b = 0.00$, $p < .05$), and Instagram use and mother-adolescent communication ($b = 0.00$, $p < .05$) on early adolescents' academic achievement.

Probing these interactions, as graphically expressed in Figure 1, was done at ± 1SD around the mean of the interaction terms. It revealed that higher Facebook and Instagram uses coupled with low mother-adolescent communication were associated with lower academic achievement. There were no other significant interactions found between the remaining social media platforms and either mother or father-adolescent communication on early adolescents' academic achievement.

Next, in testing the moderating effect of gender on social media use and early adolescents' academic achievement, Hypothesis 3 was partially supported. Across the social media platforms, results indicated significant interactions between (a) Twitter use and gender ($b = 0.17$, $p < .05$), and (b) Snapchat use and gender ($b = 0.\ 06$, $p < .05$) on early adolescents' academic achievement. There were no other significant social media use and gender interactions found.

Upon probing the interaction effect of Twitter use and gender, and Snapchat use and gender, on early adolescents' academic achievement, as graphically expressed in Figure 2, it

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was revealed that as use increased across both platforms, grades appeared to *increase* as well, particularly for girls.

Discussion

Increasingly, researchers are becoming more aware of the prevalence of social media use and its potential impact on development. Many would agree its impact is pervasive, widespread, and more far-reaching than ever before. In this study, we investigated the association between various commonly used social media platforms and academic achievement among a growing population of social media users, early adolescents. Additionally, we examined the moderating effects of parent-adolescent communication and adolescent gender on this relationship.

Preliminary Analyses

In contrast to previous findings, results suggested that the most widely used social media platforms were Instagram and Snapchat, not Facebook and Twitter, as is commonly identified in adult samples (Anderson & Jiang, 2018). This finding is especially important, as it suggests a few important features regarding social media use currently. First, it points to the fact that social media use among early adolescents differs from that of adults. This finding is especially important for parents who may be attempting to navigate their children's online presence. For example, some parents may join social media platforms as a way to connect and relate to their children, or perhaps as a way to monitor their children's on-line presence. However, their efforts may be ineffective if their child is not active on the platform they assume them to be, such as Facebook. Secondly, this finding signals that perhaps the preferred social media use platform may be changing altogether for both younger and older individuals. Understandably, the invention of Facebook ushered in an innovative and exciting means of communicating and

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connecting with others. However, newer platforms may provide features that more accurately reflect the needs of the current population, especially early adolescents.

Regarding gender, results indicated more frequent use of social media among girls than boys; specifically for the platforms Instagram and Snapchat. Along with corroborating previous research (Pujazon-Zazik & Park, 2010), this finding speaks to the societal and cultural norms that support greater disclosure for girls than for boys (Zahn-Waxler, Klimes–Dougan, & Slattery, 2000). Girls are far more likely to express intimate details about themselves, frequently co-ruminate about problems with friends and peers, and express their feelings (Rose & Rudolph, 2006; Stone et al., 2011). Social media not only provides a space in which to do so, but also may encourage them as well. An interesting note here is the type of platform for which significant gender differences were found, as it was only among Instagram and Snapchat users. These platforms are primarily used to post short-term experiences, and provide visual snapshots of daily life. Accordingly, girls are typically more engaged in behaviors such as taking, editing, and posting graphics on social media, than are boys (Dhir et al., 2016).

While Instagram and Snapchat use did not differ by race/ethnicity, it did so among Facebook and Twitter users. Use of both Facebook and Twitter were lowest among White adolescents, and highest in minority populations. Hispanic adolescents reported the most frequent use of Facebook, while those who self-identified as ‘other’ reported the most frequent use of Twitter. Findings in the literature, relative to differences in race/ethnicity and social media use, are largely inconsistent. For example, while this study reported differences, a 2009 Pew research report found no differences in Twitter use among adolescents by race and ethnicity. Such discrepancies in findings may be linked to a number of measurement inconsistencies (e.g.,

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differences in how researchers operationalize social media use, largely homogeneous samples, etc.), and therefore warrants further investigation.

Hypotheses Testing

In line with theory and previous research suggesting the negative impact of social media use on early adolescents' developmental outcomes (Ohannessian & Vannucci, 2020), hypotheses regarding its use and academic achievement were supported. Separate models independently assessing each of the four social media platforms revealed a negative association between uses of Facebook, Twitter, Instagram, and Snapshot and early adolescents' academic achievement. There are several plausible explanations for these findings supported by previous literature. For example, it is possible that social media use of any platform presents a distraction (Skiera et al., 2015), especially among early adolescents' who are not as capable of skillfully multitasking as well as their older peers. As such, attention that would otherwise be invested in their schoolwork is being diverted to social media use, which ultimately affects their ability to perform well in school. Similarly, Lau (2017) found that college students who devoted more time to media also performed less favorably in their academics.

Another plausible explanation positions other factors as mediators of social media use and academic achievement. For example, Ohannessian and Vannucci (2020) found that social media use was adversely related to externalizing behaviors. In turn, children and adolescents who engaged in externalizing problem behaviors often experience lower academic achievement (Zimmermann et al., 2013). Therefore, lower academic achievement as a result of social media use may be a result of underlying issues stemming from other factors; in that, social media use poses a problem for other aspects of development, which further disrupts early adolescents' performance in school.

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In addition to direct effects, hypotheses regarding the moderating effects of parent-adolescent communication and gender on social media use and early adolescents' academic achievement were tested. First, findings revealed significant interactions between Facebook and Instagram uses and mother-adolescent communication, in that, more frequent use of either platform, coupled with low mother-adolescent communication, were associated with lower academic achievement among early adolescents. Findings suggests that increased use of social media may be a catalyst for low mother -adolescent communication. As children enter adolescence, they often attempt to establish autonomy from their parents, and social media likely affords them a way in which to do so. Ultimately, this may cause tension between themselves and their mothers, as mothers may want to resist relinquishing such control.

Another possible explanation is that social media use could be an outcome of negative mother-adolescent interactions, which in turn, disrupts the adolescents' schooling. In this instance, adolescents may utilize social media as a way to detach from an already contentious relationship with their mother. According to Ruberry et al. (2017), children who do not have a good relationship with their parents are more likely to engage in risky behaviors. It is likely then, that if the adolescent already has a contentious relationship with their mother, that relationship may be vulnerable to the negative impact of frequent engagement with social media.

Results also revealed significant interactions between Twitter and Snapchat uses and gender on early adolescents' academic achievement. Interestingly, uses across both platforms were associated with *higher* grades for both boys and girls, with girls performing at higher levels. Further attesting to the differential effects of use, the increase in grades among more frequent users could be a reflection of a benefit of the social interaction notable on these platforms (e.g., O'Keeffe et al., 2011). Sheldon and Bryant (2015) reported a positive association

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between social interaction and social media use, as higher use suggests greater functionality among peers. Better peer relationships, in turn, is associated with higher achievement (Lynch et al., 2013).

In considering the structure of both Twitter and Snapchat, these platforms allow adolescents to engage often, but in a limited capacity. An important feature of both is the capacity to gather and disburse snippets of information in spurts (i.e., initially Twitter allowed only 140; Snapchat encourages “snaps” of texts, pictures, and videos that are meant to disappear after they're viewed). Such constraints may lessen the chance for adolescents to become overly involved, as is likely the case with Facebook that requires the building and maintenance of a profile. Therefore, in addition to promoting social engagement, engagement on these sites may be less likely to jeopardize achievement.

Using a large, diverse community sample, the findings of the current study extend the extant literature on social media use and academic achievement in several important ways. Unlike most other studies, this study focused exclusively on an increasingly growing population of social media users, early adolescents. Moreover, four of the most popular social media platforms were examined. Additionally, the moderating effects of parent-adolescent communication and gender on social media use and academic achievement were examined. Nonetheless, findings should be contextualized within the parameters of the following limitations. First, data relied on adolescent self-reports, which researchers have found can contribute to shared method variance (Marsiglio et al., 2000). Therefore, future studies should consider including the perspectives of other sources that are integral to adolescent development, such as parents, teachers, and peers.

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Second, although this study utilized two time points of data collection, designs that include a longer range of time are encouraged, as such designs are able to show more detailed patterns of social media use over time. Lastly, although popular social media sites available at the time of this study were examined, it is important to keep in mind that social media sites are ever evolving. Furthermore, each platform incorporates a slightly different version of the other, making it a challenge to tease them apart. Future research investigating social media use should be cognizant of such issues.

Despite the above limitations, this study extends the current literature on social media use in important ways. Of note, it represents an important first step toward understanding the links between social media use and academic achievement, specifically among early adolescents. Generally, findings suggest a negative association between use of Facebook, Instagram, Twitter, and Snapchat and academic achievement during early adolescents. However, results from interaction models suggested that, depending on the type of platform being used, achievement may be hindered or facilitated. Notably, mother-adolescent communication mitigated the effect of Facebook use and Instagram on early adolescents' academic achievement, such that frequent use of either platform coupled with low mother-adolescent communication, were associated with lower academic achievement. On the other hand, both boys and girls experienced greater academic success, as use of Twitter and Snapchat increased. Further research is needed to examine direct effects, as well as underlying mechanisms and other interactive effects related to social media use. Nonetheless, this research provides a more in-depth look into the world of social media use among early adolescents- a population that continues to simultaneously circumvent and expound upon the digital platforms that has come to define them.

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Table 1

Summary of Variable Characteristics

Variables	*M*/%	*SD*	Minimum	Maximum
Dependent Variable (Time 2)				
Early Adolescents' Academic Achievement	2.54	0.72	0	3
Predictor Variables (Time 1)				
Facebook	0.39	0.68	0	2
Twitter	0.35	0.64	0	2
Instagram	2.28	2.68	0	8
Snapchat	2.68	3.03	0	8
Moderating Variables				
Mother- adolescent communication	71.20	14.39	27	100
Father- adolescent communication	69.79	15.15	20	100
Control Variables				
Age	12	0.71	11	15
Gender [a]				
Male	49%			
Female	51%			
Race/Ethnicity [b]				
White	52%			
Black	9%			
Hispanic	21%			
Other	18%			

Note. Reference Categories.

[a] gender = Male.

[b] race/ethnicity = White.

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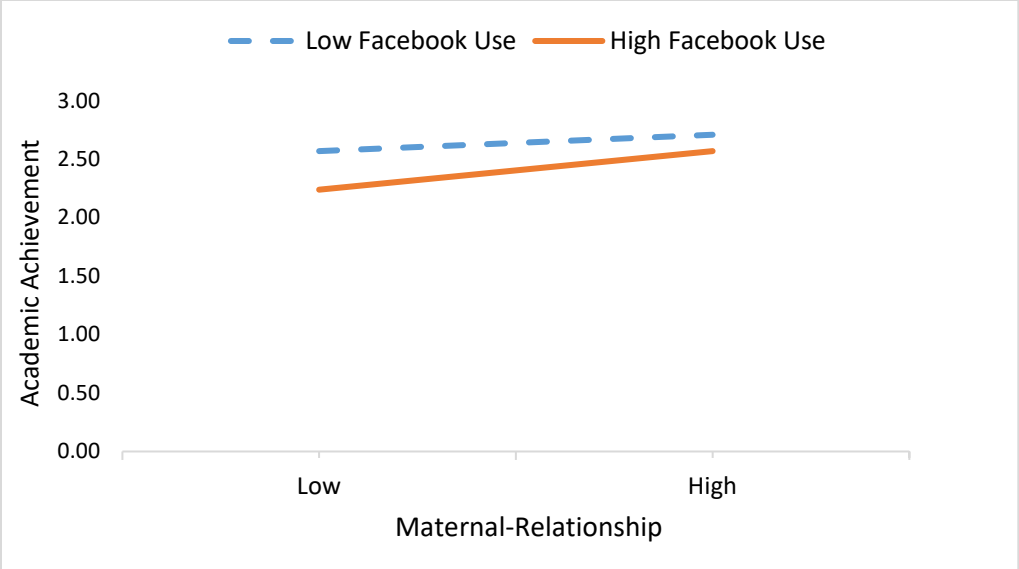
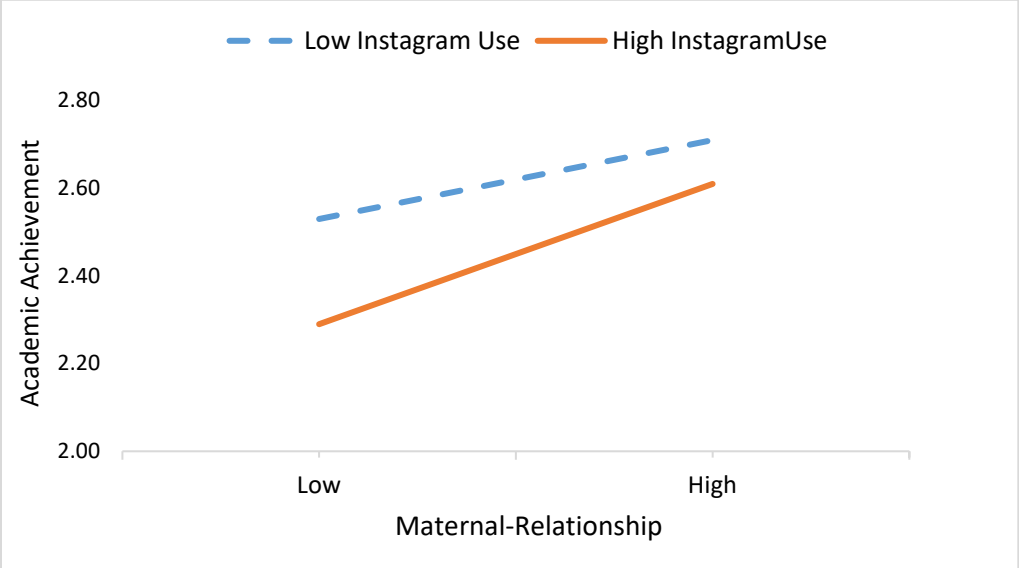
Figure 1

Moderation effect of social media use and parent-adolescent communication





Note. Significant interaction effects suggested that higher Facebook and Instagram uses coupled with low mother-adolescent communication were associated with lower academic achievement.

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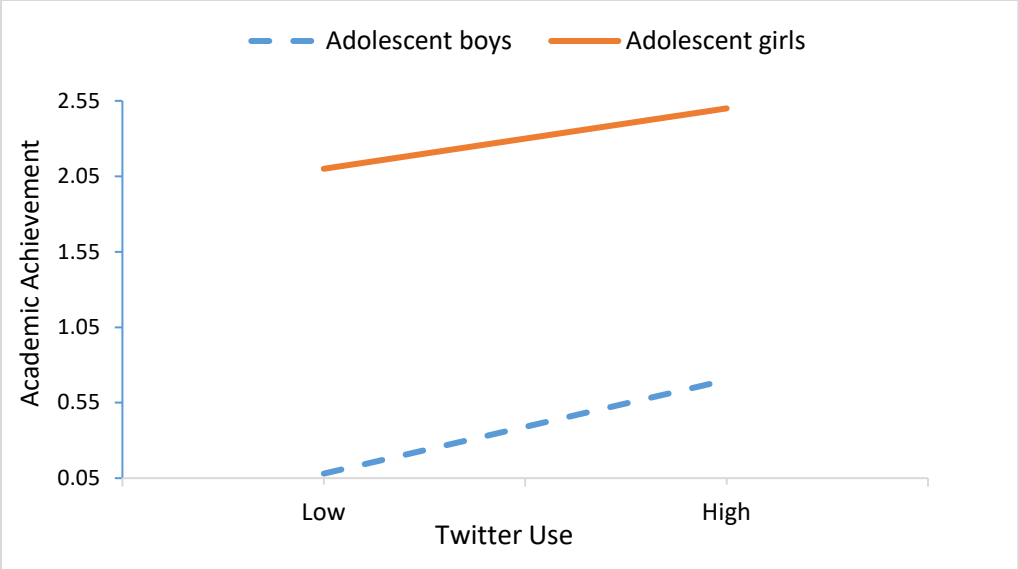
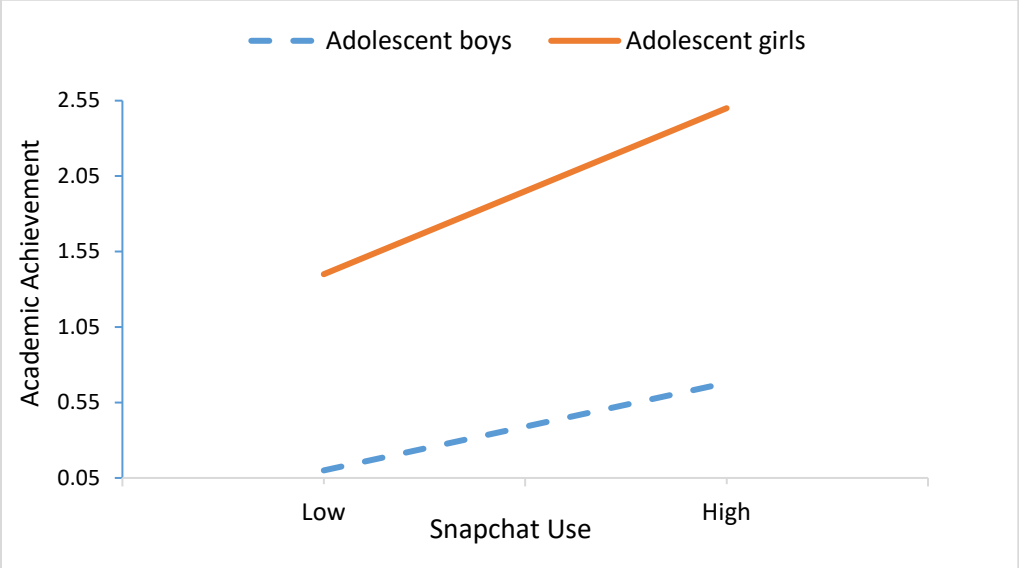
Figure 2

Moderating effect of social media use and gender





Note. Significant interaction effects suggested that as uses increased across Twitter and Snapchat, grades increased also. Girls consistently reported higher academic achievement across both platforms.