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Being in the Know

Social Network Analysis of Gossip and Friendship on a College Campus

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Abstract
Gossip (evaluative talk about others) is ubiquitous. Gossip allows important rules to be clarified and reinforced, and it allows individuals to keep track of their social networks while strengthening their bonds to the group. The purpose of this study is to decipher the nature of gossip and how it relates to friendship connections. To measure how gossip relates to friendship, participants from men's and women's collegiate competitive rowing (crew) teams ($N=44$) noted their friendship connections and their tendencies to gossip about each of their teammates. Using social network analysis, we found that the crew members' friend group connectedness significantly correlated with their positive and negative gossip network involvement. Higher connectedness among friends was associated with less involvement in spreading negative gossip and/or being a target of negative gossip. More central connectedness to the friend group was associated with more involvement in spreading positive gossip and/or being a target of positive gossip. These results suggest that the spread of both positive and negative gossip may influence and be influenced by friendship connections in a social network.

Keywords Friendship · Gossip · Negative gossip · Positive gossip · Social network analysis

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No matter where you go on a small campus, you always seem to run into someone you know or someone you know about. Although you may not know their name, you may know an embarrassing anecdote about them through a friend of a friend of a friend. Humans are social animals; we are inherently interested in hearing about others, both in positive and negative contexts. This need to gossip serves a multitude of evolutionary and social functions, particularly with regard to indirect reciprocity (Dunbar, 1997, 2004; Engelmann et al., 2016; Foster, 2004; Hess & Hagen, 2006a, 2019; Kniffin & Wilson, 2010; Kurzban & Leary, 2001; Piazza & Bering, 2008; Rand & Nowak, 2013; Wu et al., 2016b). Here, we investigate whether gossip influences friendships.

Gossip, a form of evaluative communication about absent others (Foster, 2004), always involves at least three individuals: the gossiper, the social target (i.e., the topic of gossip), and the audience (Peters & Kashima, 2007). Gossip is an essential form of knowledge that can facilitate survival in spotting potential dangers; it becomes a part of social learning when direct observation is no longer enough (Baumeister et al., 2004; De Backer et al., 2007; Sommerfeld et al., 2007). It allows bonds to be strengthened based on mutual interest and exchange of information that may be useful for the group (Peters et al., 2017). In addition, gossip serves to increase the size of one's social network and the amount of available knowledge in that network.

The dynamics of social networks and the boundaries between distinct social networks are heavily influenced by reputational information. Reputational gossip can allow us to form coalitions with our allies and to destroy others' reputations by spreading negative information about them (Barkow, 1992; Hess & Hagen, 2006b, 2019). Within the evolutionary psychology literature, such verbal aggression has been called "informational warfare" (Hess & Hagen, 2019, p. 276). Gossip is particularly useful in within-group competition given the high costs of physically aggressing against ingroup members (Hess & Hagen, 2019).

Gossip can also be useful for maintaining a positive image of oneself and one's ingroups (McAndrew & Milenkovic, 2002). According to the competitor derogation perspective, gossip can be used to enhance the self or group perception through highlighting the positive qualities of the self (or the group) or through highlighting the negative qualities of others (Buss & Dedden, 1990; Krems, 2016; Vaillancourt & Krems, 2018; Wyckoff et al., 2019). This helps to explain why people seek out negative gossip and spread negative gossip about rivals to damage competitors' reputations (Buss & Dedden, 1990; McAndrew & Milenkovic, 2002; McAndrew et al., 2007). In addition, people seek out and spread positive information about their allies (McAndrew et al., 2007). Although negative gossip is similar to another form of competitor derogation—namely, trash-talking (publicly insulting an opponent)—they differ in several ways (see Kniffin & Palacio, 2018). For instance, trash-talking is generally directed at opponents, and more publicly, whereas negative gossip can be directed toward in-group members as well as opponents (Kniffin & Palacio, 2018; Yip et al., 2018).

Alongside its uses for policing perceptions of character, gossip is employed to teach and enforce a group's norms. The possibility of being gossiped about negatively keeps individuals accountable for upholding normative expectations (Boehm,

2012, 2014; Feinberg et al., 2012; Kniffin & Wilson, 2005; Wilson et al., 2000). While negatively valenced gossip serves to deter people from violating group or societal rules (Feinberg et al., 2014; Kniffin & Wilson, 2005, 2010; Wilson et al., 2000), positive gossip serves to motivate individuals to stay true to their commitments and maintain their reputations (Feinberg et al., 2012; Jacquet et al., 2011). This allows groups to maintain cooperation. When groups are working toward a joint goal (such as winning a tournament or getting a bonus), both positive and negative gossip keeps group members accountable (Kniffin & Wilson, 2005, 2010). Thus, gossip serves as a tool to regulate relationships and identify potentially untrustworthy targets within a society (Kniffin & Wilson, 2010; Peters & Kashima, 2015).

Despite the many benefits of gossip, there are numerous detriments as well. Because sharing information about others' immoral acts is a critical element of partner control and partner choice, gossip often functions to shame and embarrass others (Boehm, 2012; Kniffin & Wilson, 2005, 2010). Thus, while gossip has the potential to protect one from untrustworthy individuals, it can also shatter the reputations and likability of gossip targets in lasting ways (Jaeger et al., 1994; Zhu & Smith, 2016). Gossip has the ability to spread doubt throughout a population quickly as well as to mark a subject as being untrustworthy (Piazza & Bering, 2010). Stigmatization and ostracism are frequently used as punishments both for the targets of negative gossip (Feinberg et al., 2014; Kurzban & Leary, 2001) and for gossipers who devalue others (Zhu & Smith, 2016). While gossiping can create and strengthen social ties (Dunbar, 1997; Ellwardt et al., 2012; Misch et al., 2016), those who are perceived as gossipers have fewer friends (Ellwardt et al., 2012; Jaeger et al., 1994).

Gossip's influence on friendship connections is likely higher in small, tight-knit groups, in which personal information can quickly spread and become common knowledge (von Rueden & van Vugt, 2015). To date, however, few have investigated the role of friendship in small groups such as same-gender athletic teams (Tape, 2019) and sororities (Jaeger et al., 1994). Although Jaeger et al. (1994) investigated gossip in a sorority setting, the study was limited in its applicability to different contexts of mixed-gender environments. Furthermore, Jaeger et al. (1994) did not distinguish between positive and negative gossip in their study. Given gossip's bad reputation, it is crucial to differentiate positive from negative gossip and how they may be distinctly related to friendship connections.

The purpose of this study is to decipher the nature of gossip and how it relates to friendship connections. In order to interpret the connectivity of a closed social group, we used social network analysis. Social network analysis allows researchers to make claims about the structure of the social interrelationships among a group of individuals (see Wasserman & Faust, 1994; also see Table 1 for definitions of key terms). Often, the emphasis in social network analysis is on the *centrality* of any given individual, where it is assumed that individuals who are central to a network have more connections and are therefore more prominent in the network.

Centrality is measured in a variety of ways; however, the current study will focus on degree, strength, and eigencentrality. *Degree* and *strength* are centrality measures that capture the number of connections an individual has with others. Grosser et al. (2010), for instance, used degree and strength to assess the relationship between several social variables—namely, how many friendship ties each

Table 1 Definitions of key terms

Term	Definition
Centrality	Individuals who are central to a network have more connections and are therefore more prominent in the network
Degree	A centrality measure that captures the number of connections an individual has with others. Degree is only used with networks that have binary relationships (i.e., the edge is either present or absent). The sum of all present edges are taken
Directed network	A network with at most two unidirectional edges between nodes which reflect directed relationships. Directed networks have an asymmetric adjacency matrix
Edge	Represent connections between these individuals in a network. Edges are represented with lines in social network graphs
Eigencentrality	A centrality measure that captures the prestige of an individual
Node	Represent individuals in a network. Nodes are represented with circles in social network graphs
Prestige	The idea that individuals with connections to other well-connected individuals should be considered more central than those without those connections
Strength	A centrality measure that capture the number of connections an individual has with others. Strength is only used with weighted networks, which have weighted edges. The sum of the magnitudes of all present edges are taken
Undirected Network	A network with bidirectional edges that represent a single value reflecting the relationship between these nodes. Undirected networks have a symmetric adjacency matrix
Unweighted Network	Unweighted networks have lines which are either present or absent between individuals. The original data are dichotomous
Weighted Network	Weighted networks have lines of differing magnitudes, where each magnitude depends on the rating from a variable that has more than two response options. The original data are polytomous (i.e., there are multiple response options)

individual has and how many people they gossip about. They found that positive and negative gossip were both transferred among friends, but only positive gossip was transferred among workplace partners. *Eigencentrality* (or eigenvector centrality), on the other hand, captures the prestige of an individual. Prestige is the idea that individuals with connections to other well-connected individuals should be considered more central than those without those connections. Although prominent in social network analysis, eigencentrality has yet to be used to understand the relationship between friendship and gossip.

Given theoretical work on how gossip influences reputations and promotes bonding with trustworthy others (Foster, 2004), we hypothesized that one's overall centrality in the positive gossip network should positively correlate with their centrality in the friendship network, whereas one's overall centrality in the negative gossip network should negatively correlate with their centrality in the friendship network. That is, the extent to which a person is gossiped about by and/or gossips about others should be associated with many friendships if this gossip is positive, but few friendships if this gossip is negative. We also hypothesized that one's overall centrality in the positive gossip network should correlate with their centrality in the negative gossip network. Although we did not have a directional

hypothesis, we expected the two different types of gossip behaviors to relate to one another. It is possible that people who are central in the positive gossip network are also central in the negative gossip network. Such findings could indicate that gossips indiscriminately gossip about others or that the same people are positively and negatively gossiped about. However, it is also possible that people who are central in the positive gossip network are less likely to be involved with the negative gossip network. The former case is associated with a positive correlation between positive and negative gossip centrality, and the latter is associated with a negative correlation between positive and negative gossip centrality.

Further, we analyzed how being a gossiper or a target of gossip relates to being labeled as a friend or how many friends people claimed to have. However, because we did not have any specific hypotheses about these analyses, we present these analyses as exploratory.

Method

All data and scripts for this study are available at: https://osf.io/95q82/

Participants

Participants were 45 undergraduate students who constituted the membership of men's and women's crew teams at a small liberal arts college in the United States. Participants were not asked to report their ages to keep their data anonymous, but they were all likely between 18 and 22 years old. One male participant was excluded from the final sample because he did not complete the survey. The final sample consisted of 24 females and 20 males.

Procedure

Participants were asked to provide information at two different time points. Participants were first contacted and asked to sign a consent form to be included on the Gossip Roster, the purpose of which was to draw connections between all members on the men's and women's crew teams. They were then subsequently asked to sign the Informed Consent Form and fill out Gossip Roster questionnaires through Qualtrics at a separate scheduled time. Compensation in the form of a team gift was offered to the team collectively, contingent upon at least 85% of members participating in the study.

A roster was created containing the names of individuals on both the men's and women's crew teams. The purpose of the roster was to draw connections within this network and decipher which individuals were gossiping about other members on the team and which team members were being gossiped about. Participants were asked about how often they gossiped positively about each member on the team (with responses ranging from 1, Do not gossip about individual at all, to 7, Gossip about this individual on a daily basis) and how often they gossiped negatively about each

member on the team questions (with responses ranging from 1 to 7). They were also asked a simple Yes–No question about whether they considered each team member to be a friend.

Several additional questions were administered but are not discussed further in this paper. Participants were asked about how often they gossiped about the sexual activities of other members on the team or attempted sabotage; however, because these activities were infrequent, and because these questions were exploratory, we present findings only in the Electronic Supplementary Material (ESM). Additionally, in order to explore the associations between gossip and subjective well-being, participants completed the General Well-Being Schedule (Fazio, 1977) and the R-UCLA Loneliness Scale (Russell et al., 1980). Again, because this issue is beyond the scope of the present paper, we present findings in the ESM.

Participants were first presented with the R-UCLA and General Well-Being Schedule (in random order), followed by questions about gossip for each member of the team (negative, positive, and hookup-related gossip questions were presented in random order), followed by questions about hookups and friends on the team (in random order), followed by questions about sabotage and number of sexual partners during college.

Full anonymity was ensured as follows. Once data collection was complete, and before looking at any of the data, the senior author ran a previously prepared syntax file to anonymize any identifiable information and randomly assign each participant a 5-digit number. All previous copies of data that contained identifiable information were immediately deleted, and only then was the rest of the research team granted access to the data.

Analysis

We used social network analysis to better understand the structure of friendship and gossip networks as they relate to each other. Social network analysis treats each person as a "node" and connections between these individuals as "edges." Social networks can be modeled in several ways. For instance, the line (or edge) connecting any two people (or nodes) in the network may be represented by a single value that reflects the relationship between these people. This kind of network is undirected. In that case, the relation between Person A and Person B is the same as the relation between Person B and Person A. However, it may be that these relations are not equivalent. For example, Person A may see Person B as their friend, but Person B may not see Person A as their friend. In this situation, the network is directed. Whereas undirected networks are the result of pairwise information that is reciprocal between individuals, directed networks may occur with data where each individual is asked to rate every other individual on some variable of interest. Since directed networks provide more nuanced information, we rely on these in the present study.

Another possible distinction occurs with weighted and unweighted networks, which depends on how the lines connecting individuals are measured. Unweighted networks have lines which are either present or absent between individuals, and the data is dichotomous. For example, if Person A reports Person B as their friend, there

will be a (directed) line from Person A to Person B, showing the presence of a relation. However, if Person B does not report Person A as their friend, there will not be a line from Person B to Person A. Weighted networks, on the other hand, have lines of differing magnitudes, where each magnitude depends on the rating from a variable that has more than two response options. For example, if Person A reports frequently talking with Person B, but Person B does not report frequent interactions with Person A, there will be a stronger connection from Person A to Person B than Person B to Person A. The current study uses both weighted and unweighted networks to model data.

A benefit of using social network analysis is that it allows researchers to aggregate relationships in a network. One such way of aggregating the relationships is by measuring which individuals are more prominent in the network, termed *centrality* (Barrat et al., 2004; Bonacich, 1972, 1987; Bringmann et al., 2019; Freeman, 1978). In our study, we captured two network centrality parameters from each network: degree or strength (depending on the network) and eigencentrality.

Degree and strength both capture counts of connections between individuals. *Degree* is used for unweighted networks, where any given edge between two individuals is either present or absent. Here, the number of connections is simply summed (Bringmann et al., 2019; Freeman, 1978). With directed networks, it is relevant to count the number of incoming edges and the number of outgoing edges separately. These are referred to as *in-degree* and *out-degree*, respectively. Since friendship ratings were collected as binary data, out-degree is a count of the friendship connections that a participant reported, and in-degree is a count of the friendship connections which other participants reported about that participant. *Strength* is used for weighted networks—in other words, when gradation exists in the response options (Barrat et al., 2004; Bringmann et al., 2019). Here, the sum of the strength of each relevant edge is taken instead of the presence or absence of the edge. Similar to degree, *in-strength* and *out-strength* can be calculated for directed networks. Since the positive and negative gossip ratings were measured on a 7-point Likert-type scale, in-strength is calculated as a measure of the strength of the incoming positive or negative ratings for each participant, and out-strength is calculated as a measure of the strength of the outgoing positive or negative ratings for other participants from that participant.

Eigencentrality, on the other hand, considers individuals with connections to other well-connected individuals to be more central than individuals without those connections (Bonacich, 1972, 1987, 2007; Bonacich & Lloyd, 2001). By doing so, eigencentrality captures relationships between directly connected nodes and also nodes connected indirectly by association with well-connected nodes. Eigencentrality values will differ from degree and strength in cases where, for instance, an individual is connected to many other poorly connected individuals or to few well-connected individuals. A single, overall centrality value for each individual is determined, which aggregates across all incoming and outgoing relationships in directed networks. This single value is bounded between 0 and 1, where 0 indicates no connections and 1 indicates connections to all other nodes. For the current study, eigencentrality captures the general centrality of a participant with respect to all other participants in the network.

The analyses for all hypotheses follow the same general framework. First, directed networks were produced using the *qgraph* package in R (Epskamp et al., 2012), where nodes represent participants and edges represent ratings of other participants. These networks are directed because each participant was asked to rate every other participant, and ratings were not always symmetrical. Ratings are represented as directed edges between nodes and seen in the network as one-headed arrows. Relevant centrality metrics were calculated for each of the three networks.

Standard Pearson correlations were used to assess the relationship between centrality parameters. To test our hypotheses, correlations were conducted between (1) friendship network eigencentrality and positive gossip network eigencentrality; (2) friendship network eigencentrality and negative gossip network eigencentrality; and (3) positive gossip network eigencentrality and negative gossip network eigencentrality. Given that eigenvector centrality does not distinguish between incoming and outgoing ties within the network, further exploratory analyses were conducted to test the correlational relationships between the in- and out-degree of the friendship network, the in- and out-strength of the positive gossip network, and the in- and out-strength of the negative gossip network. Taken together, these exploratory correlations give a more detailed picture of the relationships between friendship and gossip.

Results

Description of Networks

Network graphs can be seen in Figs. 1, 2, and 3. Because these networks are directed, at most two one-headed arrows can exist between an individual and any other individual. Note also that individuals closest to the center of the graph are more centrally connected than those further from the center. Members of the men's rowing team are indicated as blue nodes in the graph; members of the women's rowing team are indicated as orange nodes. Although in all three network graphs the two gendered teams are highly interconnected, the male team and the female team are heterogeneously distributed in each graph based on their patterns of connectedness.

Friendship Network

Visual inspection of the graph in Fig. 1 suggests that the friendship network has well-connected nodes. The density of the friendship network—the number of edges present in the graph divided by the total number of possible edges—was 0.54, indicating that more than half of the possible connections between individuals were present. Given that this network is unweighted, each connection can be interpreted as the presence or absence of a reported connection between two individuals.

Positive Gossip Network

The positive gossip network graph can be seen in Fig. 2. This graph is directed and weighted. The thickness of the connection between any two nodes represents the

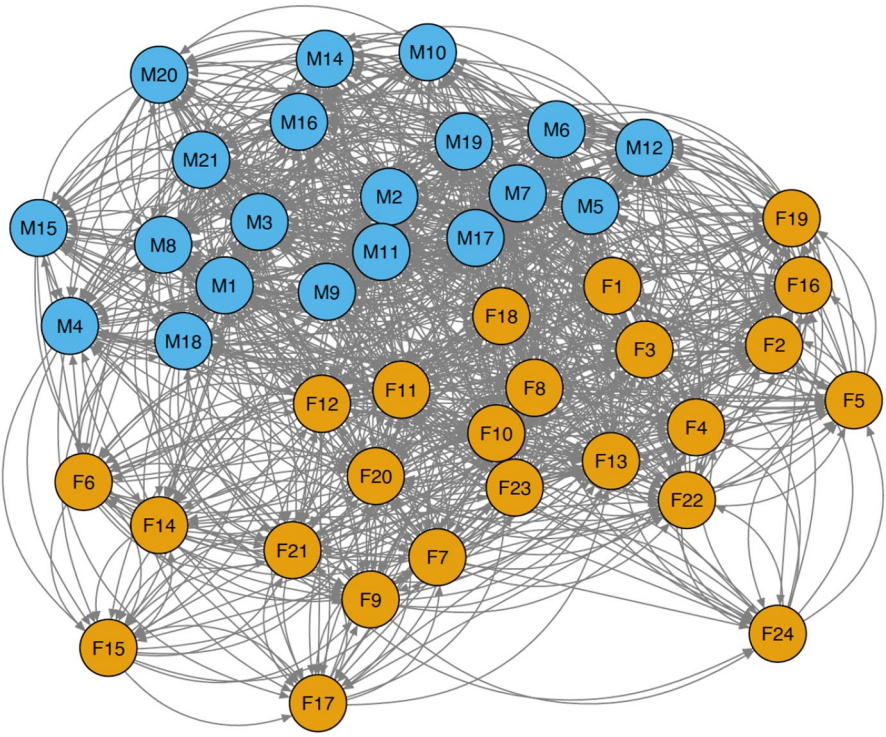

Fig. 1 Friendship network. These social network data consist of connections among the men (blue circles) and women (orange circles) of the collegiate athletic team and the number of Friendships on the team. The image has a dense amount of both one-directional arrows, which indicates a large number of connections and a very closely-knit team

magnitude of the rating one individual has given another. A lack of connection indicates a rating of zero. Therefore, the connections that exist demonstrate the extent to which individuals in the network have gossiped positively about others. The connections with higher magnitudes appear to be among the centralized nodes. The positive gossip network exhibited a density of 0.35, suggesting that the positive gossip network is less dense than the friendship network.

Negative Gossip Network

The negative gossip network graph, in Fig. 3, is also directed and weighted. Connections indicate the presence of negative gossip at some magnitude determined by the thickness of the edge. As with the positive gossip network, the higher-magnitude connections are among nodes in the center of the negative gossip network. The density of

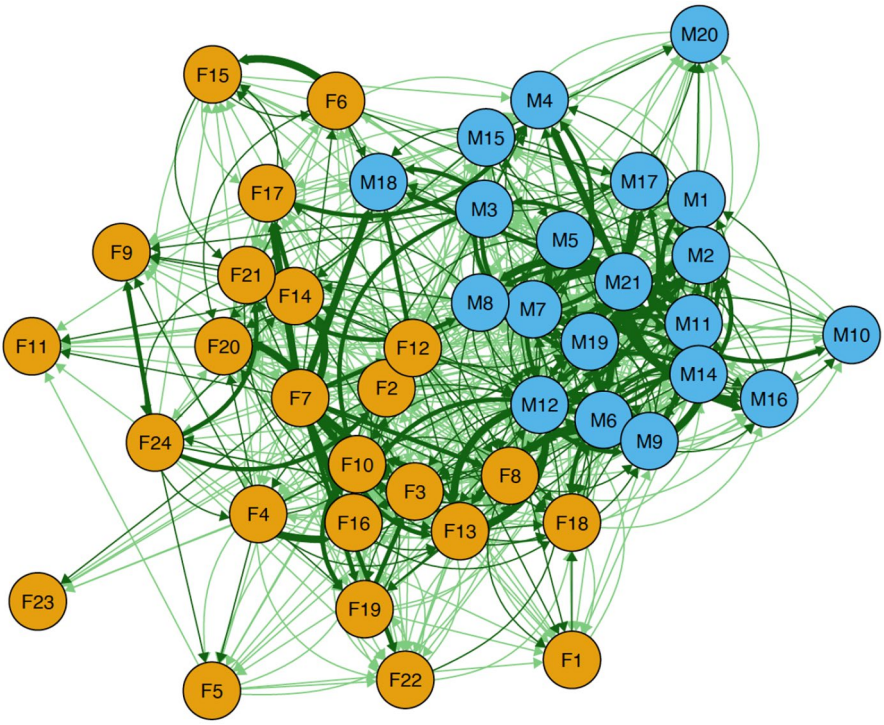

Fig. 2 Positive gossip network. These social network data consist of connections among the men (blue circles) and women (orange circles) of the collegiate athletic team and the amount of Positive Gossip. The dense amount of connections indicates that there is a large amount of Positive Gossip on the team

the negative gossip network was 0.16 and was therefore sparser than both the friendship network and the positive gossip network.

Eigencentrality Analysis

Friendship Network and Positive Gossip Network

Participants' friendship network eigencentrality ($M = 0.66$, $SD = 0.21$) positively correlated with their positive gossip network eigencentrality ($M = 0.42$, $SD = 0.26$), $r = 0.88$, $p < 0.001$. Thus, the more centrally connected an individual was to nearby friends, the more central that individual was to the spreading and receiving of positive gossip.

Friendship Network and Negative Gossip Network

The eigencentrality values for the negative gossip network were square-root transformed so this variable met the assumption of normality. Participants'

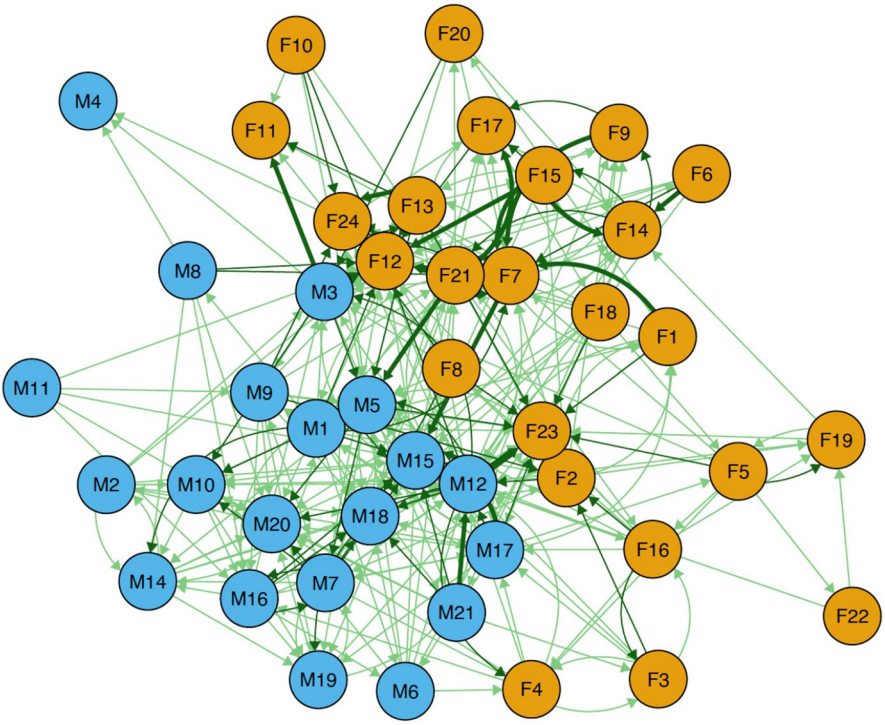

Fig. 3 Negative gossip network. These social network data consist of connections among the men (blue circles) and women (orange circles) of the collegiate athletic team and the amount of Negative Gossip. The dense amount of connections indicates that there is Negative Gossip on the team

friendship network eigencentrality negatively correlated with their negative gossip network eigencentrality ($M = 0.45$, $SD = 0.25$), $r = -0.30$, $p = 0.046$. Therefore, the closer to center an individual was among their friends, the less central that individual was in spreading or receiving negative gossip. Similarly, this means that individuals who were central in the flow of negative gossip were less likely to be the center of the friendship connections.

Positive Gossip Network and Negative Gossip Network

As with the previous analysis, the negative gossip network eigencentrality values were square-root transformed to meet the assumption of normality. An individual's centrality in spreading negative gossip and/or being the target of negative gossip did not significantly correlate with their centrality in spreading positive gossip and/or being the target of positive gossip, $r = -0.25$, $p = 0.101$. If anything, individuals centrally involved in the transfer of negative gossip or who had been targeted by negative gossip were somewhat *less* likely to be individuals

who were centrally involved in the transfer of positive gossip or who had been the target of positive gossip.

Exploratory Analysis of In- and Out-degree Correlations

Table 2 gives the correlations between the in- and out-degree metrics for the friendship network and the in- and out-strength metrics for the positive and negative gossip networks. Outgoing positive gossip and incoming negative gossip metrics were square-root transformed to preserve the normality assumption. Significant positive correlational relationships were found between incoming positive gossip and incoming friendship, between outgoing positive gossip and outgoing negative gossip, and between incoming positive gossip and outgoing negative gossip. Additionally, significant negative correlational relationships were found between incoming negative gossip and incoming friendship, and between incoming negative gossip and incoming positive gossip. These exploratory results suggest several findings: that those who gossiped about others positively were more likely to also gossip about others negatively; that those who were positively gossiped about were more likely to be rated as a friend and also more likely to gossip negatively about others; and that those who were negatively gossiped about were less likely to be rated as a friend and also less likely to be positively gossiped about.

Discussion

Gossiping is a complex behavior that takes up about 52 min of each day (Robbins & Karan, 2019). Through gossiping with others, we create new connections, strengthen existing connections we have with others, and stay informed about the happenings in our environment. Furthermore, spreading positive gossip about our allies and negative gossip about our competitors allows us to enhance our perceptions of ourselves and our ingroups, and to diminish our perceptions of competitors (Barkow, 1992; Buss & Dedden, 1990; Hess & Hagen, 2006b, 2019; McAndrew et al., 2007; Wyckoff et al., 2019). In sum, gossip serves as an important tool for our self-esteem and survival in social groups. Given the importance of gossip in the creation and

Table 2 Correlation table of in-degree (or in-strength) and out-degree (or out-strength) for friendship, positive gossip, and negative gossip networks

Measure	1	2	3	4	5	6
1. Incoming friendship	–					
2. Outgoing friendship	0.20	–				
3. Incoming positive gossip	0.84***	0.21	–			
4. Outgoing positive gossip (sqrt)	0.19	0.02	0.22	–		
5. Incoming negative gossip (sqrt)	−0.38*	−0.04	−0.32*	0.15	–	
6. Outgoing negative gossip	0.27	−0.11	0.33*	0.47**	0.05	–

Some items were square-root transformed to meet the assumption of normality

*$p < .05$; **$p < .01$; ***$p < .001$

maintenance of relationships, it is crucial to investigate how gossip may influence friendship connections in small, tight-knit groups. The study presented here sheds light on the many instances of positive and negative gossip in small groups.

The use of social network analysis to illustrate the relationship between friendship centrality and gossip centrality is a notable aspect of our study. Using social network analysis, we found that the college athletes' friend group connectedness significantly correlated with their positive and negative gossip network involvement. Here, the connections between individuals were used to determine the prominence of an individual with regard to their friendship with others and their involvement in gossip. This was done with the eigencentrality metric and institutes a novel approach to understanding gossip networks due to its emphasis on aggregating directional information into general, nondirectional relationships. In- and out-metrics, a more traditional approach to making claims about gossip networks, supplemented the interpretation of centrality in these networks. Together these approaches provide information about the relationships in gossip networks that have yet to be explored.

We found that the fewer friendship connections one had, the more central and prominent they were as spreaders and/or targets of negative gossip. Upon closer inspection, we found that people who were negatively gossiped about more often had fewer people list them as a friend, supporting the notion that gossip can be used to facilitate partner choice. For positive gossip, the more friendship connections one had, the more central and prominent they were as spreaders and/or targets of positive gossip. Further analyses revealed that people who were positively gossiped about more often had more people list them as their friend, suggesting again that gossip may be used as a mechanism for partner choice, and that this may be true regardless of valence. Together, these findings at the broad network level and concerning only incoming connections support our claim that people's friendships were highly associated with how positive and negative gossip was exchanged in the network.

The degree to which people reported positively or negatively gossiping about others did not relate to their friendship connections. It is possible that, because positive gossipers also tend to be negative gossipers, gossip does not straightforwardly influence one's reputation as kind or mean. Alternatively, classifying gossip as "positive" or "negative" may not be sufficiently fine-grained to capture certain nuanced ways in which gossiping can influence status and friendships. For example, some negative gossip may be considered valuable information, while other pieces of negative gossip may be perceived as solely hurtful.

An individual's centrality in the positive gossip network did not correlate with their centrality in the negative gossip network. Yet, noteworthy findings emerged when we looked more closely at people's incoming and outgoing gossip behaviors separately. First, people who were more negatively gossiped about had fewer teammates positively gossip about them (and vice versa). This result makes intuitive sense considering the primary evolutionary function of gossip: reputation management (Wu et al., 2016a, 2016b). Those who have a good reputation have fewer instances of negative gossip being spread about them in the network, and those with a bad reputation have fewer instances of positive gossip being spread about them in the network. This complements previous findings that people who are frequently

gossiped about are rated as less likable than those who are less frequently gossiped about (Jaeger et al., 1994).

Additionally, people who positively talked about their teammates also negatively talked about their teammates. This may indicate the presence of gossipmongers who positively and negatively gossip. It is also likely that teammates typically exchange positive *and* negative gossip depending on the situation. Indeed in workplace settings, friends engage in both positive and negative gossip rather than strictly gossiping negatively or positively (Grosser et al., 2010). An interesting avenue of research would be to examine personality trait differences among those who gossip positively and negatively and among those who strictly gossip either negatively or positively.

In our sample, people who negatively gossiped about others tended to be targets of positive gossip. Although we were not expecting such a result, this finding may make sense in the case where the negative gossipers have a higher status. Perhaps high-status gossipers can afford to talk negatively about others without damaging how they are being talked about. Although this study did not investigate the impressions people may form about high-status and low-status gossipers, others have found that higher-status individuals spread less negative gossip to lower-status individuals than lower-status spread to higher-status individuals (Martinescu et al., 2019). This finding is further supported by a recent social network study with Tsimane hunter-forager men indicating that men of lower status cooperate more with men of higher status to increase their status (von Rueden et al., 2019). In college samples, high social status may similarly relate to an increased spread of negative information about others without the fear of repercussions.

Caution should be exercised when attempting to generalize findings across cultures, however. Even in other industrialized nations, gossip may operate differently. For example, Turkey has an institutionalized setting ("day of gold") in which groups of women gather with the explicit purpose of spreading gossip, which may differentially shape patterns and outcomes of gossip (see Ekal, 2006). Additionally, although gossip is a widespread form of social sanctioning in many small-scale societies (Boehm, 2012), partner choice may not loom as large in these societies as it does in large-scale societies (Smith & Apicella, 2020), which could also lead to prominent differences in how gossip regulates social networks and friendships. Further studies with more diverse samples and cross-cultural approaches will be critical for gauging the degree to which the nature of gossip and its impacts vary across populations (e.g., Barrett, 2020; Heine & Norenzayan, 2006; Henrich et al., 2010; Hruschka et al., 2018).

Future work should additionally incorporate data on neutral gossip, given that non-valenced gossip is much more frequent than valenced (positive or negative) gossip (Dunbar et al., 1997; Robbins & Karan, 2019). It is possible that the frequent negative or positive gossip in the current network could indicate instability among team members. Past research with rowing teams found that groups' tendencies to gossip fluctuated over time, and increased during periods of discord—both in terms of more negative gossip toward noncooperative members and in terms of more positive gossip toward cooperative members (Kniffin & Wilson, 2005). Because our study is not longitudinal, we could not capture such fluctuations in gossip or social

networks. We look forward to future research that expands past a single snapshot of one particular tight-knit network of students.

In conclusion, gossip is an evolutionary and social tool that is ubiquitous in society and that has the potential to define our relationships for better or worse. Although gossip is often perceived to be negative, both positive and negative gossip play an important role in how we create and maintain relationships with others. This study highlighted the prevalence and importance of positive and negative gossip as it relates to friendship connections. Our findings add to the growing literature on the potential benefits of engaging in positive gossip. Such distinctions between positive and negative gossip are particularly important for parents and educators to emphasize to children that, when used appropriately, gossip can be helpful rather than harmful.

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Data Availability All data and scripts for this study are available at: https://osf.io/95q82/

Declarations

Conflict of interest The authors declared that they have no conflict of interest.

Ethical Approval The questionnaire and methodology for this study was approved by the Human Research Ethics committee of the Franklin & Marshall College, on 02/07/2017 for the application #R_z8tMp5lSWgH7STL.

Consent to Participate Informed consent was obtained from all individual participants included in the study.

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