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More than one's negative ties: The role of friends' antipathies in high school gossip☆

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ABSTRACT

Gossip is universal, and multiple studies have demonstrated that it can have beneficial group-level outcomes when negative reports help identify defectors or norm-violators. Gossip, however, seldom happens in a social vacuum. Instead, it is enmeshed in a fabric of positive and negative relationships that creates opportunities, constraints, and also motives to gossip. This article studies the importance of friendships and antipathies among the three concerned parties (sender, receiver, target) for negative gossip among adolescents. We contrast two theoretical accounts. According to the first, gossip brings closer individuals who have "enemies" in common. Based on this, we infer that gossip appears in triads where both the sender and receiver share their antipathy against the target. The second position argues that gossip is used to compromise different opinions of friends towards the target. Thus, what predicts gossip is direct antipathy against the target or being friends with someone who dislikes the target (indirect antipathy) rather than the combination of the two antipathies. We test these two lines of reasoning with sociometric data from 17 classroom observations (13 unique classrooms in different time points) in Hungary. Bayesian Exponential Random Graph Models yield support for direct antipathy in 13 (nine unique) classrooms and indirect antipathy in five. No evidence for shared antipathy is found. Results suggest that, at least among adolescents, negative gossip is not about bonding with potential allies but more about consensus-making between friends. Also, results reveal that negative gossip concentrates on the two ends of the reputational echelon, hinting that, in the classroom, high reputation might be contested instead of rewarded.

1. Introduction

In scientific literature, *gossip* refers to informal communication about a third person who is not present (Dores Cruz et al., 2021; Foster, 2004). The focus of interest is often restricted to the transmission of *evaluative information* from a sender to a receiver about the absent target (Eder & Enke, 1991; Hallett et al., 2009; Sabini & Silver, 1982; Wert & Salovey, 2004). Gossip seems to be universally present in all human groups and accounts for a substantial portion of verbal communication (Dunbar et al., 1997; Emler, 1994). The pervasiveness of gossip has been attributed to its multifaceted nature as it can serve many purposes: flagging norm violators, defaming competitors, venting negative emotions, sharing insights, entertainment, or strengthening social bonds (Beersma et al., 2019; Beersma & Kleef, 2012; Dunbar, 1998; Mills, 2010; Peng et al., 2015; Waddington, 2005). Gossip is not just universal but also essential for the social orientation of individuals and for achieving group-beneficial outcomes, such as cooperation and social order (Feinberg et al., 2014; Kniffin & Wilson, 2010; Wu et al., 2016). Gossip also has its downsides, concerning wrecking the reputation and social exclusion of the target (Feinberg et al., 2012; Jaworski & Coupland, 2005; Kisfalusi, Takács, et al., 2019). The recognition of its universality and its consequences for the individual and the group brought gossip

Abbreviations: BERGM, Bayesian exponential random graph model; ERGM, Exponential random graph model; GoF, Goodness of fit; GWESP, Geometrically weighted edgewise shared partners; LR-QAP, Logistic regression test with a quadratic assignment procedure; RECENS, Research Center for Educational and Network Studies.

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into the spotlight of interdisciplinary research interest (Giardini et al., forthcoming; Giardini & Wittek, 2019b; Számadó et al., 2021).

Although many researchers advocate a definition of gossip that encompasses information with any tone or valence (Brady et al., 2017; Dores Cruz et al., 2021; Michelson et al., 2010; Robbins & Karan, 2020), gossip with a *negative valence* deserves special attention. Several reasons motivate this particular interest. First, negative information is easier to recall and potentially outweighs its positive counterpart (Pratto & John, 1991; Rozin & Royzman, 2001). More important still, its effects on the target's reputation (Hauke & Abele, 2020; Kisfalusi, Takács, et al., 2019), social inclusion (Jaworski & Coupland, 2005; Martinescu et al., 2021) as well as the emotional bonding between the sender and receiver (Bosson et al., 2006; Peters et al., 2017) seem to be substantial. All the above seems to be the case particularly when negative gossip is not just an expression of spontaneous disapproval but a reiterated action. Here we focus only on gossip with negative valence, hereafter referred to as "negative gossip" or simply "gossip".

Why do individuals gossip negatively about others? To answer this question, our point of departure is that gossip needs to be addressed beyond a pure sender-based perspective. Some explanations highlighted in the literature are directly related to the target's behaviour, particularly those flagging norm violations, cheating, or free-riding (Fehr & Sutter, 2019; Feinberg et al., 2014; Fonseca & Peters, 2018; Samu et al., 2020). In this sense, gossip can be seen as an indirect and cheap way of punishing deviant actions (Becker, 1963; Feinberg et al., 2012; Giardini & Conte, 2012; Kniffin & Wilson, 2005; Malinowski, 1926). Next to the target's behaviour, previous scholarship has remarked on the importance of interdependencies between the three gossip parties: the *sender*, the *receiver*, and the *target*. For instance, affective interdependence between the sender and receiver helps solve the problem of trust (Burt, 2000), facilitating the sharing of sensitive information between these two (Grosser et al., 2010). On the contrary, strong affection between the sender and target is likely to increase the salience of solidarity norms proscribing to harm each other (Giardini & Wittek, 2019a). Thus far, however, previous scholarship has addressed interdependencies only as enablers or constraints for the occurrence of gossip (Burt & Knez, 1995; Gambetta, 1994; Giardini & Wittek, 2019a). Furthermore, most gossip research has examined the effects of positive types of ties exclusively (Ellwardt et al., 2012; Grosser et al., 2010; Yucel et al., 2021), leaving *negative ties* (Harrigan et al., 2020; Labianca and Brass, 2006; Offer, 2021; Righi and Takács, 2014) unattended. What we maintain is that, by examining positive and negative ties within the gossip triad, one can also shed light on the social mechanisms that motivate gossip: bonding with enemies' enemies, influencing others' opinions, or conforming to those of friends.

This study contraposes two theoretical accounts. According to the first, gossip is chiefly a *social bonding* mechanism (Burt, 2001; Dunbar, 1998; Peters et al., 2017), which brings closer individuals who have "enemies" in common (Bosson et al., 2006; Hess, 2017). The second approach upholds that gossip is rather used for *building consensus* about the target. Specifically, negative gossip is used to either convert others to one's antipathy towards the target (Halevy et al., 2019) or convert oneself to friends' opinions (Cialdini & Goldstein, 2004). We motivate this second position by structural balance theory (Cartwright & Harary, 1956; Heider, 1958), according to which triads that are not in "balance" because two friends have opposite evaluations of a third party, need to become "balanced" by coming to an agreement on this evaluation. While individuals can rely on gossip to do the two: bonding with potential allies and building consensus with friends; these two approaches provide different predictions regarding the types of triads where negative gossip occurs. Based on the first, gossip appears in triads where both the sender and receiver share their antipathy against the target (*shared antipathy*). From the second view, what predicts gossips is *direct antipathy* against the target or being friends with someone who dislikes the target (*indirect antipathy*) rather than the combination of the two antipathies.

We test these two lines of reasoning with sociometric data from 17 classroom observations (13 unique classrooms in different time points) in Hungary. Bayesian Exponential Random Graph Models (BERGMs; Caimo & Friel, 2011; Caimo & Lomi, 2014; Koskinen et al., 2010) reveal that in 13 (nine unique) classrooms there is a positive relationship between gossip and direct antipathy. Likewise, there is a positive relationship between gossip and indirect antipathy in five of the classrooms. No association was found between gossip and shared antipathy, however. This suggests that, at least among adolescents, negative gossip is not about bonding with potential allies but more about consensus-making between friends.

Our study enriches current scholarship in several ways. First, relative to previous studies on gossip in which only the effects of positive relationships are considered (Ellwardt et al., 2012; Grosser et al., 2010; Yucel et al., 2021), here we focus on multiplex networks which include positive and negative ties (i.e., friendships and antipathies). By doing so, we extend current gossip theorising showing that, among adolescents at least, discrepancies between friends in their relationship with the target may explain gossip better than affiliation based on shared enmities. The disentanglement of these two mechanisms is not trivial for the evolution of the community where the gossipers are embedded. Based on the first, gossip shall mostly reinforce extant negative ties (Burt & Knez, 1995). If the second, gossip might help create new negative ties instead. In addition, since our empirical study utilises school network data, the control variables — besides helping provide an unbiased estimate of our hypothesised relationships (Lusher et al., 2013) — reveal some interesting findings such as a great deal of negative gossip targeted at the two ends of the reputational echelon. It hints that in the classroom, a high reputation might be contested instead of rewarded.

2. Theoretical background

2.1. Shared versus non-shared antipathy

If one follows the literature on gossip, negative gossip is often strategic or considered an indirect form of relational aggression (Davis et al., 2019; Ingram, 2014; Kisfalusi, Takács, et al., 2019; McAndrew, 2014). Gossip might constitute a tactic to coordinate aggression against common enemies (Hess, 2017) or seek the leverage to alleviate dominance tendencies (Boehm, 1999; Scott, 1985). Besides coordinating social action, it is well-established that people often gossip with others to strengthen social bonds (Dunbar, 1998). For emotional bonding, however, the gossipers must highlight their similarity of opinions about the target (Bosson et al., 2006; Peters et al., 2017). Especially with negative information, the person sharing the gossip expects that the listener will join in condemning the target (Behfar et al., 2019). Otherwise, this can raise suspicion, damage the relationship between gossipers, and reduce the likelihood of future gossip (Caivano et al., 2020; Farley, 2011; Farley et al., 2010).

There exists some consensus that negative gossip is shared selectively (Giardini & Wittek, 2019a), typically with close contacts (e.g., good friends; Grosser et al., 2010); and even among these, only with those who share a similar sentiment towards the target (Burt, 2001, 2008; Burt & Knez, 1995; Gambetta, 1994). From a triadic perspective (Simmel, 1950), gossip is thought to happen in three-person configurations characterised by a good relationship between the sender and the receiver and, what is most important, a bad relationship between these two and the target. Wittek and Wielers (1998) labelled these configurations "coalition triads", and they found evidence that gossip occurs more often when individuals are embedded in coalition triads than in other triadic configurations. Below, we refer to structural balance theory to support a second perspective, which challenges this premise that shared negativities is a precondition for gossip.

Structural balance theory (Cartwright & Harary, 1956; Heider, 1958) is one of the most influential theories to explain the form and evolution of social relations. Structural balance theory builds upon two assumptions. First, triadic configurations — groups of three individuals — are the minimum and undecomposable relationship systems (Simmel, 1950). Second, all triads are nested in a sentiment network of positive and negative ties. Depending on which ties connect the three individuals, two kinds of triads are distinguished: balanced and imbalanced (aka forbidden). For example, triads characterised by three positive ties (+++) or one positive and two negatives (+−−) are balanced. Conversely, triads characterised by a single negative tie are imbalanced (Davis, 1967). In this context of balanced and imbalanced triads, the central principle of structural balance theory is that people prefer being embedded into the former over the latter. Therefore, while balanced triads tend to be stable, imbalanced triads (e.g., two friends with the opposite view of a third party) generate relational tensions and mechanisms to reduce them. Such mechanisms involve *individuals' conversions of their sentiments* but also *efforts to convert the sentiments of others*. Overall, structural balance theory posits that networks evolve due to sentiment-conversion processes wherewith individuals try to minimise imbalances in their immediate neighbourhood (Rawlings & Friedkin, 2017).

Certainly, bonding with enemies' enemies can be a mechanism for reaching structural balance. Nonetheless, what we want to underscore here is that this might not be the only, and perhaps not even the most important, one for explaining gossip. The main reason is that, as mentioned above, gossip frequently requires some trust between the sender and the target in the first place. Let us consider the scenario where two individuals with some affective interdependence (e.g., two friends) hold a different view of a third. Particularly, one of the two has a negative relationship, whereas the other does not (is either indifferent or even has some sympathy). According to the perspective that is dominant in the literature, gossip is unlikely to occur since the absence of a common opinion will discourage either two from initiating gossip. For structural balance theory, however, such scenarios are the breeding ground for actions aimed at influencing relationships because the absence of a shared negative opinion creates a source of distress. Our argument thus is that, due to the intention of structural change, triads characterised by a single negative tie towards the target constitute a milieu for gossip to flourish. Even if disagreement or gossip avoidance can be expected (Caivano et al., 2020; Hallett et al., 2009), the information can still be cloaked as prosocial and, coming from close individuals, accepted. Besides, this struggle for consensus can help explain why previous research in school contexts observed a high chance of forming negative ties with friends' enemies (Rambaran et al., 2015; Stadtfeld et al., 2020).

Empirically, the two positions introduced above predict different triadic configurations where gossip appears. According to the first, gossip abounds only in triads where *shared antipathy* against the target is imperative. According to the second, gossip is an action towards consensus-building in triads characterised by *a single negative relation* against the target.

2.2. Shared, direct, and indirect antipathies

In order to test the two lines of reasoning presented above, we use data collected in high school classrooms. The reason why we chose this type of data is twofold. First, tapping into negative ties and actions (i.e., negative gossip) is usually a challenge for researchers because adult respondents are more reluctant to disclose such information (Labianca & Brass, 2006). School settings, however, are better locations for studying negative ties such as dislikes and aggressions as students are more disposed to respond to such items (e.g., see: Callejas & Shepherd, 2020; Faris et al., 2020; Kros et al., 2021; Wittek et al., 2020). Second, classrooms are small, bounded units in which most students have a good approximation of their mates' positive and negative relationships with other classmates, especially those of their closest friends.

We use the RECENS dataset containing sociometric data from seven high schools in Hungary between 2010 and 2013 (Kisfalusi, Takács, et al., 2019; Pál et al., 2016). Like in some former studies, *friendships* and *antipathies* were chosen as the two measures to embody positive and negative ties (Boda & Néray, 2015; Rambaran et al., 2015; Stadtfeld et al., 2020). As for gossip, we utilise the answer given to the question: "whom do you usually say bad things about to your friends?". As it can be observed, the way gossip was collected does not allow telling whom exactly the information was directed to (unless the respondent happens to have a single friend). The question, however, implies that there is some emotional bonding between the sender and receiver. Further, the question underscores that the behaviour aimed is not a single-instance negative talk but more likely reiterated bad-mouthing of a specific classmate.

The dyadic nature of the data restricted us to operationalise our predictions as follows. We consider gossip as a relational measure or tie connecting the sender (i) to the target (j). We characterise the triadic configurations in which the two students may be embedded by the relationships of the sender and those reported as the sender's friends to the target. We define antipathy as if i has a negative relationship to j directly ($i \longrightarrow^{-} j$). Given the relative scarcity of negative ties, we talk about "indirect antipathy" if i is friends with at least one classmate (k) who has a negative tie to the target ($i \longrightarrow^{+} k \longrightarrow^{-} j$). By using these two measures, we can estimate the contribution of three factors to gossip: (1) whether i has a negative tie to j (*direct antipathy*), (2) whether i has friends with a negative tie to j (*indirect antipathy*), and (3) the combination of both (*shared antipathy*).

That said, since our first perspective endorses that gossip requires shared negativities against the target to happen, our first hypothesis reads that the combined effect of the two antipathies will predict the occurrence of gossip.

Shared antipathy (H1): The presence of both direct and indirect antipathy against the target would be positively correlated with the occurrence of negative gossip.

Based on a drive towards structural balance, our second perspective posits that one negative tie against the target, rather than two, necessitates negative gossip. In the data, two different tie combinations support this. The first is if the sender (i) dislikes the target (j), but none of the friends (k) of i does. The second is if i does not dislike j, but has a friend k who dislikes j. Since the questionnaire emphasises the role of i as the gossip sender, the first case is likely to capture i's attempts to *influence* k's image of j (Halevy et al., 2019). The second case is likely to capture i's efforts to influence their own image of j to match k's opinion instead. Previous research has shown that in casual conversion many people prefer not confronting others and go with the tone of conversation in a hypocritical way (Gastner et al., 2019). Being friends with individuals on bad terms with the target would then make them more likely to engage in negative gossip. Most importantly, however, some people may *conform* with their friends' expected attitudes, for instance, to gain their social approval (Cialdini & Goldstein, 2004). Conformity will help reduce the tension produced by the absence of shared negativity towards the target under structural balance theory principles.

(Non-shared) direct antipathy (H2a): The presence of direct antipathy and the lack of indirect antipathy against the target would be positively correlated with the occurrence of negative gossip.

(Non-shared) indirect antipathy (H2b): The presence of indirect antipathy and the lack of direct antipathy against the target would be positively correlated with the occurrence of negative gossip.

3. Data, measures, and methods

3.1. Research setting

Hypotheses were tested using the RECENS high school dataset, a four-wave sociometric panel study conducted in 7 high schools in Hungary (Boda & Néray, 2015; Grow et al., 2016; Kisfalusi et al., 2020; Pál et al., 2016). The data was collected between 2010 and 2013 (Wave 1: autumn of 2010, Wave 2: spring of 2011, Wave 3: spring of 2012, Wave 4: spring of 2013). For our analyses, we relied on the information from the last three waves (hereafter t_1, t_2, t_3), which means that students already knew each other quite well when they answered the questionnaire. We excluded the data from the first wave because key measurements for our analyses were not collected then.

The RECENS data covers 44 classrooms representing both urban and rural habitats and the three training programmes in the Hungarian education system (i.e., grammar, technical, and vocational). Information was collected via a self-administered paper-and-pencil questionnaire that the students filled during regular school lessons, with a trained research assistant's supervision. Participation was voluntary, and students were assured that their answers would remain confidential and used for research purposes solely. If parents/tutors did not want their children to participate in the study, they were asked to return the consent form.

Although the data is longitudinal, in the present study we analyse it as cross-sectional. The reason is that observations are a year apart. As a result of the long span, not only did the composition of many classrooms change enormously between observations (see Fig. S1), but also, and most importantly, the gossip networks were quite unstable for estimating longitudinal network models. Fig. S2 in the Supplementary Materials shows the Jaccard indices of the gossip networks in the classrooms observed in between t_1 and t_3. The Jaccard index is a measure of the stability of a network, and it ranges from 0 (no stability) to 1 (perfect stability). As we see, a single classroom has values above 0.2. Most classrooms, however, have values below 0.1, which is considered excessively low for the estimation of longitudinal network models (Ripley et al., 2020).

Due to the large instability of the gossip networks, we adopted a cross-sectional approach. We selected from the sample of all classroom observations available (122 in total; 43 in t_1, 41 in t_2, and 38 in t_3) only those that satisfy the following two criteria: 1) less than 20% response rate missing (Huisman, 2009), and 2) no fewer than 25 gossip ties. The sampling procedure was strict but aimed to exclude observations that, because of missing data, could distort the results (42 classroom observations) or have an insufficient number of gossip ties to be modelled (an additional 52). Of the 28 classroom observations selected, model convergence was reached in 17. Therefore, our final sample comprises 17 classroom observations from 13 unique classrooms (403 unique students): 6 in t_1, 6 in t_2, and 5 in t_3.[1] In the following, descriptive statistics and results are reported for these 17 classroom observations.

As the reader can notice, a substantive number of cases were cast aside for our eventual analyses. One of the main reasons was the low number of gossip ties observed in many classrooms, which can be attributed to the self-reported nature of the data (viz., gossip was sender-reported, so many respondents left this question unanswered in the questionnaire). In our final sample, the average age of respondents is 15.9 (t_1), 17.0 (t_2), and 17.9 (t_3). Female students represent 67.0% of the respondents.[2] In terms of ethnic composition, Roma students (the largest minority group in Hungary) represent 15.4% of the sample.

3.2. Response variable

Respondents were asked to respond to the question: "whom do you usually say bad things about to your friends?". Unlike some other studies where gossip was collected by asking the receiver (Ellwardt et al., 2012), gossip here is sender-reported. Rosters of names were used instead of free recall (Hlebec, 1993; Marsden, 1990), with no restriction in the number of nominations. We created a binary matrix per classroom observation with the answers, where "1" indicates that respondent i gossips about respondent j, otherwise it is "0".

3.3. Explanatory variables

Direct antipathy. Direct antipathy was captured by asking each student to ascertain their relationship with all their classmates in a 5-point Likert scale: "I hate this person" (−2); "I do not like this person" (−1); "this person is neutral for me" (0); "I like this person" (+1); "This person is my friend" (+2). These values were dichotomised, with relationships described as (−2) and (−1) coded as antipathy (Boda & Néray, 2015; Pál et al., 2016).

Indirect antipathy. In each classroom observation, the antipathy network was left multiplied by the friendship network (obtained by dichotomising the (+2) values above). The resulting matrix captures, for every respondent i, the number of their friends with direct antipathy for j. These values were dichotomised: "1" indicates that i has at least one friend in the classroom with direct antipathy for j, and "0" otherwise.

Shared antipathy. To distinguish the effect of indirect antipathy from that of shared antipathy, we created a third matrix where we retrieved the intersection of the direct and indirect antipathy networks. In this matrix, "1" indicates that respondent i has direct antipathy for j and is friends with somebody else in the classroom who has antipathy for j too.

3.4. Control variables

3.4.1. Gender

Although empirical evidence is rare, there is the commonly held belief that women gossip more than men (Michelson & Mouly, 2000). On top of this, some studies suggest that gossip can be used as an intra-gender strategy aimed to derogate competitors' mate value (Davis et al., 2019; Wyckoff et al., 2019). To isolate the potential distortions that gender could introduce, we controlled for it. Gender was coded as "1" for females, "0" for males.

3.4.2. Ethnicity

In schools, ethnicity can play a crucial role in explaining friendships (Leszczensky & Pink, 2015; Moody, 2001; Smith et al., 2014; Wimmer & Lewis, 2010), as well as antipathies and aggression (Boda & Néray, 2015; Kisfalusi et al., 2020; Wittek et al., 2020). In Hungary, Roma people constitute an illustrative example of an ethnic minority suffering from long-lasting socio-economic exclusion and stigmatisation (Kisfalusi, Neumann, et al., 2019). Because of this, it is plausible that Roma students might be recurrent targets of their classmates' gossip. Students were asked to classify themselves as "Hungarian", "Roma", "Hungarian and Roma", or "other". Then, we dichotomised the answers as either Roma (for "Roma" and "Hungarian and Roma") or non-Roma (for "Hungarian" and "other"). When a respondent did not report their ethnicity directly but gave a valid answer to the question "if you consider yourself a Roma, which Roma group do you belong to?", we categorised them as Roma too. As some students were not consistent with their ethnicity across different waves, we homogenised their answers (i.e., if a student reported being Roma at least once, they were considered Roma). We only miss the ethnicity of 9 students.

3.4.3. Popularity

Previous research suggests that gossip can be the weapon of the weak (Scott, 1985). Conversely, research on schools has found that the popular are more likely to harass their peers, including verbal forms of aggression (Cillessen & Mayeux, 2004; de Bruyn et al., 2010; Sijtsema et al., 2009; Wargo Aikins et al., 2017). As a way of controlling for differences due to the sender's informal position in the classroom, we retrieved for each student their in-degree in the friendship network (sociometric popularity; Zingora et al., 2020).

[1] Four classrooms are observed twice. The remaining nine once. Specifically, the classrooms for which we obtained results are 1100 (t_2), 2100 (t_3), 2200 (t_1), 3400 (t_1), 5100 (t_3), 5400 (t_2), 6100 (t_1, t_3), 6200 (t_2, t_3), 6300 (t_1, t_2), 6400 (t_2, t_3), 7100 (t_1), 7600 (t_2), and 7800 (t_1).

[2] More females than males participated in the study because many of the classrooms provide training for professions that are more likely to be chosen by women later.

3.4.4. Reputation

Having a low reputation in the classroom can be the result of sustained deviant behaviour. Accordingly, notorious students are likely to attract their peers' negative talk. On top of this, since individuals with low reputations are likely to have few defenders by their side, initiating negative gossip about them poses less of a hazard. In contrast, having a high reputation can prevent from becoming the object of negative gossip (Kniffin & Wilson, 2010; Merry, 1984). These individuals are often treated favourably (Keltner et al., 2008) and, even when their actions are controversial, given the benefit of the doubt. To account for these potential effects, each respondent was asked 2 questions: "whom do you think many people look up to?", and "whom do you think many people look down on?". With the answers to these 2 questions, we created two binary matrices, where "1" indicates that respondent *i* thinks that respondent *j* has high (or low) reputation, otherwise it is "0".

For missing ties in the explanatory and control variables, we imputed data from the previous and posterior waves ($t - 1$, $t + 1$) – save t_3, for which we only used data from t_2. The imputation procedure was as follows: If data was available for a single wave only, we imputed the value in that wave. If data was available in both waves, we coded the missing tie as "1" if there was a nomination from students *i* to student *j* in both waves, or if there was a nomination in one wave and a missing value in the other. Otherwise, the tie was coded as "0" (Boda & Néray, 2015; Kisfalusi et al., 2020).

4. Methods

To connect our hypotheses to an appropriate statistical model, we considered each gossip tie in our data as a random variable. Then, we analysed the structure of our gossip networks using Exponential Random Graph Models (ERGMs; Lusher et al., 2013; Robins et al., 2007).

ERGMs are the most common family of probability models to analyse the structure of cross-sectional networks. In essence, ERGMs take the global structure of a given network as the response variable and model it in terms of the relative prevalence of certain sub-graph configurations (e.g., the number of mutual ties present). Each configuration embodies a tie-formation mechanism (e.g., reciprocity). To infer if a specific configuration constitutes a crucial building block of the observed overall structure of the network, ERGMs compare the frequency of that configuration in the observed network to its average prevalence in a distribution of simulated networks. The estimated parameter ($\widehat{\theta}$) derived from the estimation process tells us whether a certain tie-formation mechanism exists more often in the observed network than expected at random, given all other configurations specified in the model. Configurations with a positive parameter value have a greater-than-by-chance probability of being observed. Configurations with a negative value have a lower-than-by-chance probability (Lusher et al., 2013). Besides the endogenous factors of the network being modelled, ERGMs enable the inclusion of actor attributes (e.g., gender) and entrainment (cross-network) factors. This last capability of ERGMs is what allowed us to check the importance of different forms of antipathy for the structure of our gossip networks.

Due to the relative sparsity of the gossip networks and the presence of missing data, we opted for a Bayesian estimation (BERGMs; Caimo & Friel, 2011; Caimo & Lomi, 2014; Koskinen et al., 2010). However, since previous examples of gossip networks are rare (Ellwardt et al., 2012; Kisfalusi, Takács, et al., 2019), for our analysis we employed weakly informative prior distributions for all the parameters (i.e., Gaussian distributions with mean 0 and variance 5). Our goal was to ensure that the results obtained were not influenced in excess by our choice of the prior distribution, and they can be compared to those of regular ERGMs.

Analyses were performed in the statistical system R (R Core Team, 2020), using the package Bergm 5.0.2 (Caimo & Friel, 2014). The missing data of the response networks was handled using the multiple imputation procedure available in this package (Koskinen et al., 2010; Krause et al., 2020). Of the 28 classroom observations selected for analyses, convergence was reached in 17 from 13 unique classrooms (60.7%). After convergence was achieved, we assessed the acceptance rate in every network to ensure that it is close to the optimal value (0.234; Roberts et al., 1997) as well as four Goodness of Fit (GoF) statistics (i.e., in-degree, out-degree, minimum geodesic distance and edge-wise shared partners) to see if the estimated models describe network features not explicitly modelled with the included configurations (Lusher et al., 2013).

4.1. BERGM specification

4.1.1. Hypothesised factors

To test our theoretical expectations, we computed the cross-network effects of *direct antipathy*, *indirect antipathy*, and *shared antipathy* on the probability of observing a gossip tie. The first captures the students' tendency to gossip about those classmates they hold a negative feeling (hatred or disliking). Indirect antipathy models the tendency of the students to gossip about those classmates whom their friends hate or dislike. Lastly, shared antipathy captures the interaction between the two terms above: the tendency to gossip about those held in negative feelings both directly and indirectly (via a friend).

4.1.2. Endogenous factors

Endogenous network factors capture how a gossip tie between the sender and the target depends on other gossip ties in the classroom. These factors are important to control for in social network analysis since endogenous network processes can bias the parameter estimates of the hypothesized factors (Lusher et al., 2013). Seven endogenous factors were included in our BERGM. First, we included the *edges* term to control for the general tendency of the students to send gossip nominations. The *mutual* term was included to capture the students' tendency to reciprocate nominations ($i \to j$, $j \to i$).[3] As some individuals can be expected to send or be the target of more gossip nominations than others, we added the geometrically weighted versions of *activity spread* and *popularity spread* to account for differences in the levels of activity and popularity between students. The term *sinks* was included to control for the effect of those students who are targets only (no senders).[4] Lastly, we added *multiple two-paths* (GWDSP-OTP) and the *transitive GWESP* (geometrically weighted edgewise shared partners). Multiple two-paths seize whether there is certain connectivity in the networks, namely if students are both senders and targets ($i \to k \to j$). The GWESP was included to account for potential hierarchical structures: *i* gossips about *k*, *k* gossips about *j*, and *i* gossips about *j*.

4.1.3. Control variables

We control for actor-level (i.e. individual characteristics of actors) and cross-network factors (i.e. effects of other networks) in the model. First, we added the "ego", "alter" and "same" terms for gender.[5] The first models the tendency of female students to send more gossip ties than males do: *female (sender)*. The second models whether female students are more likely to be chosen as targets compared to male students: *female (target)*. The *same gender* effect captures the tendency for intra- vs. inter-gender gossip. In classrooms with more than two Roma students,[6] we added the "alter" term for ethnicity: *Roma (alter)*. Popularity was included as an "ego" effect to capture if the students with more friends in

[3] In classrooms 5400 (t_2), 6300 (t_2) and 7100 (t_1) no gossip tie was mutual, so this factor was not included.

[4] In classrooms 2100 (t_3) and 7600 (t_2), the term *sinks* was not included in the model to reach convergence.

[5] In classrooms 2100 (t_3), 3400 (t_1), 5100 (t_3), 7100 (t_1) and 7600 (t_2), we did not include gender effects to reach convergence.

[6] Classrooms 2100 (t_3), 2200 (t_1), 3400 (t_1), 5100 (t_3), 5400 (t_2), 6100 (t_1), 7100 (t_1), 7600 (t_2), 7800 (t_1).

Table 1
Descriptive statistics of the gossip networks.

Classroom	Time	Number of students	Female students	Roma students	Gossip ties	Missing ties (%)	Average degree	Density (%)	Reciprocity (%)	Transitivity (%)	Isolates
1100	2	31	19	0	33	6.7	2.1	3.8	12.5	8.4	0
2100	3	23	21	11	33	18.2	2.9	7.9	34.5	7.8	0
2200	1	26	19	13	25	8.0	1.9	4.2	19.0	6.8	0
3400	1	36	14	6	43	17.1	2.4	4.1	5.9	13.6	0
5100	3	28	18	3	35	3.7	2.5	4.8	6.2	5.7	0
5400	2	36	18	6	28	5.7	1.5	2.3	0.0	0.0	0
6100	1	33	27	3	68	3.1	4.1	6.6	9.1	27.5	0
	3	24	19	2	39	4.3	3.2	7.4	10.5	14.0	0
6200	2	36	24	0	69	14.3	3.8	6.4	3.5	15.4	0
	3	35	23	0	58	17.6	3.3	5.9	8.0	11.6	0
6300	1	33	21	0	27	15.6	1.6	3.0	9.1	7.7	0
	2	33	20	0	25	15.6	1.5	2.7	0.0	7.9	0
6400	2	32	25	0	55	3.2	3.4	5.7	15.4	18.5	0
	3	32	26	0	56	6.5	3.5	6.0	14.5	20.5	0
7100	1	30	23	7	25	17.2	1.6	3.3	0.0	7.8	0
7600	2	25	19	5	44	16.7	3.5	8.7	5.3	16.2	0
7800	1	29	19	8	53	10.7	3.7	7.3	27.9	20.0	0

Table 2
Comparison of the gossip and direct antipathy networks.

		Counts		Overlap				Centralisation		
Classroom	Time	Gossip ties	Antipathy ties	Tie overlap	Jaccard index	LR-QAP (antipathy coefficient)		Gossip in-degree (Gini index)	Antipathy in-degree (Gini index)	$\frac{gossip\ inequality}{hostility\ inequality}$
1100	2	33	100	19	0.17	2.59	***	0.56	0.55	1.01
2100	3	33	58	25	0.38	3.54	***	0.54	0.44	1.22
2200	1	25	106	21	0.20	3.53	***	0.62	0.40	1.55
3400	1	43	95	15	0.13	1.88	***	0.61	0.42	1.47
5100	3	35	88	12	0.11	1.49	***	0.17	0.48	0.36
5400	2	28	92	13	0.12	2.60	***	0.62	0.43	1.46
6100	1	68	130	45	0.30	3.06	***	0.61	0.56	1.08
	3	39	93	29	0.28	2.96	***	0.57	0.36	1.56
6200	2	69	131	40	0.25	2.66	***	0.66	0.50	1.32
	3	58	104	23	0.19	2.18	***	0.53	0.47	1.13
6300	1	27	39	7	0.12	2.28	***	0.63	0.69	0.91
	2	25	81	11	0.12	2.37	***	0.68	0.62	1.10
6400	2	55	82	29	0.27	2.91	***	0.54	0.63	0.86
	3	56	66	24	0.25	2.76	***	0.57	0.62	0.93
7100	1	25	114	20	0.18	3.33	***	0.47	0.39	1.19
7600	2	44	93	14	0.12	0.92	**	0.25	0.31	0.79
7800	1	53	161	35	0.20	2.22	***	0.55	0.52	1.07

Note: *p < .05, **p < .01, ***p < .001; two-tailed test. Significant levels were obtained using 1,000 permutations of the response variable (gossip).

the classroom are more likely to send gossip nominations: *popularity (sender)*. Then, we added its square term to seize whether the two, students with more friends and those with fewer friends, are more likely to send gossip nominations: *popularity^2 (sender)*.[7] Finally, we included the cross-network factors of high and low reputation to capture if students are more likely to send nominations to those classmates they perceive as notable or notorious, respectively: *high reputation (target)*, *low reputation (target)*.[8]

For the specification of our BERGMs, we first estimated several different specifications using endogenous factors only to find a parsimonious number of configurations that seize the structure of gossip networks in most classrooms. The choice of our factors was inspired by previous specifications of negative ties like gossip, bullying, dislike, antipathy, or disesteem (Boda & Néray, 2015; Ellwardt et al., 2012; Harrigan & Yap, 2017; Hooijsma et al., 2020; Huitsing et al., 2012; Kisfalusi et al., 2020; Pál et al., 2016; Rambaran et al., 2015; Wittek et al., 2020). After that, we added the hypothesised and the control factors.

5. Results

5.1. Descriptive results

Table 1 contains a summary of our 17 gossip networks. Like other types of negative ties, these networks are relatively sparse, with densities around 5.3% (2.3%−8.7%). This means that, from all gossip ties that could conceivably exist in a classroom, we observe approximately 1 in 20. Remember that, though gossip is allegedly pervasive, negative gossip is only a fraction of it. Further, our gossip ties capture who gossips about whom. If person *i* repeatedly talks about *j* (either to the same receiver or everybody else), this counts as a single tie. The average number of gossip ties per student revolves around 2.7 (1.5–4.1). In other words, on average, students gossip about (or are gossiped about by) three of their classmates. As we can observe, in none of the 17 gossip networks there are any isolates (students who neither gossip about, nor are gossiped about by, their classmates). Roughly 10.7% (0.0%−34.5%) of the gossip ties are reciprocated, namely *i* gossips about *j*, and so does *j* about *i* ($i \to j$, $j \to i$). Reciprocity, however, varies noticeably across

[7] Both *popularity* and *popularity^2* were centred in the models for better convergence.

[8] Table S1 in the Supplementals contains all the factors in this study, together with a graphical representation.

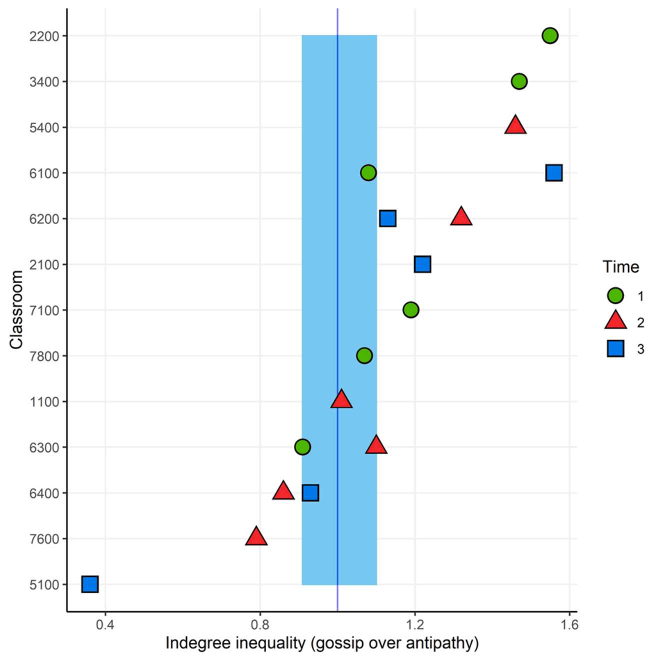

Fig. 1. Comparison of Gini indices (in-degree inequalities, gossip network over antipathy network). Values to the right of zero indicate that the gossip network is more centralised around a few individuals than the antipathy network. Values to the left of zero indicate that the antipathy network is more centralised around a few individuals than the gossip network. Values near zero indicate that the two networks have similar levels of centralisation (values falling on the highlighted area show differences below 10%).

classrooms. In three cases, no single tie is reciprocated, whereas, in two classrooms, the percentage of mutual ties exceeds 20.0%. Finally, on average, 12.3% (0.0%−27.5%) of the ties are transitive ($i \to k$, $k \to j$, $i \to j$). As with reciprocity, transitivity also varies substantively across classrooms, however.

Table 2 shows a description of the interplay between the gossip networks and direct antipathy networks. As we see, in all cases, the antipathy network is denser than the gossip network (ca. 2.5 times larger). This finding demonstrates that not all antipathies reported in our sample were expressed in gossip. As for the overlap between gossip and antipathy, around 53.8% (25.9%−84.0%) of our gossip ties are sent by a student who holds negative feelings towards their target. We ran a logistic regression test with a quadratic assignment procedure (LR-QAP; Borgatti et al., 2013) with gossip as the response variable to check whether this overlap is significant. As expected, in all the classrooms without exception, the relationship between negative gossip and antipathy is positive and significant ($p < .01$).

Finally, since we argue that shared antipathies can be essential for gossip (H1), there is the possibility that non-shared antipathies are less likely voiced, accounting for part of the mismatch between the two networks. If so, one foreseeable outcome is that the gossip networks, compared to the antipathy networks, are more centralised around a few individuals (those detested by more than a single classmate). To check this, we retrieved the in-degree centrality of every student in both the gossip and antipathy networks (i.e., the number of gossip ties and antipathy nominations received, respectively). Then, we calculated how evenly distributed these values are (Gini indices; Gonzalez-Bailon, 2009). As shown in Table 2, both the gossip ties (ca. 0.54, 0.17–0.68) and the antipathy ties (ca. 0.49, 0.31–0.69) are unevenly distributed. When we compare the two values, it seems that gossip may be more centralised around a few individuals than antipathies in some classrooms (see Fig. 1, which shows the differences in the Gini indices). This pattern does not hold for all the classrooms, however. Further, there are at least three cases (6400 (t_2), 7600, 5100) in which the opposite is found instead, as shown in the bottom-left part of Fig. 1.

5.2. BERGM results

Table 3 contains the results of our 17 BERGMs. Because in four cases results come from the same classroom observed at different time points, we preferred not to meta-analyse results from all the networks into a single estimate (Snijders & Baerveldt, 2003). Instead, we report the results independently, while acknowledging that results come from 13 unique classrooms, not 17. To make the results more accessible to the reader, however, for each predictor (h) we calculated the following formula:

$$\frac{\exp(\widehat{\theta}_0 + \widehat{\theta}_h)}{1 + \exp(\widehat{\theta}_0 + \widehat{\theta}_h)} - \frac{\exp(\widehat{\theta}_0)}{1 + \exp(\widehat{\theta}_0)}$$

where $\widehat{\theta}_0$ stands for the estimate of the "intercept" (i.e., the term edges/density). Since the value of a BERGM parameter represents the conditional (natural) log odds of a tie, the result of this transformation is a value between −1 and 1 capturing the difference in probability of observing a gossip tie introduced by the predictor h (having controlled for all the other parameters in the model). Values larger than zero indicate that the parameter makes the gossip tie more likely observable. Values lower than zero indicate that the parameter makes the gossip tie less likely. If at least 95% of the credibility interval falls to either side of zero, the estimate is depicted in red colour, otherwise in grey. Results from the same classroom at different time points are connected with a dashed line (see Fig. 2).

We first discuss the three hypothesised relationships, followed by the endogenous factors and those that served as controls last. First, no evidence was found for an association between negative gossip and *shared antipathy* (H1) in any of the 17 networks studied. This means that having a friend who also detests the target does not increase the probability of observing a gossip tie once we control for direct antipathy. This finding contradicts the argument that a shared opinion about the target constitutes a precondition for gossip (Burt, 2001, 2008; Gambetta, 1994). In contrast, we find ample support for a positive association between gossip and *direct antipathy* (H2a) and some support for an association between gossip and *indirect antipathy* (H2b). In 13 of the 17 gossip networks (nine unique classrooms), the estimate for direct antipathy is positive. Specifically, direct antipathy increases the probability of observing a gossip tie between 5.5% and 53.9%. In five classrooms — 1100, 2100, 6100 (t_1), 6200 (t_3), 6400 (t_3) —, we also observe a positive association between gossip and indirect antipathy. This entails that when no direct antipathy exists, having a friend who detests the target increases the probability of gossip. More concretely, indirect antipathy increases the probability of observing a gossip tie by an extra 10.2%– 25.7%. Altogether, results support the argument that gossip is primarily about discrepancies around the target rather than about shared antipathies, stressing the importance of this behaviour for structural balance over constraints in its expression.

That said, the seven first element in the upper row in Fig. 2 contains the results for all the endogenous factors included in the model. As we see, all other conditions being equal, the probability of observing a gossip tie (*edges/density*) varies across classrooms from 1.0% to 14.4%. Three endogenous factors seem completely irrelevant for our gossip networks: *mutual*, *sinks*, and the *GWESP*. This here entails that our gossip networks exhibit a tendency for neither reciprocity nor transitivity. Hence, reciprocity and transitive closure may not be defining properties of gossip networks, at least in high school. As for *activity spread*, it is found negative in 12 cases (10 of the 13 unique classrooms). This means that it is unlikely to observe students who are sending gossip about many of their classmates. This finding suggests that, even if gossiping can take a large share of a person's speaking time, negative gossip is not indiscriminate. *Popularity spread* does not display any pattern as it makes a positive contribution in two cases, a negative one in two others, and no

Table 3
BERGMs capturing the contribution of direct, shared, and indirect antipathy to gossip.

	2200 (t_1)			3400 (t_1)			6100 (t_1)			6300 (t_1)			7100 (t_1)			7800 (t_1)		
	Est.	*p*		Est.	*p*		Est.	*p*		Est.	*p*		Est.	*p*		Est.	*p*	
Edges/density	-4.59	<.001	***	-2.12	<.001	***	-2.05	.002	**	-1.78	.011	*	-4.45	<.001	***	-3.91	<.001	***
Mutual	0.80	.222		1.08	.185		0.06	.463		0.60	.316					1.11	.099	
Activity Spread	-2.16	.073		-1.05	.216		-3.64	.001	**	-2.79	.016	*	-3.63	.006	**	-2.88	.017	*
Popularity Spread	0.25	.403		-1.40	.026	*	-0.94	.105		-0.99	.113		1.15	.145		-1.19	.089	
Sinks	-1.40	.130		2.24	.060		-0.78	.258		0.73	.297		-0.29	.415		1.53	.149	
Multiple two-paths	-0.44	.042	*	-0.20	.067		-0.09	.188		-0.07	.349		-0.19	.203		0.21	.021	*
GWESP	-0.48	.340		0.23	.307		0.31	.133		-0.57	.240		0.38	.303		-0.36	.083	
Female (sender)	-0.07	.450					-0.69	.076		-0.10	.390					-0.42	.174	
Female (target)	-0.84	.165					-1.16	.012	*	0.15	.387					-0.42	.214	
Same gender	1.13	.077					0.59	.108		0.10	.417					1.23	.009	**
Roma (target)	-0.70	.110		-0.15	.379		0.79	.063					0.33	.313		-0.15	.386	
Popularity (sender)	0.12	.375		0.01	.479		0.09	.334		0.13	.262		-0.22	.199		0.48	.108	
Popularity^2 (sender)	-0.25	.199		0.19	.117		-0.30	.048	*	-0.11	.317		0.11	.328		-0.96	.017	*
Low reputation (target)	1.92	.004	**	0.73	.083		0.61	.081		0.51	.280		0.74	.207		2.14	<.001	***
High reputation (target)	1.30	.036	*	0.88	.055		0.52	.201		1.47	.013	*	1.19	.031	*	1.68	.002	**
Direct antipathy	1.61	.075		0.99	.098		2.14	.004	**	2.14	.010	*	2.36	.005	**	1.39	.031	*
Shared antipathy	1.87	.055		1.26	.084		0.73	.205		1.53	.120		0.50	.321		0.23	.405	
Indirect antipathy	0.60	.244		0.47	.141		0.96	.025	*	-0.94	.140		0.53	.248		0.38	.259	
Acceptance rate	*0.19*			*0.22*			*0.18*			*0.17*			*0.24*			*0.17*		

	1100 (t_2)			5400 (t_2)			6200 (t_2)			6300 (t_2)			6400 (t_2)			7600 (t_2)		
	Est.	*p*		Est.	*p*		Est.	*p*		Est.	*p*		Est.	*p*		Est.	*p*	
Edges/density	-2.92	<.001	***	-2.88	<.001	***	-2.95	< .001	***	-2.38	.009	**	-3.75	<.001	***	-3.09	< .001	***
Mutual	1.28	.140					-0.83	.247					0.85	.145		-0.07	.492	
Activity Spread	-2.69	.021	*	-1.68	.105		-1.51	.116		-2.76	.030	*	-1.68	.089		-3.78	<.001	***
Popularity Spread	0.10	.463		-0.84	.163		-2.26	<.001	***	-0.95	.157		-0.58	.215		3.32	.002	**
Sinks	1.54	.147		1.01	.224		1.44	.148		0.76	.300		1.09	.199				
Multiple two-paths	-0.20	.126		-0.21	.168		-0.16	.056		0.20	.094		-0.07	.236		-0.27	.024	*
GWESP	-0.33	.316		-2.22	.051		-0.12	.349		-0.84	.156		0.29	.174		0.48	.088	
Female (sender)	-0.20	.324		-0.59	.106		0.08	.439		-0.32	.254		0.41	.247				
Female (target)	-0.22	.350		-0.06	.454		-0.03	.474		-0.67	.130		-0.10	.438				
Same gender	0.15	.381		-0.09	.418		0.18	.360		-0.03	.481		0.87	.088				
Roma (target)				-0.15	.441											0.70	.134	
Popularity (sender)	-0.18	.186		-0.77	.009	**	0.12	.334		0.21	.236		-0.24	.120		-0.33	.039	*
Popularity^2 (sender)	0.07	.353		-0.16	.409		-1.15	.005	**	-0.32	.144		0.23	.138		0.01	.468	
Low reputation (target)	0.82	.100		2.32	<.001	***	2.76	<.001	***	1.45	.034	*	0.44	.181		1.31	.004	**
High reputation (target)	2.22	.002	**	0.65	.163		1.10	.015	*	1.87	.002	**	0.29	.255		1.29	.008	**
Direct antipathy	2.46	<.001	***	1.85	.003	**	1.72	.008	**	2.36	.007	**	3.47	<.001	***	0.91	.114	
Shared antipathy	-0.43	.319		0.80	.213		0.67	.212		0.73	.274		-0.90	.136		0.29	.383	
Indirect antipathy	1.30	.021	*	0.49	.208		0.64	.086		-0.06	.473		0.53	.130		-0.22	.333	
Acceptance rate	*0.18*			*0.17*			*0.20*			*0.18*			*0.19*			*0.20*		

	2100 (t_3)			5100 (t_3)			6100 (t_3)			6200 (t_3)			6400 (t_3)		
	Est.	*p*		Est.	*p*		Est.	*p*		Est.	*p*		Est.	*p*	
Edges/density	-3.39	< .001	***	-4.29	< .001	***	-4.11	<.001	***	-2.28	< .001	***	-2.37	< .001	***
Mutual	1.19	.085		0.65	.343		1.44	.126		0.03	.470		0.92	.128	
Activity Spread	-3.03	< .001	***	-4.53	< .001	***	-2.40	.042	*	-1.96	.050	*	-3.32	.002	**
Popularity Spread	-0.66	.256		3.45	.002	**	-0.61	.260		-1.04	.067		-0.44	.272	
Sinks				0.64	.363		1.20	.213		1.64	.118		-0.43	.357	
Multiple two-paths	0.00	.516		-0.06	.365		-0.44	.011	*	0.03	.367		0.00	.493	
GWESP	-0.49	.133		-0.12	.398		0.07	.432		-0.41	.135		-0.06	.419	

(*continued on next page*)

Table 3 (*continued*)

	2100 (t_3)			5100 (t_3)			6100 (t_3)			6200 (t_3)			6400 (t_3)		
	Est.	*p*		Est.	*p*		Est.	*p*		Est.	*p*		Est.	*p*	
Female (sender)							0.41	.268		-0.45	.119		-0.21	.330	
Female (target)							-0.59	.216		0.08	.415		-0.76	.073	
Same gender							1.06	.075		0.24	.269		0.43	.206	
Roma (target)	-0.28	.315		0.16	.440										
Popularity (sender)	0.16	.287		-1.62	.006	**	0.42	.083		0.32	.092		-0.16	.210	
Popularity^2 (sender)	0.09	.375		-1.09	.023	*	-0.79	.002	**	-0.32	.088		0.39	.011	*
Low reputation (target)	1.97	.002	**	1.44	.044	*	2.25	<.001	***	1.11	.026	*	1.24	.014	*
High reputation (target)	3.08	<.001	***	0.17	.455		-0.05	.479		-0.22	.358		-0.55	.221	
Direct antipathy	1.50	.054		1.86	.017	*	3.68	<.001	***	1.42	.016	*	2.88	< .001	***
Shared antipathy	-0.01	.494		-0.78	.271		0.16	.435		0.57	.246		-1.21	.078	
Indirect antipathy	1.78	.004	**	-0.38	.313		0.95	.103		0.86	.012	*	1.72	< .001	***
Acceptance rate	*0.19*			*0.17*			*0.21*			*0.19*			*0.18*		

Note: * Bayesian $p < .05$, ** Bayesian $p < .01$, *** Bayesian $p < .001$; one-tailed test. For GoF statistics, see Table S2 in the Supplementary Materials.

contribution at all in most classrooms. This finding contrasts with that found by Ellwardt et al. (2012). Although, as this previous study indicates, gossip might be centralised around one or a few targets exclusively, our results suggest that this does not constitute a characterising property of gossip in classrooms. Finally, the contribution of *multiple two-paths* is negative in three cases and positive in one. It indicates that, in our classrooms, there are barely any students holding the roles of both gossip sender and gossip target.

Turning to the actor-level factors, we notice in Fig. 2 that two are irrelevant for our gossip networks: *female (sender)* and *Roma (target)*. The first entails that neither gender sends more gossip nominations than the other. We do see that males are more likely targets in one classroom (negative parameter estimate for *female (target)*). Further, gossip ties are more likely within gender than across genders in one case (*same gender*). Overall, however, neither gender nor ethnicity seems to play a key role to explain our gossip networks. In this regard, our findings do not support the argument that gossip is a strategy to damage competitors' mate value (Davis et al., 2019; Wyckoff et al., 2019) or a form of aggression aimed at the stigmatised groups. Regarding popularity, we find a negative contribution of *popularity (sender)* in three classrooms, and *popularity^2 (sender)* has a negative contribution in four. Only in one classroom, *popularity^2 (sender)* has a positive contribution. Put together, these two factors show that gossip senders are more likely students with few or an average number of friends rather than those with many friends.

The fifth and sixth elements in the lowest row (see Fig. 2) contain the contribution of the target's position within the classroom (as perceived by the gossip sender): *high reputation (target)* and *low reputation (target)*. As we see, these two factors have a positive contribution in many classrooms: 10 for low reputation, and 8 for high reputation. It entails that both make an important contribution to the explanation of our gossip networks. The difference in probability of observing a gossip tie increases from 4.1% to 40.3% if the gossip target is seen as a despised person, and from 2.5% to 38.9% if seen as an admired one. This here suggests that being well-known, for either good or bad, makes one more likely to be the target of the others' negative talk. We will come back to this finding in the discussion section.

Finally, to see whether results could be affected by the control variables in the model, we repeated the analyses with no exogenous factors besides our hypothesised ones. The results are visually displayed in Fig. 3. As the reader can observe, the results are virtually the same. Specifically, evidence for *direct antipathy* is found in 14/17 classroom observations, for *indirect antipathy* in 6/17, and *shared antipathy* in one classroom only. Overall, the pattern is the same as above, outlining the importance of direct and, to a lower extent, indirect antipathy for gossip, whereas shared antipathy plays little if any role.

6. Discussion and conclusions

Although negative gossip can increase cooperation within the group (Beersma & Kleef, 2011; Kniffin & Wilson, 2005; Wu et al., 2016), targets of negative gossip might experience social exclusion, avoidance, and other negative consequences (Feinberg et al., 2012; Jaworski & Coupland, 2005; Kisfalusi, Takács, et al., 2019; Martinescu et al., 2021). The group-beneficial consequences and the potentially severe individual implications for the target both justify the necessity of closely investigating the drivers of negative gossip. This study emphasised the importance of moving beyond a perspective that focuses on the individual only (i.e., the sender, the target). Specifically, the article addressed the association between one's and friends' antipathies and the occurrence of negative gossip. Two positions were examined. One posits that shared antipathies towards the target are a precondition for gossip (Burt, 2001, 2008; Gambetta, 1994). The second argues that discrepancies between the sender and the receiver in how they relate to the target are resolved by engaging in gossip. We use sociometric data collected in 17 classroom observations (13 unique classrooms in

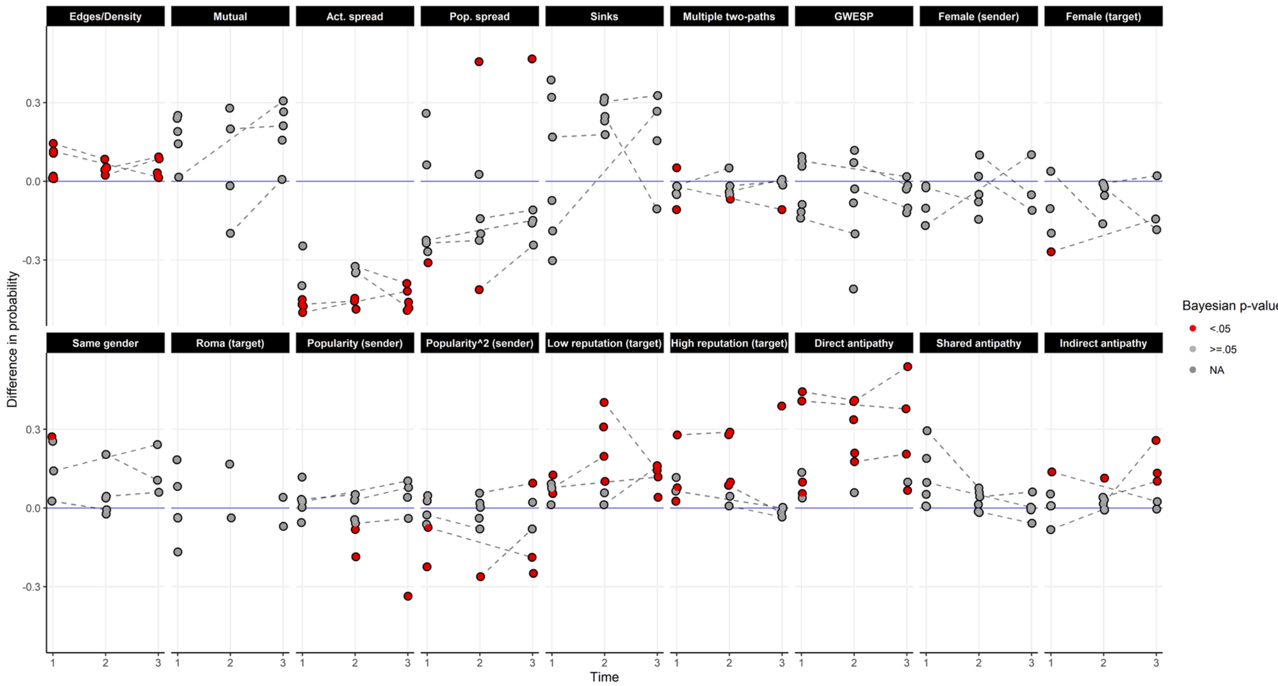

Fig. 2. Differences in the probability of observing a gossip nomination. Results from the same classroom at different time points are connected with a dashed line.

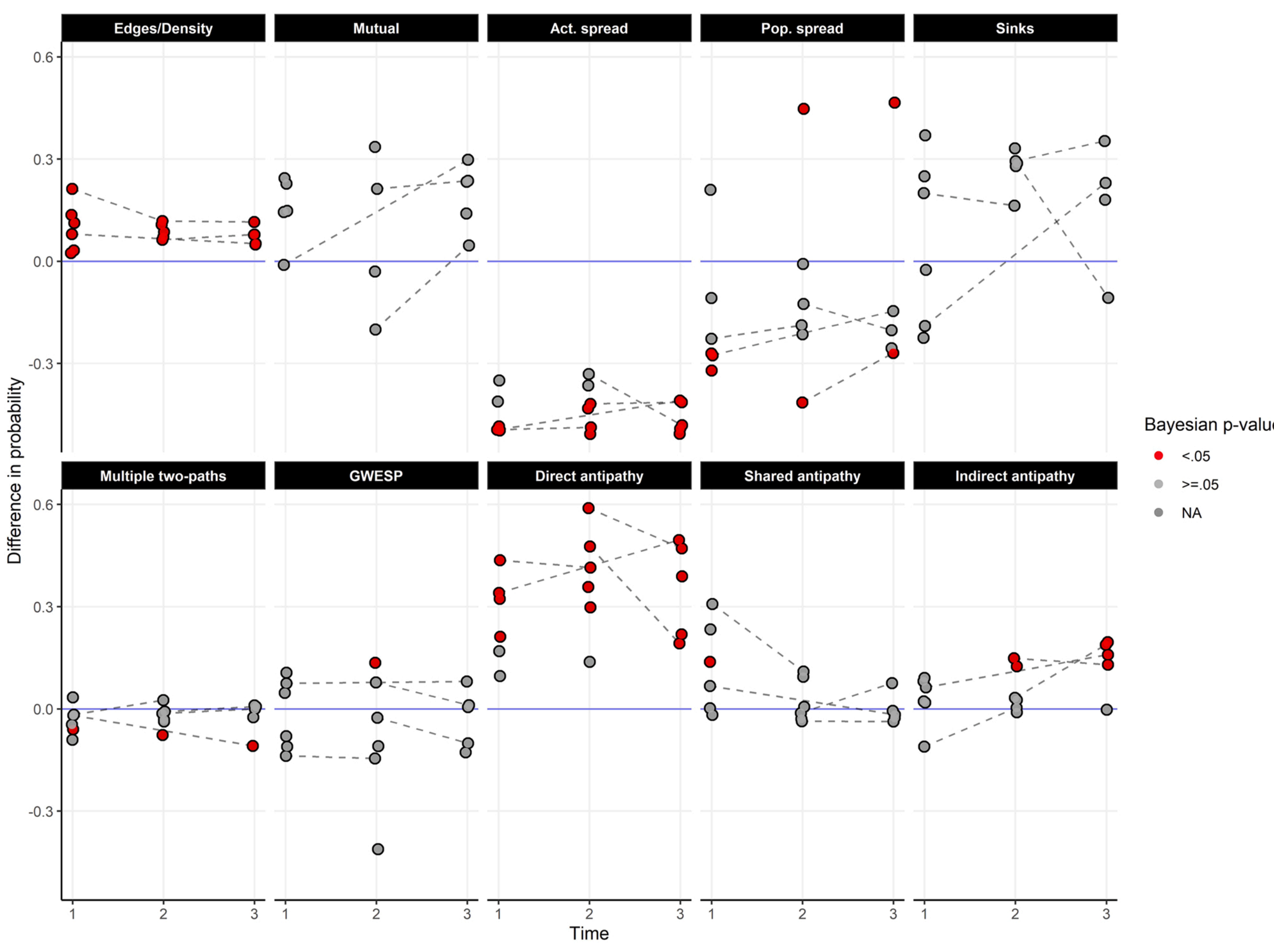

Fig. 3. Differences in the probability of observing a gossip nomination (no controls added to the model). Results from the same classroom at different time points are connected with a dashed line.

different time points) in Hungarian high schools to test these two perspectives. In addition to the contribution of antipathy from the sender to the target (*direct antipathy*), we quantified those of *indirect antipathy* (throughout friends) and *shared antipathy* to the probability of gossip. Results revealed that gossip and direct antipathy are positively related in 13 (nine unique) classrooms, and that gossip and indirect antipathy are positively related in five. No evidence was found for an association between gossip and shared antipathy, however.

Starting with the lack of support for *shared antipathy* (H1), it seems that, at least in the classrooms under investigation, having a friend who also detests the target does not increase the probability of gossip above and beyond the sender's antipathy against the target. Whereas a sizeable part of the gossip literature maintains that a certain shared opinion for the target is a precondition for gossip (Burt, 2001; Burt & Knez, 1995; Gambetta, 1994), our results here hint otherwise. We can think of several reasons why we did not find support for this first association, however. One is that the cost of expressing negative opinions is not as hazardous among adolescents as it is in other contexts like the workplace, for example. Insofar as classmates are not functionally interdependent, one might speculate that they also dispose of leeway to express their negative opinions. Another explanation is that, among adolescents, gossip is more about changing friends' minds than building alliances or finding a safe space to voice one's complaints without disapproval. As we argued above, non-shared antipathies between pairs of friends can cause distress and motivate actions to influence others' relationships. This connects us with the next point regarding non-shared antipathies.

Unlike shared antipathy, we found convincing support for the association between gossip and *direct antipathy* (H2a) and some support for the association between gossip and *indirect antipathy* (H2b). The support for these two factors confirms our expectation that discrepancies in the relationship with the target can be essential for explaining negative gossip. Moreover, the support for both factors also hints those discrepancies might be addressed in two different ways. One is to change friends' opinions about the target. This is what direct antipathy is likely to capture. Say student *i* has a negative relationship with student *j*, so she wants her friends to adopt a negative view of *j*. Such a result can potentially be achieved by telling negative stories and comments (Halevy et al., 2019). Another possible way of solving discrepancies is to adopt friends' negative relationships. If there is bad blood between a close friend and another classmate, one can support the former by showing understanding and blaming the latter for the feud. Indeed, since our data does not allow us to tell whether the gossip partner was the person with the negative tie (or another friend of the gossip sender), there might be other explanations for indirect antipathy (e.g., a passing-the-word effect). More importantly, bad-mouthing somebody does not entail that a negative tie will necessarily develop, albeit some evidence supports this (Kisfalusi, Takács, et al., 2019). Future studies may address these limitations by better controlling for potential confounders like the target's behaviour or collecting information on whom the exact receivers (not only the targets) of the gossip are.

In addition to the three hypothesised relationships, we want to stress an extra finding. Previous research proposes that negative forms of gossip display "scapegoating" patterns and focus only on a few targets, allegedly those with low reputations (Ellwardt et al., 2012). In most of our classrooms, negative gossip was not concentrated on a few individuals. Still, we found a significant contribution of both high and low reputation, meaning that negative gossip zeroes in on the two ends of the reputational echelon. While, based on the literature, it is unsurprising that students with a low image were frequent gossip objects, so were those with perceived high reputations, which deserves further attention. One possible explanation is that, among adolescents, gossip can be "merciless" towards small mistakes (Bergmann, 1993), and students with high reputations are under a social spotlight, so their higher exposure. Another potential reason is that this higher reputation is perceived as undeserved (Jazaieri et al., 2019). An alternative reason could be that students punish the good-doers in an attempt to improve their image in comparison (Pleasant & Barclay, 2018). A related explanation is that students with high reputations are targeted instrumentally by their peers because confronting them offers larger status gains (Faris & Felmlee, 2014). Considering the few occasions demanding cooperation in classrooms, group-beneficial goals (like norm-enforcement) may be displaced here by self-serving purposes (like defaming competitors or garnering status). If so, it might be the case that, among adolescents, prosocial behaviours are penalised rather than rewarded to prevent that some individuals stand out over the rest. Unfortunately, since the relationship between reputation and previous behaviour is not straightforward (Anderson & Shirako, 2008), our speculations here might be unwarranted. Future studies can try to explain this allure for individuals with high reputations. Specifically, whether the reasons lay primarily on the sender's motives (e.g., envy, unfavourable comparison), the target's actions, or both.

This brings us to the limitations of our study. As we just pointed out above, one limitation is that the focus on antipathies somehow obscures the source of gossip in our data. Specifically, it leaves unclear whether the source of the gossip is the target's behaviour or the sender's motives instead. Controlling for properties of the sender, and especially of the target, was our way to account for the fact that some individuals might be seen to "deserve" being bad-mouthed. Unfortunately, measures like reputation are nothing but perfect as not all positive deeds are rewarded with a positive reputation, and not all negative actions are penalised with a negative reputation. A second limitation is that the results presented here only concern negative forms of gossip (not positive) and, even within these, when the gossip is somewhat recurring. Therefore, our contribution to the gossip literature is limited since our data does not capture all instances of negative talk. Continuing with data constraints, we must notice that ours were self-reported antipathies and gossip. As a result of this, we had to discard loads of information for the analyses. Most importantly, because of this data selection, it is plausible that our results may be biased towards settings where expressing gossip is somewhat normalised and accepted. This could help explain the absence of support for shared antipathy. Finally, since we addressed the data cross-sectionally, results should be read with caution in terms of causality. Ideally, we would have used the longitudinal component to measure the impact of negative ties on subsequent instances of gossip. Regrettably, the data did not lend itself to such type of treatment.

All in all, our results highlight the importance of considering negative as well as positive ties (Ellwardt et al., 2012; Grosser et al., 2010) in the study of gossip. The approach here considering multiplex relations helped delineate various mechanisms explaining negative gossip (viz., social influence and conformity with friends' antipathies). This was important both for gaining new theoretical knowledge about negative gossip in general and improving our foresight in practice regarding who is vulnerable to be the object of badmouthing in the classroom.

Data availability

A replication package including both the data and the code used is fully available on the GitHub account of the first author: https://github.com/joseluisesna/Gossip_in_Hungarian_high_schools.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.socnet.2021.11.009

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