

Developing and networking in the digital age: Identifying factors that influence online
communication among adolescents

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Abstract

Adolescents' engagement on social networking sites has been tied to positive social developmental outcomes. However, research has been limited in examining the communication strategies adolescents utilize to form these online relationships. To address this gap, the authors utilized social network analysis to examine the communication strategies of 54 students (2,916 relationships) on a private Facebook group. Communication strategies were identified through qualitative interviews with adolescent Facebook users (N = 12), as well as coding archival Facebook comments and posts (N = 271). Three themes emerged from the data regarding tactics adolescents applied or noticed in others concerning effective online communication strategies: 1) level of relevancy (the extent to which the post related to their personal lives), 2) use of dialogical questions (the extent to which participants utilized questions, and engaging language to solicit a response from others), and 3) social media savviness (the extent to which participants utilized images to convey information). Random permutation regression analysis indicated that those who demonstrated high performance levels in social media savviness were more central within the online network (i.e. degree centrality). Additionally, users who applied dialogic questions held significantly higher scores in network betweenness. Implications for intervention efforts, and future research will be discussed.

Keywords: Adolescents, Social Networking Sites, Facebook, Social Network Analysis, Relationships.

Communication is a key foundation and skillset for forming relationships. Non-familial relationships are pivotal for adolescents in fostering identity formation and positive social skill development (Santrock, 2005). Research indicates positive associations between mental health outcomes and supportive peer relationships (Buhrmester, 1990). The field of developmental psychology has recognized the inevitable expansion of social networking sites (SNS) and the crucial role they play in facilitating adolescents' non-familial social interactions (Aillerie & McNicole, 2016; Best, Manktelow, & Taylor, 2014; Ellison, Steinfield, & Lampe, 2007).

Currently, one third of internet users are children or adolescents (Berman & Albright, 2017). The Pew Research Center (2015) indicates that an estimated 71% of adolescents in 2015 reported using Facebook (Pew Research Center, 2015), and that social networking is typically enacted in more than one domain. For instance, 93% of users on Twitter are also active on Facebook. Adolescents are using social media in order to explore their sexuality, maintain friendships, express their political opinions, and further develop communication skills (DeAndrea, Ellison, LaRose, Steinfield, & Fiore, 2012; Author, 2017; Author, 2016; Oh, Ozkaya, & LaRose, 2014; Subrahmanyam, Greenfield, & Tynes, 2004; Valkenburg & Peter, 2007). The literature indicates that SNS provide novel opportunities for identity formation, well-being, and engaging in prosocial behaviors (Davis, 2012; Huang, 2016; Utz, 2015; Wright & Li, 2011).

Research has expanded from examining the negative associations with social media use in the context of adolescent development (i.e. body dysmorphia, cyberbullying, and trafficking) to the potential benefits social media has to offer (i.e. agency, social bonding, bridging, and capital). However, further research within the field of social development is needed to identify effective online communication strategies, thereby heightening the potential social

developmental benefits of online engagement, social networking, and social capital for adolescents.

The authors apply a positive youth development and assets lens concerning the potential benefits of SNS communication in adolescents' daily social lives and relationships. Thus, we identify and explore how adolescents can employ effective communication strategies within their SNS in order to obtain online popularity (i.e. operationalized through network measures of centrality and betweenness). This study explores the social networking styles and practices among adolescents connecting three geographically distinct classroom settings located in three separate schools utilizing data from a Facebook group engaged in Youth-Led Participatory Action Research (YPAR). YPAR consists of young people, in partnership with adults, actively engaging in various stages of the research process (problem identification, data collection, and analysis), and utilizing their findings for social change (Author, 2015). In this study, we explore the communication strategies between adolescents engaged online in relation to their network positions and tendencies in relationship formation by analyzing which communication strategies are most effective in regards to soliciting "likes" or personalized feedback via the Facebook comment function.

This paper begins by reviewing the literature regarding the developmental benefits of SNS for adolescents (popularity, socio-emotional development, and communications skills), trends in the online communication styles of adults and adolescents, and the application of social network measures. Second, we utilize archival Facebook data to examine communication styles amongst adolescents. Third, employing an ordinary least-square regression (i.e. random permutations), we examine the association between communication strategies and online network popularity (i.e. degree centrality and betweenness). We conclude with a discussion on

future implications for online interventions and their potential to further adolescents' socio-emotional development.

Developmental Benefits of SNS

Recent research indicates several benefits to adolescents' engagement in SNS. These benefits include: popularity, socio-emotional development, civic engagement, and increased communication skills.

Popularity is a highly desired and sought after social status for adolescents (Zywica, & Danowski, 2008). Notably, popularity grants adolescents admittance into larger peer networks, access to diverse social activities, information and resources, and the ability to exert social pressure over others to obtain desired objectives while also promoting self-confidence (Adler & Adler, 1996; Eder, 1995, Author, 2016). Online popularity may reflect some of the social benefits of offline popularity (Subrahmanyam, & Greenfield, 2008). Adolescents have employed SNS to gain or maintain a desired social status, thereby acquiring the social clout to enforce or disseminate specific information to invoke the desired emotions, behaviors, and actions from other online users (Bonds-Raacke & Raacke, 2010; Nadkarni & Hofmann, 2012; Sheldon, Abad, & Hirsch, 2011). More introverted individuals may also be able to reap some of the advantages of popularity within online spaces as compared to offline settings (Zywica, & Danowski, 2008). Thus, in this study we operationalize popularity using social networks.

In addition to popularity, several studies have examined online participation in relation to socio-emotional development (Alloway, Runac, Qureshi, & Kemp, 2014; Author, 2017; Vossen & Valkenburg, 2016). For example, Vossen and Valkenburg (2016) examined adolescents' use of social media in relation to empathy via self-report. Their longitudinal findings indicated that

social media use was positively associated with affective empathy (i.e. ability to share the same feeling that another individual is expressing) and cognitive empathy (i.e. ability to understand how another is feeling). In other words, participants who were frequent users of Facebook displayed an enhanced ability to understand and accurately detect the emotions their peers expressed online. Findings suggest that SNS allow adolescent users to practice social skills in empathy and emotion detection with other online users, which may transfer to offline settings.

Findings also indicate that SNS can provide opportunities for self-disclosure, self-preservation, intimacy, conflict management, and social connection (Davis, 2002; Valkenburg, & Peter, 2007; Valkenburg & Peter, 2011). For instance, Davis (2002) noted through adolescent interviews that connecting and communicating with like-minded peers on SNS (in this case Facebook) promoted interviewees' perceived sense of personal identity due to their ability to disclose personal matters online (i.e. sexuality, personal politics) with compatible and like-minded peers. In this manner, adolescents utilize SNS in order to develop an online identity as well as a sense of belonging and connection to various social groups (Lips et al., 2017; Middaugh, Bowyer, & Kahne, 2016). Furthermore, adolescents gain access to vital personal information and guidance from their peers (Kim, Weinstein, & Selman, 2017). For instance, Kim and colleagues (2017) analyzed anonymous responses within an online forum and found that adolescent users frequently requested advice concerning interpersonal or romantic relationships.

Social networking and digital media can also further promote civic engagement, sociopolitical awareness, and political discussion (Author, 2017; Coleman, 2006; Patton et al., 2016). YouTube has been found to be a tool to increase adolescents' civic participation, providing young people with an accessible venue to disseminate information to larger audiences (Garcia et al., 2015). SNS can also be utilized to gather needed information and resources,

offering a venue or platform to advocate for a specific social issue of interest (Coleman et al., 2006). Additionally, as our political discourse moves into online spaces, adolescents gain the opportunity to observe and at times resolve online political debate (Middaugh et al., 2016). Patton and colleagues (2016) stress that these online experiences provide opportunities to develop citizenship in both online and offline spaces.

Lastly, adolescents engaged in SNS indicate growth in their personal communication skills and conflict management (Author, 2017; Middaugh et al., 2016). Author (2017) conducted qualitative interviews with high school students engaged in a Facebook group focused on social justice organizing. Interviewees reported perceived gains in communication skills in relation to their online engagement. Specifically, interviewees noted enhanced skills in revealing personal narrative (e.g. personalizing messages and engaging in some degree of personal disclosure) and strategically designing the content of their online post in order to invite communication from their peers (e.g. friendly language, posing questions/feedback to other online users).

While research highlights the social developmental benefits of adolescents' participation on SNS, it is limited in examining how adolescents express themselves online in order to reap these potential rewards. Thus, this study aims to shed light on an existing gap in the literature pertaining to which communication strategies promote adolescents' online popularity and relationship formation within an SNS. Based on the abovementioned findings, there is a need for further investigation concerning communication within SNS in order to identify strategies for heightening adolescent social skills, online popularity, and online relationships.

Adolescent Communication Styles & Theories

Though the literature has been scant regarding adolescents' preferences in online

communication styles, research does indicate that adolescents prefer content that requires a sense of self-disclosure and intimacy that appears in the form of positive, entertaining, or personal messages (Choi & Bazarova, 2015; Utz, 2015; Valkenburg & Peters, 2011). Author (2015) found, via qualitative interviews, that adolescents were more likely to communicate with their peers when: 1) they could relate to the content, 2) they received inviting feedback from others, and 3) they utilized social media in a creative manner (i.e. memes, artistic photographs, etc.). In the context of adult online networks, Huffaker (2010) found that popular members across 16 online interest groups (i.e. google groups) tended to exhibit lengthier, more emotionally evocative and clearer communication, as compared to other online members. These particular findings may transfer to adolescent communication strategies within SNS.

Reich (2010) discusses the possibility of creating a sense of community for online users by providing a shared interest and a common purpose for online interactions. Through surveys and focus groups with adolescents, Reich (2010) identified common themes towards promoting and elevating sense of community within an online platform. These themes include influence, membership, personal fulfilment of needs, and shared emotional connection. Although the aforementioned study was seeking to identify factors that promote a sense of online community, these themes could also be applied while examining which communication patterns promote community building or relational development within online platforms. In particular, the membership theme suggests that users value sharing their opinions regarding important topics within a supportive online setting (Reich, 2010). Thus, the more a user is able to relate to key topics within an online platform, the stronger their connections and their sense of community may be to other online users. These findings suggest that the relevance of discussion topics and communication amongst users plays a key role in community building and communication

trends. However, Reich's findings indicate that the majority of adolescents practice individualism (i.e. individuals connecting with other individuals rather than with a larger online group) when engaging in SNS. This trend may be due to a possible lack of shared interests and common purpose between online users.

The literature discussed above emphasizes the importance of exploring adolescents' online communication patterns in the context of relationship development within an online network. In this study, we examine the online communication strategies of adolescents engaged in YPAR. The unique context of our study (i.e. a private Facebook group) offers an optimal online community setting to further explore communication strategies that foster relational development. In the section below, we discuss the potential of social network analysis (SNA) in operationalizing and capturing online popularity.

Social Networks

In order to examine the communication patterns among adolescents within an online Facebook group this study employs SNA. SNA allows researchers to identify characteristics within a network and quantify the relationships embedded within them while providing a unique methodology and structural perspective for exploring relationships in association with individual characteristics (Author, 2016). For example, Wölfer and colleagues (2012) found that adolescents' understanding of empathy was tied to their social connections and positions within their classroom network. Findings indicated that adolescent participants with more social connections with classmates reported a higher understanding of the emotional state of their peers as well as a higher level of personal concern for those peers (Wölfer, Cortina, & Baumert, 2012). In order to explore adolescent popularity online, this study employs SNA to determine the

relationship between communication strategies of adolescents in association with network popularity. Popularity has been studied using SNA in past research to examine children's behaviors in relation to peer nominated networks (Author, 2016). In this study, we will measure popularity by looking at degree centrality and network betweenness to assess how central a student is within their online network. These measures are discussed in further detail below.

Degree Centrality. Degree centrality is defined by how central an individual (i.e. actor) is within a network and is operationalized based on the amount of connections an actor has out of all possible relations within a network (Freeman, 1977). Degree centrality is an essential measurement tool for network research. Specifically, it allows the researcher to determine the density of connections an individual has within a network as well as compare an actor's position within the network in relation to others (Hanneman & Riddle, 2005). Degree centrality plays a pertinent role in network studies as a quantifiable measure and proxy to popularity or social prestige (Neal & Neal, 2017). This study utilizes degree centrality to assess which adolescents hold central positions (i.e., popularity) within an online communication platform (i.e. a private Facebook group). In the context of this study, degree centrality is used to measure the positionality of adolescents (i.e., their centrality) within the online network.

Betweenness. Betweenness measures the influence an actor has between all connecting pairs of actors within a network (Freeman, 1977). Freeman (1977) describes the concept as "local dependency" due to an actor's reliance on others to connect them to one another within the network. Betweenness provides the quantitative measures necessary to identify the prominence of an actor's position within a network and has been used in research to explore the quality of student and teacher relationships (Hawe & Ghali, 2008). Additionally, betweenness has enabled researchers to locate which actors in the network would be most helpful for intervention efforts

regarding sustaining and influencing relationships within a school setting. For instance, Hawe and Ghali (2008) found that within their study on school networks, the school principal held the highest betweenness score, and thus was selected as the ideal stakeholder in disseminating intervention information. This study examines the association between students' communication strategies and influence within an online network (i.e., a private secure Facebook group).

In sum, the current study aims to examine the communication strategies of adolescents engaged in an online network conducting YPAR. The authors' intent is to explore emerging patterns in online communication, and to test if particular communication strategies predict the prominence of adolescents' online popularity and communication trends over time. Based on the literature above, we propose the following hypotheses: First, communication scores are positively associated with degree centrality and betweenness (Hypothesis 1). Next, individuals rating high in particular communication styles are significantly more likely to score high in dimensions of degree centrality and betweenness (Hypothesis 2).

Sample

The sample consisted of 54 high-school adolescents from three separate schools within an urban region participating through an SNS (i.e. Facebook). Participants were adolescents (high school freshman to seniors) who were conducting YPAR in a leadership elective course. The student-led projects focused on social issues surrounding public health, specifically focused on promoting health education (increasing access to information regarding safe sex practices), supporting isolated peers (reducing stigma surrounding depression), and improving student access to counselors (applying for a grant and petitioning the district for an additional counselor). Although the sample consists of a small number of participants, it contains a network size of

2,916 relationships (54 x 54 students) consisting of all possible relationships (present and non-existent) amongst student participants, as well as 271 Facebook posts. Within the Facebook group, participants posted comments, updates, and information regarding their YPAR project to the larger group. In order to capture students' natural perspectives, viewpoints, and communication within a SNS, online communication was not a course requirement.

Approximately 94% of the youth that were invited to the study agreed to participate (i.e. obtaining parental consent and student assent), with 53% reporting themselves as male. In regards to race and ethnicity, 36.4% of the participants identified as Hispanic or Latino(a), 32.7% as Asian, 12.7% as Black or African American, and 7.3% as White. Each school was evenly represented within the sample with 36.4% of participants from School 1, 27.3% from School 2 (27.3%), and 34.5% from School 3 (see Table 1).

Methods

This study consisted of three data sources: 1) qualitative interviews, 2) online social networks, and 3) an in-person demographics survey. Qualitative codes were initially identified through qualitative interviews with adolescent participants, and then refined through coding archival Facebook posts and comments. In the context of the SNS, the network consisted of both edges (i.e. relationships) which were operationalized as posts, likes, and comments, and nodes (i.e. actors) which were operationalized as students within the Facebook group.

Measures

Qualitative Interviews. Interviews were purposively constructed by inviting four students from each of the three schools participating in a YPAR group ($N = 12$). Interviewee selection

was strategic in that two interviewees from each school (i.e. each YPAR group) whom scored high (i.e. one standard deviation above the mean) regarding online network degree centrality ($M = 1.95$, $SD = 2.82$) were recruited, resulting in six students across all three schools. Two additional interviewees from each school who indicated low network degree centrality within the online platform were also recruited, resulting in six students additional across all three schools. This strategic sampling allowed us to examine the core communication strategies within the network from two different perspectives (i.e. high and low degree centrality). The research team applied an inductive and deductive qualitative coding approach. Codes were initially developed from a inductive approach, utilizing previous semi-structured interviews to gather statements regarding students' perspectives concerning: 1) which online posts attracted their attention, and 2) what online communication strategies they found to be particularly effective (see Author, 2016 & 2017).

Next, the research team (consisting of three coders and utilizing a deductive approach) reviewed themes that emerged from the Facebook feed ($N = 271$) and modified initial codes. Bi-weekly research team meetings focused on discussing the criterion for each code. Ultimately, the three coders independently coded 271 posts, obtaining a reliability of .80 calculated at the individual post. Any discrepancies were discussed, and re-coded using consensus across all three coders.

Social Network Analysis. Networks were created by crafting an adjacency matrix indicating present and non-existent relationships. This adjacency matrix was quality checked. Once the adjacency matrix was developed in Microsoft Excel, it was transferred into the network software UCINET (Borgatti, Everett, & Freeman, 2002). UCINET was utilized to calculate both

betweenness ($M = 1.42$, Range = .00-8.38, $SD = 1.70$) and degree centrality ($M = 20.27$, Range = .00-48.15, $SD = 12.84$) (Borgatti et al., 2002).

In-Person Survey. Demographic controls used in this study were extracted from an in-person survey implemented at the beginning of the semester-long elective course. Demographic variables within the context of this study included school, grade, and gender.

Results

Qualitative Themes. Three prominent themes emerged across semi-structured interviews. First, the theme of relevance was reported in 83% (ten of the twelve) interviews. Students described posts as catching their interest, in that they resonated with some aspect of their lives, lived experiences, or specific YPAR projects. For example, students noted similarities between challenges occurring at other schools and those transpiring within their own school.

I think there was one post about how the counselors don't have time. How it is really hard to get things done. Where you actually need to talk to a counselor, and you aren't able to talk to them. And that was one post I could relate to, because I know my school counselor is super busy with other students (Student Interview).

Alternatively, if posts were too limited in scope, obscure, or vague in detail, students were unable to relate to the online user and were less likely to spark conversation.

Furthermore, 67 % of interviewees (eight out of twelve) noted that they were more likely to communicate with their peers whom exhibited social media savviness. Pictures, video, or memes that captured social issues occurring within the school environment generated the most online conversation and interest. Students reported enjoying seeing visuals of everyday occurrences. Additionally, students noted that online images enhanced their ability to comprehend and relate to others, as compared to lengthy text-based posts. *"The pictures, they*

caught your attention, and you went to those, rather than a full block of text” (Student Interview).

Lastly, 58% of the interviewees (seven out of twelve) indicated that they were more likely to communicate if their peers posed dialogic questions, sought out additional information, or welcomed outside advice. *“I commented if anyone asked a question, like ‘what course of action you could take’, maybe from an outsider perspective, or if it was just a question, and it really was important to them”* (Student Interview). Students noted that questions or a general tone of openness within a post provided an invitation for others to offer advice and opinions, and to initiate conversation with other online users.

Communication codes were vetted, tested, and numerically operationalized utilizing archival Facebook data (posts, comments, etc.). Two coders whom were not aware of the initial themes, engaged in open coding of the Facebook feed, and were asked to analytically note thematic patterns. This open coding complimented the findings identified through the qualitative interviews. Codes were then modified and refined by examining alternative and/or negative cases. Each code was scored with a rating scale from 0 (low in a specific communication strategy) to 4 (high in a specific communication strategy) (see Table 2 for further details). The final themes consisted of: relevance to students’ lives, $M = 1.93$, $SD = 1.14$ (i.e. the extent to which the post pertained to the context of the YPAR project), social media savvy, $M = .81$, $SD = .77$ (i.e. the extent to which participants utilized images to convey information), and dialogic questions, $M = .20$, $SD = .33$ (i.e. the extent to which participants utilized questions and engaging language to solicit a response from others).

Descriptive Statistics. A bivariate correlation assessed the relationship between degree centrality, betweenness, and different types of communication strategies (i.e. relevance, social

media, and dialogic questions) utilized by participants (see Table 3). Degree centrality was significantly positively correlated with betweenness, $r(54) = .81, p < .05$, relevance, $r(54) = .40, p < .05$, and social media savviness, $r(54) = .42, p < .05$. Findings indicated that those who were more central in the network were more likely to rate higher in communication strategies pertaining to the domains of relevance and social media savviness. Additionally, betweenness was significantly positively correlated with relevance, $r(54) = .40, p < .05$, and dialogic questions, $r(54) = .28, p < .01$. Findings indicated that students who scored higher in the codes “relevance” and “dialogic questions” were more likely to indicate higher betweenness scores (i.e. connecting pairs of actors to one another within the network).

Next, two ordinary least square regressions were conducted in order to examine the role of different types of communication strategies (independent variables: relevance, social media, and use of questions) in association with measures of network popularity (dependent variables: degree centrality and betweenness). A random permutation test was employed in order to examine the statistical significance of regression coefficients. Notably, random permutation tests are recommended as a best practice in the literature for non-independent data and small sample sizes (Good, 2000). Demographic variables were coded as dummy variables (i.e. 0, 1). Therefore, reference groups included School A, and male participants.

Degree Centrality. Results from the regression indicated that the demographic controls (gender, grade, and school) were not significant predictors of degree centrality. However, participants who rated high in social media savviness ($T = 4.90, p < .05$) and dialogic questions ($T = 15.03, p < .05$) were significantly more likely to rate higher in degree centrality. Thus, adolescents who use social media and dialogic questions online tended to hold a more central position within the online network (see Table 4).

Betweenness. In addition, regression results indicated that participants who utilized dialogic questions were significantly more likely to rate higher in betweenness ($T = 1.78, p < .05$). Notably, no demographic controls were significant predictors of betweenness.

Discussion

Building on previous literature concerning the use of SNS and its impact on adolescent development, this study highlights the association between online communication strategies and online popularity (i.e. degree centrality and betweenness) within an enclosed SNS. The unique context of this study (i.e. a private Facebook YPAR group) provides the optimal setting for exploring communication strategies, as it embodies key characteristics (i.e. membership, collective purpose, etc.) identified and proposed by Reich (2010).

Results from this study suggest that adolescents utilize creative and intentional communication strategies for the purpose of connecting to larger audiences and gaining social contacts. Specifically, the use of visuals (i.e. being social media savvy) was an effective strategy in soliciting “comments” and “likes”, thereby fostering online popularity. Findings are consistent with previous research, which highlight how sharing photos in the offline world stimulates conversation between group members (ten Bhömer, Helmes, O’Hara, & van den Hoven, 2010). Similarly, online participants who shared images within the context of the group that were either irrelevant or poorly taken often formed fewer online connections (i.e. lower degree centrality). Thus, knowing the context, focus, and audience in applying social media content in an innovative manner attracted greater online communication. This trend mirrors prior research. For instance, Instagram images that reveal personal features tend to attract more communication via

“likes” and “comments” as compared to pictures without personal connection, contextual information, or identifying features (Bakhshi, Shamma, & Gilbert, 2014).

Findings also suggest that asking intentional and discussion-focused questions may serve as a forum for online discussion. This strategy facilitates adolescent users to share their opinions with other adolescent users, many of whom they have not yet formed a personal connection. Participants that asked dialogic questions were more likely to solicit online communication and feedback from others. These participants were also more likely to rate higher in two dimensions of popularity: 1) centrality (a high proportion of connections out of the entire sample) and, 2) betweenness (connecting and relaying information between pairs of online users). Additionally, findings indicate that posing an idea via post or comment to all users in an unobtrusive manner (i.e. open ended, non-abrasive questions), may have geared greater response and online discussion. Thus, the types of questions asked that solicited genuine input and discussion, and avoided judgement garnered greater online popularity. This particular skill set may be especially important as opportunity to engage in online civic discourse has become increasingly divided and siloed (Patton et al., 2016). Promoting truly dialogical questioning and insight may provide opportunities for adolescent to develop skills in digital citizenship (Middaugh et al., 2016), thereby forming communication strategies that foster productive dialogue with others from diverse backgrounds surrounding civic issues (Coleman, 2006; Third et al, 2017).

Relevance, the third communication strategy within this study, was positively correlated with both measures of popularity. However, relevance was not a significant predictor of degree centrality or network betweenness. While the majority of interviewees identified the theme of relevance as an important contributor to their communication decision-making process, they did not provide feedback concerning our qualitative codebook. Thus, our operationalization

regarding the topic of relevance may have differed subjectively from that of adolescents.

Notably, the second author was engaged in all three YPAR projects and well-versed in the online content. In addition, our coding research team consisted of undergraduate coders in their late teens. However, the nature of the relevance code may need to be further verified or even coded by adolescents engaged in the YPAR project themselves. This code may differ subjectively, as compared to identifying social media savviness and the application of clear dialogic questions.

This study is subject to several limitations. First, the sample consists of students who resided within an urban setting. It would be beneficial to examine students in rural communities. Notably, researchers have documented inequity in adolescents' access to the digital world (Garcia et al., 2015; Third et al., 2017). According to reports from the Pew Research Center (2018), rural communities rank lower in SNS use across various platforms (i.e. Twitter, Instagram, Facebook, etc.) as compared to urban and suburban areas. Future research would benefit from recruiting a larger and more geographically diverse student body to further test communication trends in relation to online popularity across unique settings (i.e. rural communities).

Second, the current study utilizes Facebook as a platform for studying communication strategies. Facebook's popularity amongst adolescents may be in decline with the advancement of newer SNS platforms such as Snapchat and Instagram (Pew Research Center, 2018). Additionally, while Twitter has been used by adolescents to connect with peers, the communication strategies used to "tweet" may differ due to recent modifications within the application. For instance, the installment of messaging other peers online in the form of Graphic Interchange Format (GIF) has recently been included. GIFs appear as moving images within a user's post or comment thread. GIFs often depict pop culture references and are utilized to

communicate message to other online users. This technological innovation in SNS may alter adolescents' preferences and communication strategies. Thus, the social media savviness code may need to be continually modified or adapted to encompass new trends in communication and online technology. We are currently replicating findings by assessing the preferred communication strategies of college students from a medium-sized university serving a rural region of Northern California. This assessment consists of mock SNS posts within an online survey formatted based on variation in the pre-existing codes. Participant responses will consist of rating likeliness to comment, re-share, or like a post.

Third, this study consisted of a group of adolescents in a private Facebook group. However, a public SNS platform offers the potential for an unlimited amount of possible relationships and exposure. Posts shared in the context of this study were private. Thus, communication strategies may vary in the context of a more public and larger online network, and ought to be further explored in future research.

Lastly, longitudinal research could examine trends in communication among adolescent users, such as whether adolescents are more likely to communicate with peers that exhibit similar communication strategies, as compared to those with limited communication skills. This information is vital to more fully understand and address disparities in online communication and relationship building.

Findings may be used to support intervention efforts targeting adolescents who struggle socially when attempting to connect with their peers. These particular adolescents may benefit from specific online education, workshops, tutorials and opportunities for skill development in utilizing effective communication strategies. Understanding one's audience as well as tapping into one's creativity, and ability to communicate in an open and engaging forum could provide

socially isolated or withdrawn adolescents with practice, and perhaps the ability to transfer these positive exchanges into offline settings.

SNS can also support adult and adolescent relationship formation (i.e. mentorship models). Researchers examining youth-centered programs from an international data set (i.e. Big Brothers Big Sisters, Friends for Youth, Youth Mentoring) found that online communication between adult mentors and adolescents was positively associated with an increase in youth involvement in the after-school program as well as stronger relationships between mentors and mentees (Lenhart, 2015; Schwartz et al., 2014). Future research could examine whether these communication strategies persist between mentorship networks, and if specific communication strategies predict the strengthening of the mentor-mentee relationships or the mentor's positionality within the online network. Research would benefit from employing longitudinal SNA to examine causal influences, providing insight on the direct associations between communication (Snijders, van de Bunt, & Steglich, 2010).

Conclusion

The field of social development has an exciting new avenue through which to explore the benefits and strategies for advancing adolescent social capital and social skills within online platforms. Future research could benefit from additional examination of communication strategies of adolescents, particularly, the communication styles of those holding popular positions within their online network. Further research is needed to examine these findings across unique geographic contexts and examine if training and intervention efforts could further address divides in online engagement.

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Table 1.

Demographics across Schools

	School A	School B	School C
Race & Ethnicity			
Native American	0%	6%	0%
Asian	52%	31%	26%
African-American	11%	19%	11%
Latino(a)	21%	31%	58%
Pacific Islander	5%	0%	0%
White	0%	25%	0%
Other	11%	0%	5%
Gender			
Male	21%	77%	64%
Female	79%	33%	46%
Grade			
Freshman	0%	13%	11%
Sophomore	11%	0%	16%
Junior	47%	58%	37%
Senior	42%	16%	37%

Note: N = 54 Students

Table 2.

Communication codes

	Mean	Range	SD	Definition	Example	0	1	2	3	4
Relevance	1.93	0-4	1.14	Post is relevant information that expresses a personal opinion using complex explanations.	<i>“Our water fountains at our school are dirty and it’s very nasty to drink out of. People spit in them, throw food, and clog up the holes and it would just be nasty. I want this to change because I would like to drink from the water fountains when I go to get water.”</i>	No text is present in the post.	The post shares irrelevant information and no personal connection is made.	The post shares relevant information, however personal voice is not utilized.	The post shares a personal connection to the information with a short description.	The post shares a personal connection to the information with a clear and personal explanation.
Social Media Savvy	.81	0-4	0.77	Post is of attention-grabbing image (i.e. unexpected occurrences from the average school experience) or popularly shared content, known as memes.		No image is present.	The image shared is blurry or irrelevant to the discussion (i.e. a student discussing mental health would not be related to images of chickens).	The image shared is of relevant content (i.e. images of the school grounds).	The image shared is of relevant content and important to the public (i.e. images containing information or elements regarding the current topic of the group).	The image shared is of attention-grabbing content or meme images that are relevant to the group discussion.
Dialogic Questions	.20	0-4	0.33	Post contains an open-ended question soliciting an answer but does not require respondent to reveal personal information.	<i>“What is important for you in school?”</i> <i>“Do you have a school counselor? What do they do?”</i>	No question in the post.	The question in the post is difficult to find.	The question in the post requires a narrow response (i.e., yes or no).	The question in the post requires a personal response.	The question in the post solicits a general answer (i.e. not too personally revealing).

Table 3.
Bivariate correlation analysis

	1	2	3	4	5
1 Degree Centrality	---				
2 Betweenness	.813**	---			
3 Relevance	.472**	.397**	---		
4 Image	.403**	.260	.417**	---	
5 Dialogic Question	.253	.277*	.196	-.199	---

$N = 54$, * $p < .10$, ** $p < .05$

Table 4.

Demographic controls and communication strategies predicting degree centrality

	Network Degree Centrality T obs.	Betweenness T obs.
Constant	9.64	
Demographic Controls		
Female	4.10	.77
Grade	-.49	-.234
School B	3.39	.451
School C	-5.89	-.201
Communication Strategies		
Relevance	2.49	.345
Social Media Savvy	4.90*	.434
Dialogic Questions	15.03**	1.78*

$N = 54$, * $p < .10$, ** $p < .05$

Random permutations were utilized to test for statistical significance.

Reference group School A, and Male.