THE BASES AND IMPACTS OF NEGATIVE SOCIAL RELATIONSHIPS

by

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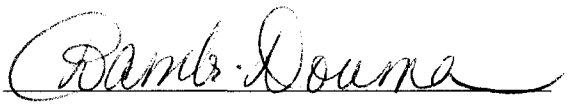
SIGNED: 

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DEDICATION

To Bari and Cooper, who continually remind me of what matters most in my life. You are the best children I could have ever asked for.

To Troy, who is my very best friend. Thank you for supporting me and loving me through it all.

To Jennie, who is so much more than a mother to me. I will always see you!

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Without you all, I would not be me.

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ABSTRACT

While there is a large amount of research on positive social relationships and their potential benefits and opportunities (*social capital*), negative social relationships and their potential *social liabilities* have been virtually ignored in the sociological and organizational literatures. Several researchers have identified this gap and made the call for research to examine both sides of social relationships to balance the "social ledger" (e.g., Brass & Labianca, 1999).

This dissertation was designed as a first step into the investigation of negative social ties. Two studies were conducted to examine characteristics that might affect the valence of social relationships as well as the influence of these types of social ties on various outcomes. Homophily, or interactions with similar individuals, has been shown to positively influence social relationships in a variety of areas (McPherson, Smith-Lovin, & Cook, 2001) and heterophily, or interactions with dissimilar others, has been proposed to influence negative social relationships (Brass & Labianca, 1999; Labianca & Brass, 1997). Furthermore, Brass and Labianca theorized that there would be an asymmetric effect between these two types of social ties and that negative ties would have more of an impact on outcomes than positive ties. I test hypotheses about heterophily and negative asymmetry, yet go beyond Brass and Labianca to also test for differences between forms of negative ties.

Data from three samples of undergraduate students in a male-dominated field of study were examined. Dissimilarities in age and differences in leadership preferences between dyad members were significantly related to negative ties. Older participants

were more likely to have negative ties than younger participants, as older participants rated others negatively more often and were rated negatively more often. Participants who preferred to be leaders in their small groups did not want to work again with others who did not care who led the small group or others who definitely preferred someone else lead.

There was little evidence to support Brass and Labianca's negative asymmetry theory. An expansion of this theory that includes distinguishing between self-directed and other-directed outcomes, as well as when to apply the different forms of negative ties is presented.

CHAPTER I: INTRODUCTION

There has been a large amount of research outlining the benefits and opportunities individuals in organizations possess as a result of positive social relations. The potential for these benefits and opportunities is known as *social capital*. Individuals with positive relationships receive greater access to information, better (and more timely) information, and more referrals for better positions (e.g., Burt, 1992). While there is a large amount of research on positive social relationships, negative social relationships and the potential of *social liabilities* have been virtually ignored in the sociological and organizational literatures. Several researchers have identified this gap and have made a call for research that examines both sides of social relationships together in order to balance the "social ledger" (e.g., Brass & Labianca, 1999).

This dissertation addresses this gap and two of the questions that currently exist in these literatures. The first study was designed to examine the antecedents or characteristics that might affect the valence of social relationships. While there exists research that suggests similar people tend to interact more and in a more positive manner in organizations (e.g., Granovetter, 1973), only propositions have been put forth about dissimilarities between individuals as a source of negative relationships (Brass & Labianca, 1999). In furthering the understanding of why some relationships develop to be negative and others neutral or positive, this study speaks to how people interact within a small group working together on a project. A finding that young men tend to have more negative ties to older women, for instance, would indicate that managers may need to design interactions that de-emphasize dissimilarities in age and gender and instead

emphasize similarities to increase the possibility of the development of positive ties (see Tsui & Gutek, 1999). Positive ties should, in turn, incur benefits and opportunities for the individuals and for the organization as information and resources are more likely to be shared. Training managers on the factors that are likely to impact tie valence could lead to a more productive workforce. If opportunities for the transfer of information and resources are left open rather than blocked by a negative tie, both the individuals and the organizations can benefit.

The second study was designed to investigate the impacts of the numbers of positive and negative social relationships on outcomes. Brass and Labianca (1999; Labianca & Brass, 1997) suggested that negative relationships would have a larger social impact in organizations than their positive counterparts. Negative social relationships with others are likely to prevent access to the same benefits and opportunities that those with positive social relationships within the organization enjoy. Lacking this access may have a more dramatic effect on outcomes than possessing it. An understanding of these impacts would allow managers to protect individuals as well as organizations from poor outcomes. Managers would be able to diagnose problems within the organization better. For instance, if necessary information was not reaching its destination, managers could investigate, or have consultants who understand networks investigate, the valence of the relationships to find out where the problem was occurring. Managers could also work to reduce poor organizational outcomes such as employee turnover and sabotage through managing relationships between employees.

Overall, these two studies serve as an introductory investigation into the sources of negative social ties and give us more information on the interactions between people who work closely together as well as the consequences of different types of social ties. In each study, I go beyond merely testing Brass and Labianca's hypotheses and negative asymmetry theory in social relationships (Brass & Labianca, 1999; Labianca & Brass, 1997) to also test differences in several forms of negative ties.

Relevant Literature Review: Theory and Evidence

Social Capital

Social capital lies in the potential for benefits and opportunities for those who have positive social relationships. It is ". . . a quality created between people, whereas human capital is a quality of individuals" (Burt, 1997, p. 256). Someone with a lot of human capital (e.g., education, experience, and intelligence) will not necessarily be successful. Success occurs when opportunities from social capital provide an opening for a person to apply his/her human capital (Burt).

Social capital has been defined as the ability to connect otherwise unconnected individuals to provide access to or control over non-redundant information and resources (Burt, 1997). Social capital is thought to be a public good (Coleman, 1988) in that the people who generate it usually see only a small portion of the benefits while others benefit from it as well. Coleman suggests that social capital has three forms or uses: 1) obligations and expectations – dyad members are willing to do something for the other member because of trust that s/he will do something in return, 2) obtaining information –

one dyad member gets useful information from the other, and 3) norms and sanctions – knowing how one should act and what happens if s/he fails to act in that manner.

There has been a lot of work demonstrating that positive social relations result in many benefits and opportunities for both individuals and organizations. For individuals, for instance, positive social relationships have been shown to give people access to more information, better information at the right times, and referrals for better positions (e.g., Burt, 1992; 1997). The assumption behind these findings is that friends, and even acquaintances, provide information, mentoring, and good references when they "know" good things about someone else (e.g., Higgins & Nohria, 1999). This type of social capital can enhance career development, progress within one's career, and promotion rates. Mentors provide protégés with information, access to information, and access to resources.

There are distinct benefits within the workplace, such as getting a job or a better job (e.g., Burt, 1992), more job satisfaction, power, and more and faster promotions (e.g., Brass, 1984). Burt also suggested that the more ties a person has, the better. For example, someone with a lot of positive ties is more likely to get information and get that information earlier than others who do not have a lot of positive ties. However, this is also suggested to work best when a person has a lot of weak ties, which makes these information benefits even larger because of diverse information received through the different ties (Granovetter, 1973).

Many of the benefits and opportunities come from social capital that results from homophily. Homophily is interaction with similar others (e.g., Lazarsfeld & Merton,

1954) and it is based on similarities in aspects between dyad members such as status and value (see McPherson, Smith-Lovin, & Cook, 2001). Homophily occurs because it is easier to communicate with those who are similar, it is easier to predict how they are going to behave, and there is more likely to be trust between similar people (Brass & Labianca, 1999). More similar people are likely to have more positive relations with each other (e.g., Burt, 1992; Granovetter, 1973). Homophily may also occur in departments within an organization (e.g., accounting folks stick together) based on proximity in the formal organizational chart.

McPherson et al. (2001) reviewed various types of homophily in different types of network relationships. They suggested that race and ethnicity homophily produces the most stratification in social networks. This type of homophily is evident for a lot of different social relationships. For example, prior evidence shows that race and ethnicity similarities are strong predictors of both intimate and confiding relationships (e.g., Marsden, 1987), friendship in schools (e.g., Shrum, Cheek, & Hunter, 1988), and work relationships (e.g., Ibarra, 1995).

McPherson et al. (2001) also reviewed research that showed evidence of gender homophily. In general, men tend to interact with other men and women tend to interact with other women. For example, Brass (1985) studied male and female interaction patterns within an organization. He found that most men listed other men and the women listed other women a majority of the time when asked who they interact with most. Ibarra (1992) found that men tend to interact with other men in a variety of situations. Women, on the other hand, interact with other women in friendship networks but interact with

men in other networks. Crosby, in work on relative deprivation, also found that people list same-sex others as referents (1982; Zanna, Crosby, & Loewenstein, 1987). McPherson et al. suggested that content-bound relationships, instead of intimate relationships, may be more likely to be characterized by gender homophily. However, gender homophily is not as common in the networks of young, educated people as in other networks (e.g., Marsden, 1987).

McPherson et al. (2001) also reviewed evidence for age homophily. They found that the amount of homophily varies between different types of networks. For example, age homophily can be the strongest of the homophily dimensions in close friendship networks (e.g., Verbrugge, 1977). Most friends outside of family are close to being the same age (e.g., Fischer, 1982).

Overall, the evidence is pretty consistent. Positive social network relationships are characterized by homophily. Let us now turn to the other side of these social relationships, the negative ties and the potential of these ties to create social liabilities.

Social Liabilities

The workplace is made up of humans interacting and behaving constantly, therefore conflict as well as cooperation has to exist. As Homans (1961) put it, conflict is inherent in human behavior. Brass and Labianca (1999) suggested that behaviors and relationships were not always positive and research needed to be done to find out more about the negative social ties and impacts as well. They suggested that information about negative relations (defined as "relationships in which at least one person has a negative

affective judgment of the other", p. 324) could be used to balance the 'social ledger'. Other researchers (e.g., Portes, 1998; Völkner & Flap, 2001) have agreed.

In a 1997 brief article in the *Proceedings from the Academy of Management Conference*, Labianca and Brass made explicit hypotheses about how the number of negative social relationships would be related to several different individual and organizational outcomes. Propositions included that the number of negative relationships would be negatively related to job satisfaction, commitment to the organization, power in the organization, and managerial perceptions of performance. The number of negative social relationships was also proposed to be positively related to negative outcomes such as withdrawal, turnover, absenteeism, and stress. In 1999, Brass and Labianca extended Coleman's (1988) work, as well as other more recent findings, and included many of these hypotheses for how negative social relations would impact individual and organizational outcomes. They also expanded on the outcome hypotheses to include ideas about the antecedents of negative ties as well.

Negative social relationships were suggested by Brass and Labianca (1999) to be built on heterophily (interactions with dissimilar others; dissimilarity based on affiliations, attitudes, gender, race, etc.). Status and value heterophily were both presented (as actor and attitude heterophily) to be sources of negative social relationships (Brass & Labianca). Dissimilarity between members of a dyad may lead to a negative social tie between the two members and also to exclusion from the benefits and opportunities of social capital. Dissimilar dyad members are more likely not to trust the other or to share information with the other. This could have an overall negative effect on

the social capital in the network (Brass & Labianca). Non-redundant information that could travel between dissimilar actors would not be passed on. Dissimilarity in attitudes among two members may also lead to reduced overall social capital because value dissimilarity might lead to avoidance. People who share similar attitudes tend to be in the same places at the same times (e.g., sporting events), while those with dissimilar attitudes or values do not (Brass & Labianca).

Heterophily may cause people to be excluded from the positive social networks that result in promotion, job satisfaction, and power within the organization. Being excluded from the positive social networks might result in poor outcomes for the individual (i.e., turnover, loss of productivity). These poor outcomes may also extend beyond the individual level (e.g., lower job satisfaction) to the organizational level (e.g., transfer of information and sharing of resources).

Little research has been done on negative relationships to this point. It is not known what factors result *in* a negative relationship or conclusively, what consequences result *from* a negative relationship. Research on negative ties can complement the research on positive ties and enhance our understanding of how relationships are formed and what the consequences for different types of ties are.

Negative Asymmetry

Negative events can have an adverse impact on individual and organizational outcomes, and in many cases a stronger impact than positive events (e.g., Skowronski & Carlston, 1989; Taylor, 1991). Because negative events are unexpected, they are more salient than positive outcomes once they occur (e.g., a *contrast effect*). For example, a

person can spend a lot of time building a positive reputation through many positive events, but one negative event can destroy that reputation he built (e.g., Jesse Jackson, Bill Clinton). In addition, negative information tends to be clearer and more direct than positive information, which allows people to make judgments based on that information more easily (Skowronski & Carlston). For example, a patron making a complaint at a restaurant will usually tell exactly what the problem is (e.g., a fly in the soup), while a person giving positive feedback will likely say something more ambiguous (e.g., the service was good).

In several articles about the proposed impacts of negative social relations, Brass and Labianca (Brass & Labianca, 1999; Labianca & Brass, 1997; Labianca, Brass, & Gray, 1998) suggested that negative social ties would have a greater impact on outcomes than positive social ties. Citing earlier work in the psychological literature about the devastating impact of negative events (as compared to positive events) on emotions, psychological reactions, and physiological reactions (e.g., Kahneman & Tversky, 1984; Rook, 1984), Brass and Labianca extended this idea to the area of social relationships. Other research in psychology also has indicated a negativity bias or negative asymmetry (e.g., Klein, 1996; Ito, Larsen, Smith, & Cacioppo, 1998; Matthews & Dietz-Uhler, 1998; Ohira, Winton, & Oyama, 1998). All relations are not positive, so negative relationships must also impact organizational variables. A negative social tie may have more of an impact than a positive social tie because it is unexpected and more influential. Basically, social liabilities are likely to result in the withholding of information and the absence of

referrals. Implicit is the idea of distrust, where trust is so important in social capital (especially in the form of obligations and expectations).

Labianca and Brass (1997) explicitly hypothesized that the number of negative relationships would be negatively related to managerial perceptions of performance and several other variables. Homans (1961) wrote about the exchange of rewards (positive social relations) having more of an influence on social behavior than the exchange of punishments (negative social relations). At first glance, this might be taken to mean that negative asymmetry would not occur. However, the reason behind this difference between positive and negative social relations and the impact on behavior is that negative relationships usually put an end to social behavior altogether. If one person does not like another, s/he may try to avoid the other (although this is often impossible in the work setting, as Brass and Labianca [1999] have indicated). If he cannot avoid the other person, then he may choose to show avoidance in some of his behaviors toward the other, such as refraining from giving the other information that could be beneficial or from referring the other for a better position (this can happen consciously or unconsciously). Little research has been done at this point to test this theory in social relationships.

Relevant Literature Review: Critique

I find three problems in Brass and Labianca's (1999; Labianca & Brass, 1997) propositions about negative social relationships and theory of negative asymmetry. Two of these problems are based on their definition of negative ties. Brass and Labianca have defined negative ties as "relationships in which at least one person has a negative

affective judgment of the other" (p. 324). This definition may impede future empirical research, as it is poorly explicated. The other problem deals with treating all outcomes the same in the theory of negative asymmetry. I attempt to address these problems here in this critique as well as in the studies conducted for this dissertation.

Symmetry of Negative Ties

The first problem with the definition is that it is too general in regards to the direction of negativity flow. The definition, as is, only refers to undirected negative ties. Undirected ties occur when *at least one* of the dyad members chooses the other for some relationship. Let us assume that each member of a dyad can either rate the other member positively or negatively. There are four possible outcomes. First, person A could rate person B positively and person B could rate person A positively. This relationship would be determined to be positive. Next, person A could rate person B positively, but person B could rate person A negatively. This results in a negative tie according to Brass and Labianca's (1999) definition. The situation where person A rates person B negatively but person B rates person A positively would also result in a negative tie. Finally, both person A and person B rating each other negatively also results in a negative tie. In this simple case, where the relationships can only be positive or negative, three of the four possible relationships would be determined to be negative. Information as to the direction of the tie is not possible under their definition. A researcher cannot determine who is rating whom negatively.

I argue, then, that directed negative ties are also important. Directed ties occur when one member's choosing of the other (person A choosing person B) is independent

of the choice in the other direction (person B choosing person A). Therefore, directed ties should give the researcher more information. Directed ties can be separated into two distinct forms. One is directed-from social ties, which comes from one member choosing the other (person A choosing person B results in a directed-from social tie for person A). The other form of directed tie is found by examining which member was chosen for the relationship (person A choosing person B results in a directed-at social tie for person B).

Why is this distinction important? These three separate types of ties based on directionality can be directly applied to Bandura's (2001) three different modes of human agency in social cognitive theory. All people want to have some control over what happens to them (human agency). The most-studied mode of human agency is personal agency. Personal agency is characterized by intentionality and forethought – that is, people intend to act a certain way in hopes that the action produces the desired outcomes. People attempt to control their lives by the choices they make (Bandura). Directed-from social ties are akin to this mode of human agency. Choices are made about others and the relationships between the egos and the alters can be studied as directional from the ego.

But, as Bandura notes, "people do not live their lives in isolation" (2001, p. 13). There are some outcomes that people can achieve only through dependence on others. When a person does not have direct control on what will happen, but others do, s/he turns to proxy agency. Proxy agency occurs when a person tries to get desired outcomes through others who have the access or resources to provide those outcomes (Bandura). This mode of agency can be studied through directed-at social ties. Choices made by

others, especially choices about that person, can influence his or her outcomes. The relationships between egos and alters can be studied as directional towards the alter.

Finally, some outcomes are produced through the collective network or the social system (Bandura, 2001). The direction of social ties in these cases are not important, the fact that a tie exists is. Therefore, undirected social ties can be studied for questions regarding collective agency.

Affective Judgment

The second problem with this definition is the type of judgment (affective only). Based on this definition, I can make the assumption that a positive relationship is based on some positive affective judgment about another. While I do not wish to become involved in the debate on whether positive and negative affectivity should be considered two separate scales (i.e., every relationship has both positive and negative affective components and these components are distinct) or one bi-polar scale (i.e., an increase in negative affectivity means a decrease in positive affectivity; see Cropanzano, Weiss, Hale, & Reb, 2003 for a review), I adopt the perspective of Brass and Labianca (1999) that an ego (person making the judgment) forms a global judgment of an alter (person judgment is being made about) which can be expressed by like versus dislike – on opposite ends of a continuum.

Generally, then, this judgment of the valence of social ties is simply an attitude about another person. If this is the case then the judgment probably has both affective and cognitive components (e.g., Eagly & Chaiken, 1993) which cannot be separated. Therefore, defining a negative tie on affect alone is very limiting. Depending on the

situation, affect or cognition may override the other (see Ajzen, 2001 for a discussion). Also, there may be individual differences in the tendencies to rely on one or the other when making judgments (Haddock & Zanna, 1998). Empirical research using this definition is almost impossible. I argue that the definition of a negative tie should be based on a negative judgment of another, not strictly on a negative *affective* judgment of another.

Differentiation of Outcomes

The final problem deals with the theory of negative asymmetry. The central idea of this theory, as Brass and Labianca (1999) explained, is that negative ties will have more impact on outcomes than positive ties. The broad definition of the term "negative ties", as discussed earlier, is evident. The problem here, however, lies in the vagueness of the term "outcomes". Brass and Labianca do not distinguish between different types of outcomes. I argue that outcomes are likely to arise from one of three conditions (self-directed, other-directed, or network-directed). For example, self-directed outcomes (individual outcomes that the person has control over) include turnover, stress, job satisfaction, and commitment. Other-directed outcomes (individual outcomes that others have control over) include managers' perceptions of performance, power within organizations, and promotions. Network-directed outcomes (individual outcomes based on the structure of the network) include centrality in the network, connections in cliques, and filling structural holes. Applying the perspectives of human agency, I also argue that self-directed outcomes are likely to be based on the mechanism of personal agency (directed-from ties), other-directed outcomes are likely to be based on the mechanism of

proxy agency (directed-at ties), and network-directed outcomes are likely to be based on the mechanism of collective agency. Therefore, it makes sense to investigate these different types of outcomes by different types of relational ties.

Research Questions

While a great deal of research has been done on the positive aspects of social capital, a gap remains in the sociological and organizational literatures with regards to both the bases of and consequences of negative social ties. This dissertation is a necessary first step to start filling in this gap by examining characteristics that are related to negative social ties and comparing the impacts of ties of different valence.

I intend to address two questions that are currently without answers in the literature.

1. What types of individual dissimilarities influence the negativity within a dyadic social relationship?
2. Does the number of an individual's negative social relationships have a greater impact on outcomes than the number of positive social relationships?

In this endeavor, I also intend to go beyond Brass and Labianca's ideas and also examine the differences between undirected and directed negative ties as well as self-directed versus other-directed outcomes.

Overview of Studies

I attempt to provide an answer, appropriate for the samples that I am studying, to both of these questions in this dissertation. First, in Chapter II, I describe a study in which dissimilarities between dyad members were examined as bases for negative social ties. While there is evidence that positive ties are based on homophily, there are currently only propositions about the sources of negative ties. One specific form of homophily that has been examined in the social capital or positive tie research is gender. Therefore, gender heterophily served as a primary variable of interest in this first study. I proposed that differences in gender would be positively related to negative social relationships. Another primary variable of interest was physical attractiveness. This variable has not been, to my knowledge, studied in regards to its effects on social relationships in the sociological and organizational literatures, although it has been studied extensively at the individual level in social psychology. I proposed that differences in physical attractiveness would be positively related to negative social relationships. Secondary variables that were examined included differences in age, citizenship, foreign student status, grade point average from a previous semester, masculinity and femininity scores, and leadership preferences. In each case, I proposed that differences between members based on the characteristics would be positively related to negative social relationships. In this study, I specifically examined the relationships between dissimilarities in characteristics with both undirected and directed-at negative social ties.

Next, in Chapter III, I describe a study that was designed to test Brass and Labianca's (1999; Labianca & Brass, 1997) negative asymmetry theory. The

relationships with and impacts of the number of positive ties (from Douma, Koput, & Gutek, 2003) and the number of negative ties (from Chapter II) on various outcomes were investigated. Outcomes included self-directed outcomes such as perceptions of difficulty, satisfaction, and interest of the group project and commitment to the field of study. Other-directed outcomes such as current and future choice of leader in the small group, the numbers of job interviews, and the number of job offers received are also investigated. I proposed that not only would the number of negative ties have a greater relationship with or impact on the outcome than the number of positive ties, but that also the number of negative ties would have a significant negative relationship and the number of positive ties would have a significant positive relationship with positive outcomes (the opposite is proposed for negative outcomes). In this study, I specifically examined the effects of the number of undirected negative ties relative to the number of directed negative ties.

These studies serve as a necessary first step into the investigation of negative ties. People in organizations interact on a daily basis and the relationships that are built on these interactions cannot all be positive. It is important to investigate not only what influences the valence of social ties, but also the consequences of tie valence and directionality of the negative social tie.

Overview of Methods

Data

A University of Michigan (UM) research group provided me with a dataset that included many variables related to the issues in question. The data were collected as part of an investigation into the role of social networks in the underrepresentation of women in the information technology field. Undergraduate business students at a large southwestern university who were majoring in management information systems were the participants in this project. Rather than working with an entire network of students within an information technology program of study, the data for this project were condensed to include only cases for those students who had been in semester-long project teams. These groups were formed according to the students' choosing. If no choice was made, then the student was assigned to a group.

Every case is from a student who participated in a team of three to six students. Each network here, then, is relatively small (size between three and six). In each sample, these small-group networks are embedded within the larger cohort network. While I am not examining the larger network within this dissertation, the overall network is also a mechanism by which negative outcomes are realized (see earlier discussion on collective agency and network-directed outcomes). Each ego knows and has interacted with each alter on an ongoing basis, and there is a high degree of task interdependence.

Each case was given a randomly assigned case number and all data remained completely anonymous and confidential. There was no way to trace cases back to a specific person.

Samples

Three samples were examined in these studies. Each sample consisted of one cohort of students (i.e., students beginning the program together by taking the introductory course in the same semester).

Sample 1

Sixty-three participants who entered the program in the spring of 2000 and graduated in the fall of 2001 made up Sample 1. Eighteen of these participants (29%) are female. A majority of the students in this sample are from the United States (68%). The 21 foreign students have various citizenships with India being the most highly represented with three students. Participants' ages range from 20 to 42 with the mean age being 24 (median: 23; standard deviation: 4.1).

Each participant was a member of a small group who worked together throughout the semester on a course project. There were twelve groups included in this sample. There were no all-women groups, nor were there any all-foreign student groups. There were four groups with all men members, five men-majority groups, and three women-majority groups. There was only one group in which all members were United States citizens, eight groups with a United States citizen student majority, and three groups with a foreign student majority. Nine groups had at least half of the members from the same country of citizenship. There were eight groups in which the range of ages was less than five years. Two participants were assigned to a group; the rest of the participants chose which group to be in.

Sample 2

Ninety-nine participants who entered the program in the fall of 2000 and graduated in the spring of 2002 made up Sample 2. Like Sample 1, a majority of the students are men from the United States, with only twenty-two members of this sample (22%) being female, and 25 being foreign students (25%). China had the most foreign students in this sample with five. The ages for participants ranged from 20 to 52. The mean age is 24 (median age: 22; standard deviation: 5.9).

This sample consisted of 20 groups. There were no all-women member groups or any all-foreign student groups. There were six all-men member groups and 11 men-majority groups. There were three groups in which women were the majority. There were 10 groups in which the members were all from the United States. Five groups were made up of a majority of United States citizens and five groups had a majority of foreign students. Fourteen of these groups had at least half of the members from the same country of citizenship. Seven of the groups were made up of students whose ages did not differ by more than five years. Seven participants in this sample were assigned to a group.

Sample 3

Participants who took their introductory course in the fall of 2001 and who will graduate in the spring of 2003 made up the third sample. One hundred students were included in this cohort. Thirty-one of these participants are female. Thirty-two participants had citizenship outside the United States. India had the most foreign students represented in this sample with seven. The mean age was 23.5 years (standard deviation: 4.3). The median age was 22 and the range was 20 to 55.

There were 22 groups in this sample. There were seven all-men groups and no all-women groups. Nine of the groups had a majority of men members, five had a majority of women members, and one group had the same number of men and women. Ten groups were made up of all members from the United States and two of the groups were made up of members who all had foreign citizenship. Six of the groups had a majority of members from the United States, three had a majority of foreign student members, and one group had the same number of United States and foreign citizens. Eighteen of these groups had at least half of the members from the same country of citizenship. Eleven of the groups had age ranges less than five. Eight participants in this sample were assigned to, rather than chose, a group.

Differences Between Samples

There were several differences among samples for the independent and dependent variables (see Table 1-1). Therefore, each sample was investigated separately. The most conservative of the multiple comparison tests for the characteristics, the Scheffé test (Kerlinger & Lee, 2000), showed that Sample 1 and Sample 2 differed in the mean physical attractiveness ratings of the participants ($M_1 = 4.30$, $M_2 = 5.07$, $p < .05$) and in the amount of times participants chose that they definitely wanted someone else to lead ($M_1 = .00$, $M_2 = .08$, $p < .10$). Sample 2 and Sample 3 had different average masculinity scores ($M_2 = 3.08$, $M_3 = 2.84$, $p < .05$). The numbers of different valence ties were similar for all samples except for the number of undirected negative ties. For this variable, Samples 1 and 3 differed ($M_1 = .89$, $M_3 = .52$, $p < .10$). For two of the outcome variables, perceived difficulty of the project and interest in the project, Sample 1 ($M_{Dif} = 3.42$; M_{Int}

= 3.92) differed from both Sample 2 (M_{Dif} = 4.24, $p < .01$; M_{Int} = 4.35, $p < .01$) and Sample 3 (M_{Dif} = 4.14, $p < .01$; M_{Int} = 4.49, $p < .01$). Grade point average, commitment to the field of study, number of job interviews and number of job offers were not included for Sample 3 because those participants had not yet completed the appropriate UM survey.

TABLE 1-1. Differences Between Samples

Variable	F	Variable	F
Gender	.949	Number of Times Chosen as Task Leader	.585
Physical Attractiveness	4.002*	Number of Times Chosen as Relational Leader	1.318
Age	.590	Number of Times Chosen for Overall Leader	1.220
Foreign Status	.729	Difficulty of the Project	26.815**
Grade Point Average[a]	.819	Satisfaction with the Project	1.851
Masculinity	3.52*	Interest Value of the Project	8.851**
Femininity	1.617	Commitment to Field[a]	.494
Leadership Preference1[b]	.450	Number of Job Interviews[a]	1.140
Leadership Preference2[b]	3.257*	Number of Job Offers[a]	2.761
Number of Positive Ties	2.169	Number of Directed-At Negative Ties	.957
Number of Undirected Negative Ties	3.105*	Number of Directed-From Negative Ties	1.190

[a] Data for these variables were not available for Sample 3.
[b] Dummy variable for leadership preference; Leadership Preference1 = definitely prefer me to lead; Leadership Preference2 = definitely prefer someone else to lead; reference category = does not matter who leads
** indicates p-value < .01; * indicates p-value < .05; $^{+}$ indicates p-value < .10

Variables

Independent Variables in the First Study

Several different variables were examined in the two studies. As briefly mentioned earlier, gender and physical attractiveness were the primary independent variables in the first study. These are both physical characteristics that can be easily and quickly identified and assessed by others (Fiske & Taylor, 1991). Gender was coded as female = 1 and male = 0 and was provided in the dataset by the UM research group.

Three graduate-student raters who were unfamiliar with the participants rated each participant's physical attractiveness on a ten-point scale (1 being not at all attractive and 10 being very attractive). This separation in raters from participants was necessary for nullifying the effects of height, weight, and personality. Photographs were collected from an instructor in the department in which the participants took classes and a member of the UM research group matched the name of the participant in the photograph with an identification number and then assigned the random case number for identification purposes in this study. For as many participants as pictures were available, a head-and-shoulders photograph was shown on the computer for approximately 10 seconds. Each rater had a laptop on which they made independent ratings. When all raters had completed the rating, the next photograph was shown. For 258 cases, the inter-rater reliability was .82. Fifteen of the cases were presented twice to enable test-retest reliability to be calculated. Together, the test-retest reliability for the three raters was .82 (individual α ranged from .70 to .93).

Secondary independent variables included in the first study were age, country of citizenship, foreign student status, grade point average from the previous semester, masculinity scores, femininity scores, and preferences of group leadership. Each of these variables were provided by the UM research group. Age was calculated from the last day of the semester in which the survey was taken minus the date of birth. This number was then divided by 10,000 and rounded to the closest integer. Country of citizenship was provided in abbreviated text form and was identified through a code sheet provided from the UM research group (see Appendix A for the list of countries for all participants). Whether the participant was a foreign student or a domestic student was also provided by the UM research group. The codes were 1 for a foreign student and 0 for a domestic student. Grade point average from the previous semester was provided for two of the three samples. The scale for grade point average was the standard 4.00 scale. Masculinity and femininity scores were each calculated as the average response to eight questions from the Personal Attributes Questionnaire (Spence & Helmreich, 1978). The responses were coded from 0 to 4, with 0 being not at all and 4 being very (see Appendix B for the items included). Finally, preferences for group leadership was a nominal variable provided from an item that asked, "Who do you prefer to be the leader when you are working in a group/team?" The response options were definitely me (coded as 1), does not matter (coded as 2), and definitely someone else (coded as 3).

Dependent Variables in the First Study

Each of the participants was asked to rate the other members of their small group on several items. One of these items, "If you had to do another group project for a course

grade, would you want this member in your group again?" was used as the basis for coding the tie between the individual as positive, negative, or neutral. While neutral ties were not explored in either of the two studies included in this dissertation, they were coded so that positive and negative ties would not be mutually exclusive. The response options for the above item were numbers on a five-point scale from 1 (no desire to work with again) to 5 (would like to work with again). Responses of five, as long as each member of the dyad rated the other as a five as well, were coded as positive ties. When each dyad member rated the other with the highest possible rating, each member was scored as having a positive tie. One of the members rating another member with anything less than five indicated that there was some aspect of the relationship that was not positive. Therefore, these ties were not coded as positive.

Any response of one or two was coded as a negative tie. These negative ties were then coded several different ways. For undirected negative ties, when at least one member of the dyad rated the other with a one or a two, both the ego that rated the alter and the alter that was rated negatively were coded as having that negative tie. Undirected negative ties then could be present for a participant even if that participant did not fill out the survey. For directed negative ties, the ego and alter choices of each other do not have to match. In the first study negative ties were examined using matrix form (see Douma et al., 2003 for a similar study examining positive ties for these samples).

The numbers of undirected negative ties, as well as the numbers of directed-from negative ties and directed-at negative ties are also used as dependent variables in the exploratory analyses in the first study. Directed-from negative ties were those ties where

only the ego who rated an alter negatively was given the negative tie. Those who did not fill out the survey or who did not rate others at all were coded as missing in this form of the variable. Directed-at negative ties were those ties where only the alter receiving the negative rating from an ego was given the negative tie.

Independent Variables in the Second Study

In the second study, the numbers of positive ties (taken from Douma et al., 2003) and the numbers of negative ties were examined as independent variables. Negative ties were further broken down into undirected, directed-from, and directed-at, as discussed above.

It seemed that there would be fewer negative social ties than positive social ties within the samples because presumably people tend to avoid those whom they do not like (i.e., would not choose to be in the same groups). For example, the people who are involved in the group that attends the theater once a month are not likely to be as involved with the group of people that head out to the monster truck show together. Similar people enjoy similar things and are therefore more likely to interact with each other. The frequencies and totals of the different types of ties are shown in Table 1-2. The five-point scale used to differentiate positive and negative ties was 1 (no desire to work with again) to 5 (would like to work with again). Positive ties occurred when both the ego and alter rated each other as 5. Undirected negative ties occurred when at least one of the dyad members rated the other as 1 or 2. The dyad member rating the other member with a 1 or 2 has a directed-from negative tie. The dyad member receiving a negative (1 or 2) rating from the other member has a directed-at negative tie.

TABLE 1-2. Frequencies and Total Number of Different Valence Ties

Sample	Variable	Frequencies 0	1	2	3	4	Total
1	Positive Ties	23	13	7	5	2	50
	Undirected Negative Ties	28	20	9	6	0	56
n = 63	Directed-From Negative Ties	35	5	6	4	0	29
	Directed-At Negative Ties	40	18	4	1	0	29
2	Positive Ties	28	23	21	19	4	138
	Undirected Negative Ties	55	25	11	5	3	74
n = 99	Directed-From Negative Ties	63	26	5	1	0	39
	Directed-At Negative Ties	81	5	8	2	3	39
3	Positive Ties	26	24	10	0	16	108
	Undirected Negative Ties	66	20	11	2	1	52
n = 100	Directed-From Negative Ties	54	16	5	1	0	29
	Directed-At Negative Ties	81	11	7	0	1	29

Dependent Variables in the Second Study

Self-directed outcomes. There were various outcomes examined in the second study. First, self-directed outcomes based on the perception of the project were studied. There were three variables included, each of which was a response on a five-point scale ranging from 1 (not at all) to 5 (very). The first was the negative outcome of difficulty. This was assessed by the item, "How difficult was this semester's team project?" Next, the participants were asked to respond to the positive outcome items, "How satisfied were you with the deliverable your team produced?" and "How interesting was this semester's project?"

The other self-directed outcome that was examined was commitment to the field of study. The commitment scale used in the UM survey was adapted from the Mowday, Steers, and Porter (1979) scale. The items were changed slightly to fit the field of study that participants were responding about. The scale, as given, is shown in Appendix C. Commitment questions were asked during the last semester of study in the given field and

therefore are cross-sectional when used in conjunction with the tie variables for Sample 1 and are longitudinal when used in conjunction with the tie variables for Sample 2. Sample 3 participants answered the same commitment questions in an earlier semester, but data had not been collected for their final semester. Therefore, commitment was not examined for Sample 3.

Other-directed outcomes. Other-directed outcomes were also examined in the second study. First, choices by team members of leadership within the small group were investigated. The number of times that each participant was chosen as the overall group leader (i.e., name was written in as the one group member who best exemplified the statement, "Was the overall leader of the group") was calculated, as were the number of times that each participant was chosen as the group task leader (i.e., name was written in as the one group member who best exemplified the statement, "Made the most direct contribution [e.g., solving problems, providing information, making decisions] to the project") and the number of times that each participant was chosen as the group relational leader (i.e., name was written in as the one group member who best exemplified the statement, "Made the most indirect contribution [e.g., interpersonal relations, group morale] to the project"). The participant could choose any of the other group members or themselves as the group member for any of these choices. This was a cross-sectional variable as it was included in the same survey as the ratings item used to distinguish positive and negative ties.

For one sample, Sample 2, there were also data available from a similar survey taken the next semester. In that semester, the participants again had a group project and

filled out the same questionnaire. The participants were expected to remain in their same groups, so the number of times chosen on the three leadership dimensions could also be studied longitudinally. The items were identical and whether the participants changed groups or not was included as a control in the analyses.

Finally, the numbers of job interviews and the numbers of job offers were investigated as other-directed outcomes. Participants self-reported the number of job interviews that they had been to in the past 12 months. They also self-reported the number of job offers that they had received.

Overview of Analyses

Networks are patterns of relations between individuals in a specified group. Social networks are often studied from an ego-centric perspective – meaning the ties or relationships for target persons are analyzed (target's or ego's ties with various others, called alters). For example, studies of relationships within organizations can show whether the informal relationships among the individuals follow those outlined in the formal organizational chart (e.g., Krackhardt & Hanson, 1993). Each relationship exists between two members of the organization, but is not necessarily strictly a property of these two members. Instead, each relationship connects these members into larger systems or networks of social relations (Scott, 2000).

Analyses of social networks are based on relational, rather than attribute, data. "Relational data . . . are the contacts, ties, and connections, the group attachments and meetings, which relate one agent to another . . ." (Scott, 2000, p. 3). There can be

different types of networks for each ego. For example, one person may have a network of people that she goes to seeking advice or specific information, a network of people she trusts, and a network of friendship relationships. The same alters do not necessarily have to be present in each of the different types of networks, and the ego does not necessarily have to hold similar positions in the different networks.

After relational data are collected they must be organized into matrix form. The most general matrix that is formed is that of a standard dataset in that the rows represent the agents or egos and the columns represent attributes or other variables. These matrices are rectangular because the numbers of rows and columns do not have to match (Scott, 2000). From this standard matrix, a square case-by-case matrix can be formed. In this matrix, the rows and columns both represent cases or particular people and the cells then indicate whether or not the two intersection people have a specific type of relationship (Scott). This pattern of rows and columns shows the relationships between any two members that are part of the overall social network.

Relationships or ties can be examined as undirected or directed. Undirected data are the easiest to handle in network analyses because the matrix of relationships is symmetrical (Scott, 2000). Undirected ties occur when at least one of the dyad members chooses the other for some relationship. The relationship between person A and person B is the same as the relationship between person B and person A. Directed data, when the choices of the two members are examined independently, cause the matrix to be asymmetrical. The relationship between person A and person B may be different than the relationship between person B and person A. For example, a survey question asks for the

respondent to name the people s/he goes to for a specific reason (e.g., assistance, friendship). If the researcher was interested only in the existence of a relationship, rather than what direction the relationship went, s/he would construct an undirected matrix. This matrix would include all of the people in the network as the rows and columns. The cell values would be one if at least one of the members of the intersecting members chose the other. Values of zero (0) would be present for cells in which neither of the intersecting members chose the other. If the researcher was interested in the direction of the relationship (i.e., who picked who as a friend), then a directed matrix would be constructed. In this matrix, a one (1) would be entered if the row person chose the column person. Therefore this matrix would be asymmetrical unless all of the relationships went both ways. In the directed tie matrix, directed-from ties are evident for each of the row cases because the row person chooses the column person and directed-at ties are evident for each of the column cases. The distinction between undirected and directed ties is important for this dissertation.

Analyses will be conducted at several different levels in order to determine support for the hypotheses that are outlined in each chapter. Individual level analyses in the form of regressions, with the number of positive ties or the number of negative ties as the dependent variable, were used in investigating the different outcomes. In the cases where the outcomes or dependent variables were non-negative count variables standard linear regressions were replaced by Poisson or Negative Binomial regression models. Because standard linear regression models can result in inefficient and biased estimates for count variables (Long, 1997), these two models were used instead. When the variance

equals the mean for count variables, the Poisson regression model was used. In some cases, however, the variance of the count variable is greater than the mean. In these cases, the Negative Binomial regression model was used. When the dependent variables were binary, logit regressions were used.

Analyses that dealt more with the process of the formation of a negative tie were conducted differently. The level of analysis here was the dyad and analyses were conducted with data from a matrix form. Matrices developed in the software program Ucinet 5 for difference in characteristics were used as the independent variables and undirected or directed negative ties between members of the dyad were used as the dependent variables. Quadratic Assignment Procedure (QAP) regressions were used to examine whether dissimilarities were related to negative ties. The QAP regression technique (Krackhardt, 1988) was used because the data violate the assumption of independence necessary in the ordinary least squares (OLS) regressions. The dyadic information was extracted from the Ucinet 5 program into Matlab 6.1 in order to run the QAP regressions when there was a lot of missing information (i.e., each matrix only had values for those participants who were in the same group). In this extraction, the data were converted from matrices into columns.

During the first step of a QAP regression, a standard OLS regression is run and coefficients are determined. During the second step, the program randomly permutes the rows and columns 2000 times, recalculating the coefficients each time. When this process is finished, the original coefficients are indicated along with a corresponding p-value. The p-value is the actual proportion of permutations that resulted in a coefficient larger than

the original. P-values greater than .05 and less than .10 are considered marginally significant in all analyses. QAP regressions are used extensively in the next chapter.

CHAPTER II: BASES OF NEGATIVE SOCIAL RELATIONSHIPS

There has been what some might call a positivity bias in the literature on social networks and the workplace since the research has investigated positive social relationships and ignored negative social relationships. While the positives are interesting, they do not tell the full story. The workplace is made up of humans interacting and behaving on a daily basis and therefore, conflict as well as cooperation has to exist. Conflict is inherent in human behavior (Homans, 1961). Besides research on positive social relationships and the potential benefits of social capital, there should also be research on negative social relationships and the potential consequences of social liabilities. Several researchers have made a call for such research on negative ties (e.g., Brass & Labianca, 1999; Portes, 1998; Völkner & Flap, 2001). This study is designed to begin to fill the gap in the literature by examining antecedents or bases of negative ties in social relationships.

Theory and Evidence

Much of the social network research has focused on the potential benefits of social capital (e.g., Brass, 1984; Burt, 1992). However, while relationships may have benefits, they may also have costs or consequences. This is the other side of social capital. Information on the other side – social liabilities – can be used to balance the 'social ledger' (Brass & Labianca, 1999; Labianca & Brass, 1997). Social liabilities have been referred to as the "potential liabilities that can result from negative relationships" (Brass & Labianca, p. 325). Negative relationships were defined as "relationships in

which at least one person has a negative affective judgment of the other" (Brass & Labianca, p. 324).

Labianca and Brass (1997) took the first step towards the study of negative ties by presenting a theory about negative relationships at work. In this theory, negative relationships can be formed in three ways: direct interaction, indirect interaction, or third party information. In direct interaction, interpretations of another as threatening or unpleasant cause an ego to experience an intense physiological response. This response, in turn, increases the attention paid to that alter and influences a negative schema about the alter. Egos will then use future interactions to confirm that negative schema (Labianca & Brass).

In indirect interaction, interpretations of the alter are based on information about the alter received from others. Negative information about another person known to the ego is likely to be attended to and a negative schema developed. When others know that the ego feels negatively about an alter, they are likely to pass on negative information that can confirm or reinforce that schema. Likewise, the ego is likely to pay attention to information that feeds that feeling (Labianca & Brass, 1997).

When there is no interaction between an ego and an alter, negative judgments about the other will be based on negative gossip from a third party. Labianca and Brass (1997) suggested that third party information tends to be less ambiguous than information gained in direct interactions. Because the information is clearer, the ego can make judgments more quickly and easily.

Along with their theory of negative relationships at work, Labianca and Brass (1997) made explicit hypotheses about how the number of negative relationships would relate to several different individual and organizational outcomes, such as turnover, loss of productivity, lower job satisfaction, and not sharing information and resources. Negative ties may cause people to be excluded from the positive social networks that result in promotion, job satisfaction, and power within the organization (Brass & Labianca, 1999). These outcomes will be explored more in the next chapter.

Brass and Labianca (1999) expanded on these outcome hypotheses to also include ideas about how negative ties are formed. Negative relationships were proposed to be built on heterophily (interactions with dissimilar others). Two forms of heterophily were presented as important. These two forms presented by Brass and Labianca, actor and attitude, are similar to the two forms of homophily, status and value, that Lazarsfeld and Merton (1954) described.

Actor or status heterophily means dissimilarities in gender, age, ethnic or racial background, religion, and ability. These are major demographic characteristics that may stratify society (McPherson et al., 2001). Dissimilarities in status may cause communication between two actors to be infrequent, asymmetric, and/or negative (Brass & Labianca, 1999). Dissimilar actors are less likely to trust each other or share information with the other.

Attitude or value heterophily, on the other hand, means dissimilarities in attitudes or internal states (McPherson et al., 2001). Dissimilarities in values can lead to disagreements and avoidance of the alter. While it is possible that a negative relationship

may be based on dissimilarity between attitudes, it is also possible that having a negative relationship may influence dissimilarity in attitudes between two actors (Brass & Labianca, 1999). An ego who does not like an alter may take the opposite side on issues, just to show that the two of them are not alike. It is not known which is likely to influence the other more.

This study was designed to examine antecedents or bases of negative ties in social relationships. Both forms of heterophily, status and value, will be used to determine the types of characteristics that relate to negative relationships. In addition to testing Brass and Labianca's (1999) ideas about heterophily, I also investigate the differences between undirected and directed negative ties.

Hypotheses

To examine heterophily influences on the development of negative ties, several hypotheses were examined. First, since there is a great deal of research citing evidence for gender homophily in organizations with regards to social capital (e.g., Brass, 1985; Ibarra, 1992), it is proposed that gender heterophily will be related to social liabilities. Gender is a status variable. Men are usually considered, or at least have been considered in the past, to have more status than women. This is likely to be the case in the samples examined in this study, as men are the majority. There is likely to be less trust and shared information when two people are different from each other. Therefore, negative ties should be more likely within dyads where the individuals are not of the same gender (i.e., a mixed dyad; one man and one woman).

Hypothesis 2-1: Gender heterophily will be positively related to negative ties.

Physical attractiveness has been studied extensively in social psychology in interpersonal relations and love relationships. This variable has not been studied much in the sociological and organizational literatures, particularly in social networks. Physical attractiveness can be viewed as a status characteristic (e.g., Jackson, Hunter & Hodge, 1995). Social psychology researchers have found that more attractive people are perceived to have more status. Therefore, differences in physical attractiveness should cause avoidance or dislike. When one member of the dyad is not as attractive as, or is more attractive than the other member, it is likely that one of the members will prefer to avoid the other.

Hypothesis 2-2: Physical attractiveness heterophily will be positively related to negative ties.

Finally, other heterophily variables, including both status heterophily and value heterophily are examined. Secondary variables such as age, citizenship, foreign student status, grade point average, masculinity, femininity, and preferences in group leadership are all investigated. The prediction for each of the secondary variables is that dissimilarities will be positively related to negative ties.

Hypothesis 2-3: Dissimilarity in secondary variables will be positively related to negative ties.

Labianca and Brass (1997) also suggested that research should be done on the differences in networks and network relationships of different types of people. It is easily

imagined that different types of people (i.e., men and women) may have differences in their networks of relationships. For example, in this study because the majority of the people in the field are men, women may have a greater amount of negative ties in general. It may also be the case that less attractive people have more negative ties than attractive people because others are likely to want to be associated with more attractive people. Explorations into these types of differences are made.

Method

Data and Samples

The University of Michigan research group described in the Introduction provided the data in anonymous form. The same samples as those discussed in the introductory chapter were utilized for this study. Data were received in standard case form, where each case contained information for an ego (see Appendix D for a sample of the data). Along with ego information, variables for alters in which the ego had rated negatively (as described below) were also included.

Variables

Independent Variables

There are a number of independent variables, and several forms of some of these variables, used in this study. Independent variables for both the ego and the alter were included. The standard form of each variable was used in the individual level analyses.

The first primary independent variable was gender, coded as male = 0 and female = 1. For use in dyad level analyses, a dissimilarity matrix for gender was created in

Ucinet 5 (see Appendix E for a description of steps). These independent variable matrices (one for each sample) contained cell values of 0 if the genders of the dyad members matched (i.e., either both men or both women) and cell values of 1 if the genders of the dyad members did not match (i.e., one man and one woman).

The second primary independent variable was physical attractiveness. The physical attractiveness score for each ego and alter was the average of the ratings discussed in the introductory chapter. For the dyad level analyses, dissimilarity matrices for physical attractiveness were created by the same steps as the dissimilarity matrices for gender. The cell values for this matrix were the Euclidean distance between the members' average ratings of physical attractiveness.

The secondary independent variables included age, citizenship, foreign student status, grade point average from a previous semester, masculinity and femininity scores, and leadership preferences. Information about the participants' ages was provided in birth date form. The age variable was created by subtracting the ego or alter's birth date from the last day of the semester that the survey was offered and then dividing by 10000, always rounding to the nearest whole number. This calculation gave a two-digit number for age (e.g., 23). For example, those participants in Sample 1 took the survey in the fall semester of 2001. For those participants, their birth date (in the form of YYYYMMDD) was subtracted from 20011231 and then divided by 10000. When the age variable was turned into dissimilarity matrix form, the Euclidean distance between dyad members' ages was input in each cell.

The citizenship variable was provided for each ego and alter in text, abbreviated form. For example, if a participant was from Pakistan, the appropriate citizenship code was PK. A list of the citizenship codes for all participants is included in Appendix A. Because the United States was the most frequent country of citizenship of the participants, it was given the code of 1. The other countries were given numbers based on the order they were presented. Citizenship is therefore a nominal variable. The dissimilarity matrix for citizenship contained cell values of 0 for a match of citizenship country and a 1 for a non-match of citizenship country.

Whether each participant was a foreign student (coded as 1) or a domestic student (coded as 0) was also provided. The dissimilarity matrix for foreign status was created to contain cell values of 0 for a match of foreign student status (i.e., both foreign students or both domestic students). Cell values of 1 were input for dyads in which the members did not match on foreign student status (i.e., one foreign and one domestic student).

Grade point average from the previous semester, based on the standard 4.00 scale, was provided for each ego and alter in Samples 1 and 2. At the time of analyses the research group had not yet provided this information for Sample 3. A dissimilarity matrix based on the Euclidean distance between the dyad members' grade point averages was created.

Masculinity and femininity scores were each calculated from eight different responses to items on the Personal Attributes Questionnaire (Spence & Helmreich, 1978). The items and the response options used for each of these scores are shown in Appendix B. A dissimilarity matrix for Euclidean distance between dyad members' masculinity

scores was created, as was a dissimilarity matrix for Euclidean distance between members' femininity scores.

The independent variable for leadership preferences was a nominal variable based on responses to the item, "Who do you prefer to be the leader when you are working in a group/team?" The response options were "definitely me" (coded as 1), "does not matter" (coded as 2), and "definitely someone else" (coded as 3). The dissimilarity matrix created for this independent variable contained cell values of zero (0) for matches between dyad members' leadership preferences and cell values of one (1) for non-matches. For example, if both dyad members responded that they definitely prefer to be the leader themselves, then they were coded as matching (0).

After each dissimilarity matrix was created it was multiplied by a matrix that contained cell values of 1 if the members were in the same group and 0 if the members were not in the same group. The resulting matrices of the independent variables contained values for row members who were in the same groups as column members. These participants would have had the option of rating each other on different items. While the above discussed dissimilarity matrices were created for analyses with undirected negative ties, another form was created for analyses dealing with directed negative ties (see the discussion of dependent variables). Since directed negative ties were only evident for those who were rated by others, the number possible was lower than the number of undirected negative ties. The forms of the dissimilarity matrices created for the undirected analyses were examined and information in cells was deleted for dyads that did not have ratings from one of the members.

Dependent Variables

Negative ties serve as the dependent variable in this study. Negative ties were determined by the responses to the item, "If you had to do another group project for a course grade, would you want this member in your group again?" Each ego was asked this question about every other member of his/her small group. The response options ranged from one to five with one being "no desire to work with again" and five being "would like to work with again." If the ego responded with a number less than three (i.e., one or two), then that ego was coded as having a negative tie with the member that s/he was rating.

There are three forms of this dependent variable that are used in the analyses. The first is an undirected form of negative ties. In the case of undirected ties, if one member of the dyad rated the other negatively, then each member was coded as having a negative tie with the other. This form of the dependent variable matches Brass and Labianca's (1999) definition. The resulting matrix of negative ties between dyad members was symmetrical with a zero in the cell if neither member rated the other negatively and a one if one of the members rated the other negatively.

The other forms of negative ties are directed. Directed negative ties are only coded as negative for the specific case where the ego rates an alter negatively. While Brass and Labianca (1999; Labianca & Brass, 1997) did not specifically hypothesize about directed negative ties, it makes sense to investigate this form of the dependent variable as well. It seems likely that directed ties would give more information about the antecedents of negative ties (i.e., characteristics of the ego and alter could be separated).

It is impossible, by the definition, to separate the actual characteristics of the ego and the alter in undirected negative ties. With directed negative ties, these characteristics can be analyzed separately.

The matrix of directed negative ties between dyad members is asymmetrical as a 1 is placed in the cell when the row person has rated the column person negatively. Since the matrix is square with the row cases matching the column cases, directed-from negative ties can be examined by looking at the rows of this matrix and directed-at negative ties can be examined by looking at the columns of this matrix. For the group-level analyses in this chapter (QAP regressions), directed-from and directed-at negative ties are not distinguishable. The two forms of directed negative ties will be examined later in this chapter and in Chapter III.

These forms of the dependent variable were used to create individual level dependent variables as well. The number of undirected negative ties for each ego and alter was calculated by summing the number of times at least one member of the dyad (for all dyads in a group) had rated the other member with a score of less than three on the five-point scale. The number of directed-from negative ties for each ego was calculated by summing across the rows of the matrix (number of times that person had rated other members of the group negatively). The number of directed-at negative ties for each alter was calculated by summing the down the columns of the matrix (number of times that person had been rated negatively by other members of the group).

Results

There were 56 undirected negative ties out of 270 possible undirected ties between dyad members (21%) in Sample 1, 74 out of a possible 392 (19%) in Sample 2, and 52 out of 366 (14%) in Sample 3. These are undirected negative ties in that at least one member of the dyad rated the other member less than 3 (Brass & Labianca, 1999). Each member of the dyad was then coded as having a negative tie with the other. The numbers of directed negative ties – those based only on the evaluations by one dyad member of the other were slightly different – indicating that not all negative ties went both ways. There were 29 directed negative ties out of 215 possible directed ties between dyad members (13%) in Sample 1, 39 out of 373 (10%) in Sample 2, and 29 out of 272 (11%) in Sample 3 (see Table 1-2). The number of possible ties was lower in directed negative ties because not all members of each group rated each of the other members. Some group members chose not to answer the survey conducted by the UM research group or left out group members when filling it out.

Gender Heterophily

Undirected Negative Ties

To test Hypothesis 2-1, that gender heterophily would be positively related to negative ties, QAP regressions were run for each sample. First analyses had the dependent variable as the matrix of undirected negative ties (negative tie = 1; non-negative tie = 0) and the independent variable as the matrix for non-matches in gender (i.e., non-match = 1, gender match = 0). In Samples 1 and 2, the coefficient was positive,

but not significant ($B_1 = .034, p = .47$, n = 270; $B_2 = .011, p = .88$, n = 384). In Sample 3, gender dissimilarity was positively related to undirected negative ties ($B_3 = .083, p < .05$, n = 366). Therefore, Hypothesis 2-1 for undirected negative ties was supported in Sample 3 only.

Table 2-1 shows a break-down of the descriptive undirected results by ego and alter gender. The number of undirected negative ties out of the total number of ties possible between the dyad members are shown along with the percentages. For instance, in Sample 3, 14 of the 174 possible undirected ties (8%) between two male dyad members were negative while 10 of the 46 possible undirected ties (21.7%) between two female dyad members were negative.

TABLE 2-1. Undirected Negative Ties By Gender

		Alter Gender			
Sample	Ego Gender	Male	Percent	Female	Percent
1	Male	22 / 140	15.7	11 / 48	22.9
	Female	11 / 48	22.9	12 / 34	35.3
2	Male	44 / 232	19.0	13 / 65	20.0
	Female	13 / 65	20.0	4 / 22	18.2
3	Male	14 / 174	8.0	14 / 73	19.2
	Female	14 / 73	19.2	10 / 46	21.7

Directed Negative Ties

QAP regressions using the dependent variable matrix of directed negative ties were run with the independent variable matrix of dissimilarity in gender to further investigate this relationship. For Samples 1 and 3, the coefficients were positive but not significant ($B_1 = .03, p = .61$, n = 215; $B_3 = .06, p = .15$, n = 272). For Sample 2, the coefficient was negative and not significant ($B_2 = -.004, p = .92$, n = 365). Therefore,

Hypothesis 2-1, that dissimilarities in gender would be positively related to negative ties, was not supported for any sample when using the directed negative tie matrix as the dependent variable.

Further investigation revealed the differences in the Sample 3 findings (significant in undirected and not significant in directed). As shown in Table 2-1, Sample 3 has a distinct pattern in that the percentage of undirected negative ties between men is lower than the percentages of undirected negative ties for mixed or female dyads. Table 2-2 (a similar break-down of descriptive directed results by ego and alter gender) shows that when these ties are examined as directed, the pattern is not as distinct. Almost half of all dyads (47%) in this sample were between men and only 5.5% of those man-man ties were directed negative ties. Where ratings could be made across genders, slightly more than 11% of the ties where men were rating women were negative and over 17% of the ties where women were rating men were negative. Almost 18% of the possible directed ties between women were negative.

TABLE 2-2. Directed Negative Ties By Gender

		Alter Gender			
Sample	Ego Gender	Male	Percent	Female	Percent
1	Male	11 / 111	9.9	6 / 40	15.0
	Female	6 / 38	15.8	6 / 26	23.1
2	Male	24 / 219	11.0	7 / 63	11.1
	Female	6 / 62	9.7	2 / 21	9.5
3	Male	7 / 128	5.5	6 / 53	11.3
	Female	9 / 52	17.3	7 / 39	17.9

Therefore, women were rated negatively at a higher rate by men than other men, but women also rated others (both men and women) negatively at a higher rate than men (see Table 2-2). The results from Sample 1 follow a similar, but also non-significant, pattern.

Physical Attractiveness Heterophily

Undirected Negative Ties

QAP regressions were conducted for each sample to test Hypothesis 2-2, that physical attractiveness heterophily would be positively related to negative ties. The dependent variable was the matrix of undirected negative ties and the independent variable was the matrix for Euclidean distance between members' physical attractiveness ratings. In Samples 1 and 2, the coefficient was negative, but not significant (B_1 = -.036, p = .15, n = 80; B_2 = -.022, p = .20, n = 332). Dissimilarity in physical attractiveness scores was positively related to undirected negative ties for Sample 3 (B_3 = .067, p < .001, n = 336). Hypothesis 2-2 was supported for undirected negative ties in Sample 3 only. Descriptively, for each sample, the average attractiveness score for those with undirected negative relationships was less than the average attractiveness score for those without undirected negative ties (see Table 2-3).

TABLE 2-3. Physical Attractiveness Score By Ties

Sample	Tie	Mean	S. D.	n
1	Negative	4.08	.86	24
	Not Negative	4.37	1.28	118
2	Negative	4.82	1.33	65
	Not Negative	5.13	1.45	295
3	Negative	4.58	1.66	49
	Not Negative	4.85	1.22	301

Note: Attractiveness scores based on a 10-point scale (1 = not at all attractive; 10 = very attractive)

The general pattern is that the participants with undirected negative ties were the less attractive participants. However, since these results are undirected, it is not possible to determine whether unattractive people were rating attractive people negatively or vice versa. QAP regressions using the matrix of directed negative ties clarified this.

Directed Negative Ties

Hypothesis 2-2 was also supported for directed negative ties in Sample 3 only. Dissimilarity in physical attractiveness scores were not related to directed negative ties in Sample 1 (B_1 = -.034, p = .30, n = 58) or Sample 2 (B_2 = -.014, p = .31, n = 321). In Sample 3, however, dissimilarity in physical attractiveness scores were positively related to directed negative ties (B_3 = .05, p < .01, n = 248).

Investigation into this result revealed that the more attractive participants did not want to work with the less attractive participants again. Table 2-4 shows the mean attractiveness scores broken down by ego and alter for both negative ties and for non-negative ties.

TABLE 2-4. Physical Attractiveness Scores by Sample for Directed Negative Ties

Sample	Dyad Member	Negative Ties			Not Negative Ties		
		Mean	S.D.	n	Mean	S. D.	n
1	Ego	4.10	.69	13	4.42	1.08	96
	Alter	4.03	1.03	12	4.37	1.23	101
2	Ego	4.94	1.26	38	5.11	1.48	310
	Alter	4.62	1.35	31	5.09	1.44	311
3	Ego	4.88	1.74	29	4.68	1.32	231
	Alter	3.99	1.67	26	4.83	1.31	232

Note: Attractiveness scores based on a 10-point scale (1 = not at all attractive; 10 = very attractive)

The mean physical attractiveness score for the ego is higher than that of the alter. Also, the mean physical attractiveness scores for those with negative ties were lower than those with non-negative ties. This pattern occurred in each of the samples, but was only significant for Sample 3.

Status (Actor) Heterophily Variables

Age Heterophily

Undirected negative ties. Hypothesis 2-3, that heterophily in secondary variables would be related to negative ties, was supported for the age variable in all samples using undirected negative ties. Differences in age between members of the dyads were positively related to undirected negative ties for each sample. In each case, Euclidean distance between dyad members' ages was positively related to undirected negative ties between these members. For each sample, the coefficient was positive and significant (B_1 = .025, $p < .001$, n = 270; B_2 = .006, $p < .05$, n = 384; B_3 = .019, $p < .001$, n = 366). Table 2-5 shows the mean ages for those people with undirected negative ties and those without those negative ties.

TABLE 2-5. Age By Type of Undirected Tie

Sample	Tie	Mean	S. D.	n
1	Negative	25.93	6.16	56
	Not Negative	23.50	3.47	214
2	Negative	25.39	6.56	74
	Not Negative	24.06	5.67	314
3	Negative	25.69	7.02	52
	Not Negative	23.12	3.21	314

While it is not possible to determine conclusively from these results the direction of the negative tie, a pattern occurred that indicated undirected negative ties were more likely to be held by older participants. For each sample the mean is higher for those with negative ties than for those with non-negative ties.

Directed negative ties. QAP regressions with the directed negative tie matrix as the dependent variable showed support for Hypothesis 2-3 only in Samples 1 and 3. In each of these samples, age dissimilarity was positively related to directed negative ties ($B_1 = .014, p < .01$, n = 215; $B_3 = .018, p < .001$, n = 272). For Sample 2, the coefficient was positive but not significant ($B_2 = .003, p = .25$, n = 365).

An examination of the average ages for both the ego and the alter confirm that the average ages were different for those who have directed negative ties and those who do not. However, the direction between the ages of the ego and alter differs between the two samples that showed significant results for dissimilarity in age (see Table 2-6). In this table the mean ages are shown by dyad member and negative or non-negative tie. In Sample 1 older participants did not want to work with younger participants again (mean ego age is higher than mean alter age) while in Sample 3 younger participants did not want to work with older participants again (mean ego age is lower than mean alter age).

TABLE 2-6. Ego and Alter Age by Type of Directed Tie

Sample	Dyad Member	Negative			Not Negative		
		Mean	S.D.	n	Mean	S. D.	n
1	Ego	28.21	6.82	29	23.85	3.95	186
	Alter	24.14	4.96	29	24.07	4.28	186
2	Ego	26.10	7.92	39	24.23	5.69	330
	Alter	24.38	4.51	39	24.44	6.14	330
3	Ego	25.79	8.40	29	23.21	3.25	243
	Alter	27.45	8.87	29	23.35	3.48	243

Citizenship Heterophily

Undirected negative ties. Hypothesis 2-3 was supported only in Sample 1 for dissimilarity in country of citizenship when using the matrix for undirected negative ties. Differences in citizenship were related to undirected negative ties in Sample 1 ($B_1 = .139$, $p < .01$, n = 270), but not in Samples 2 and 3 ($B_2 = .026$, $p = .57$, n = 384; $B_3 = -.036$, $p = .33$, n = 366). In these QAP regressions, the matrix of undirected negative ties was regressed on a matrix of non-matching country of citizenship.

A majority of the participants in each sample were from the United States. A majority of the possible undirected ties (130 in Sample 1) and also a majority of the actual undirected negative ties (18 in Sample 1) were between two participants from the United States. Table 2-7 shows a break-down of the undirected negative ties by United States and non-United States citizenship. There is not a consistent pattern between the samples.

TABLE 2-7. Undirected Negative Ties By U.S. and Non-U.S. Citizenship

Sample	Ego Citizenship	Alter Citizenship			
		U.S.	Percent	Not U.S.	Percent
1	U.S.	18 / 130	13.8	14 / 53	26.4
	Not U.S.	14 / 53	26.4	5 / 16	31.3
2	U.S.	36 / 200	18	10 / 65	15.4
	Not U.S.	10 / 65	15.4	8 / 14	57.1
3	U.S.	30 / 178	16.9	9 / 55	16.4
	Not U.S.	9 / 55	16.4	2 / 34	5.9

Directed negative ties. QAP regressions with the matrix for directed negative ties were run to further investigate citizenship differences. Hypothesis 2-3 was partially

supported for Sample 1, but not for Samples 2 and 3. The coefficient was positive and marginally significant for Sample 1 ($B_1 = .085, p < .10$, n = 215). In both of the other samples, the coefficient was positive but not significant ($B_2 = .029, p = .32$, n = 365; $B_3 = .003, p = .88$, n = 272).

Investigation into the directionality of this difference in Sample 1 called for sixteen dummy variables to be created for the different countries of citizenship within the sample. The United States served as the reference country (zeros inputted for all dummy variables) because a majority of the participants were from the United States. A participant from one specific country rated others negatively more often than participants from the United States. One participant from a different country was rated negatively more often relative to participants from the United States. The identity of those two countries is not given because there was only one participant from each country and therefore his/her identity might be revealed for a certain audience. In this case, because of the low numbers of participants from the different countries it remains unclear whether specific differences in citizenship relate to negative ties (e.g., U.S. citizens do not want to work with Iraqi citizens).

Foreign Status Heterophily

Undirected negative ties. With sixteen citizenship dummy variables in Sample 1, 26 in Sample 2, and 31 in Sample 3, interpretation was difficult. Therefore, a simpler independent variable was used to determine if differences in foreign student status of the participants was related to negative ties. A participant most likely is considered to be a foreign student if the country of citizenship is not the United States. QAP regressions

were conducted with the dependent variable of the matrix of undirected negative ties regressed on a matrix of non-matches for foreign status.

Hypothesis 2-3, predicting that dissimilarity in secondary variables (including foreign status), was supported for Sample 1, but not Samples 2 and 3. These results follow the same pattern as citizenship, with the matrix of differences in foreign status being positively related to the matrix for undirected negative ties in Sample 1 ($B_1 = .093$, $p < .05$, n = 270), but not Samples 2 or 3 ($B_2 = .000$, $p = .91$, n = 384; $B_3 = -.034$, $p = .41$, n = 366). Table 2-8 shows the results for undirected negative ties by foreign status. Foreign students were more likely to have undirected negative ties than domestic students in Sample 1. Sample 2 percentages follow a similar, but non-significant, pattern.

TABLE 2-8. Undirected Negative Ties By Foreign Student Status

		Alter Status			
Sample	Ego Status	Domestic	Percent	Foreign	Percent
1	Domestic	18 / 130	13.8	14 / 53	26.4
	Foreign	14 / 53	26.4	10 / 34	29.4
2	Domestic	38 / 228	16.7	11 / 57	19.3
	Foreign	11 / 57	19.3	14 / 42	33.3
3	Domestic	38 / 202	18.8	5 / 43	11.6
	Foreign	5 / 43	11.6	4 / 78	5.1

Directed negative ties. QAP regressions using the directed negative tie matrix along with the matrix for non-matches in foreign status were conducted. Hypothesis 2-3 was not supported for any sample when using directed negative ties. The coefficients in Samples 1 and 3 were positive but not significant ($B_1 = .058$, $p = .30$, n = 215; $B_3 = .032$, $p = .60$, n = 272). The coefficient in Sample 1 was negative and not significant ($B_2 = -.009$, $p = .78$, n = 365).

Further investigation revealed the differences in the Sample 1 findings (significant with undirected negative ties and not significant with directed negative ties). Table 2-9 shows a break-down of directed negative ties by foreign student status.

TABLE 2-9. Directed Negative Ties By Foreign Student Status

		Alter Status			
Sample	Ego Status	Domestic	Percent	Foreign	Percent
1	Domestic	10 / 108	9.3	11 / 46	23.9
	Foreign	3 / 36	8.3	5 / 25	20.0
2	Domestic	19 / 220	8.6	8 / 54	14.8
	Foreign	3 / 55	5.5	9 / 36	25.0
3	Domestic	20 / 171	11.7	5 / 32	15.6
	Foreign	2 / 21	9.5	2 / 48	4.2

It is evident from the results shown in this table that foreign student participants had a greater percentage of directed negative ties than domestic students. This is the case whether domestic or foreign student participants were rating foreign students. The only exception is in Sample 3 when the dyad members are both foreign students and the percentage of directed negative ties is lower than other dyads.

Grade Point Average Heterophily

Undirected negative ties. The matrix for undirected negative ties was regressed on the dissimilarity matrix of Euclidean distance between grade point averages for Samples 1 and 2. Sample 3 did not have data on grade point averages and was not included in this analysis. Hypothesis 2-3 was supported in Sample 2 only. Dissimilarity in grade point average was positively related to negative ties in Sample 2 ($B_2 = .07, p < .05$, n = 384) but not in Sample 1 ($B_1 = .009, p = .83$, n = 254).

Evidence from both samples indicate a pattern that those with lower grade point averages were more likely to have undirected negative ties. The difference between grade point averages was greater for Sample 2 (M_{neg} = 3.18, $M_{not\text{-}neg}$ = 3.42), which accounts for the significance of the result discussed above for this sample. In Sample 1, the same pattern was evident, but the difference between means was not as large (M_{neg} = 3.14, $M_{not\text{-}neg}$ = 3.27).

Directed negative ties. Hypothesis 2-3 was not supported for either sample when using the directed negative tie matrix. In Sample 1, the coefficient was negative and not significant (B_1 = -.001, p = .97, n = 199). In Sample 2, the coefficient was positive and not significant (B_2 = .031, p = .16, n = 370). The results indicated a non-significant pattern in both samples (Sample 1: M_{ego} = 3.30, M_{alter} = 2.99; Sample 2: M_{ego} = 3.42, M_{alter} = 3.25) where participants with higher grade point averages did not want to work with participants with lower grade point averages again.

Value (Attitude) Heterophily Variables

Masculinity and Femininity Heterophily

Undirected negative ties. QAP regressions with the matrix for undirected negative ties were run separately for the masculinity and femininity variables. Hypothesis 2-3, predicting that dissimilarity between the dyad members would be related to negative ties, was not supported for either of these variables in any of the samples. For dissimilarities in masculinity scores, the coefficients in Samples 1 and 2 were positive and not significant (B_1 = .062, p = .34, n = 246; B_2 = .059, p = .64, n = 104). For Sample 3, the coefficient

was negative and not significant (B_3 = -.076, p = .13, n = 290). Table 2-10 shows the averages and standard deviations of the masculinity scores for all samples.

TABLE 2-10. Masculinity Scores By Sample for Undirected Negative Ties

Sample	Tie	Mean	S.D.	n
1	Negative	2.83	.55	55
	Not Negative	2.96	.51	203
2	Negative	3.08	.33	36
	Not Negative	3.08	.41	152
3	Negative	2.95	.54	43
	Not Negative	2.82	.54	282

Note: Masculinity score based on average of responses to 8 items from PAQ scale developed by Spence, Helmreich, and Stapp (1974). Responses made on five-point scale (0-4); one item was reverse-coded.

For dissimilarities in femininity scores, the coefficients for each sample were positive and not significant (B_1 = .032, p = .56, n = 246; B_2 = .123, p = .19, n = 104; B_3 = .04, p = .33, n = 290). Table 2-11 shows the averages and standard deviations of these scores by undirected negative ties for all samples.

TABLE 2-11. Femininity Scores By Sample for Undirected Negative Ties

Sample	Tie	Mean	S.D.	n
1	Negative	2.93	.67	55
	Not Negative	2.90	.57	203
2	Negative	2.88	.47	36
	Not Negative	2.83	.52	152
3	Negative	2.71	.51	43
	Not Negative	2.78	.55	282

Note: Femininity score based on average of responses to 8 items from PAQ scale developed by Spence, Helmreich, and Stapp (1974). Responses made on five-point scale (0-4).

Directed negative ties. Hypothesis 2-3 was not supported for these variables when the matrix for the directed negative ties was used for any sample. Neither dissimilarities in masculinity scores or in femininity scores were positively related to directed negative

ties. For dissimilarities in masculinity scores, the coefficient for Sample 1 was positive and not significant ($B_1 = .059, p = .31$, n = 199). For the other two samples, the coefficient was negative and not significant ($B_2 = -.001, p = .95$, n = 104; $B_3 = -.081, p = .12$, n = 225). Table 2-12 shows the pattern in masculinity scores for directed negative ties. In each sample the egos had higher average masculinity scores than the alters, but the differences were not significant.

TABLE 2-12. Masculinity Scores By Sample for Directed Negative Ties

Sample	Dyad Member	Mean	S.D.	n
1	Ego	2.89	.57	29
	Alter	2.74	.53	28
2	Ego	3.11	.37	19
	Alter	3.01	.27	20
3	Ego	3.03	.57	27
	Alter	2.93	.49	21

Note: Masculinity score based on average of responses to 8 items from PAQ scale developed by Spence, Helmreich, and Stapp (1974). Responses made on five-point scale (0-4); one item was reverse-coded.

For dissimilarities in femininity scores, the coefficients for all three samples were positive and not significant ($B_1 = .019, p = .71$, n = 199; $B_2 = .069, p = .31$, n = 104; $B_3 = .016, p = .65$, n = 225). Table 2-13 shows the opposite pattern of the masculinity results.

TABLE 2-13. Femininity Scores By Sample for Directed Negative Ties

Sample	Dyad Member	Mean	S.D.	n
1	Ego	2.87	.59	29
	Alter	2.94	.76	28
2	Ego	2.85	.53	19
	Alter	2.89	.39	20
3	Ego	2.67	.50	27
	Alter	2.74	.47	21

Note: Femininity score based on average of responses to 8 items from PAQ scale developed by Spence, Helmreich, and Stapp (1974). Responses made on five-point scale (0-4).

Generally, in each sample, the mean femininity score for the alter was higher than that for the ego, but the differences were not significant.

Heterophily in Leadership Preferences

Undirected negative ties. Hypothesis 2-3, that dissimilarity between dyad members on variables like leadership preferences would be related to negative ties, was supported in two of the samples for undirected negative ties. In Samples 1 and 3, dissimilarities between preferences were positively related to undirected negative ties ($B_1 = .168, p < .01$, n = 178; $B_3 = .142, p < .01$, n = 222). The relationship was not significant in Sample 2 ($B_2 = .042, p = .28$, n = 362). Table 2-14 shows the percentages of undirected negative ties by sample for the different options of leadership preference.

TABLE 2-14. Percentages of Undirected Negative Ties For Leadership Preferences

Sample	Ego Preference	Alter Preference					
		1	%	2	%	3	%
1	1	2 / 6	33.3	13 / 35	37.1	0 / 0	0
	2	13 / 35	37.1	20 / 102	19.6	0 / 0	0
	3	0 / 0	0	0 / 0	0	0 / 0	0
2	1	6 / 20	30.0	12 / 56	21.4	1 / 6	16.7
	2	12 / 56	21.4	22 / 170	12.9	3 / 23	13.0
	3	1 / 6	16.7	3 / 23	13.0	0 / 2	0.0
3	1	0 / 12	0.0	10 / 45	22.2	2 / 3	66.7
	2	10 / 45	22.2	12 / 104	11.5	1 / 5	20.0
	3	2 / 3	66.7	1 / 5	20.0	0 / 0	0

Note: Preference Values: 1 = definitely me; 2 = does not matter; 3 = definitely someone else

In Sample 1, since there were no responses that participants definitely preferred someone else to be the leader, the dissimilarities that contributed to significance were between those who definitely preferred themselves to lead and those who did not have a preference. In Sample 3, the differences were between those who definitely preferred

themselves to lead and those who chose either of the other options (did not care, definitely someone else).

Directed negative ties. For directed negative ties, Hypothesis 2-3 was partially supported for Sample 3 only. The coefficients in both Samples 1 and 2 were positive and not significant ($B_1 = .095, p = .13$, n = 175; $B_2 = .034, p = .21$, n = 359). The coefficient for Sample 3 was positive and marginally significant ($B_3 = .081, p < .10$, n = 222). Table 2-15 shows the percentages of directed negative ties by ego and alter leadership preference.

TABLE 2-15. Percentages of Directed Negative Ties For Leadership Preferences

	Ego	Alter Preference					
Sample	Preference	1	%	2	%	3	%
1	1	1 / 6	16.7	12 / 34	35.3	0 / 0	0
	2	2 / 35	5.7	10 / 99	10.1	0 / 0	0
	3	0 / 0	0	0 / 0	0	0 / 0	0
2	1	3 / 19	15.8	7 / 54	13.0	0 / 6	0.0
	2	7 / 56	12.5	11 / 170	6.5	2 / 23	8.7
	3	1 / 6	16.7	1 / 23	4.3	0 / 2	0.0
3	1	0 / 12	0.0	9 / 45	20.0	1 / 3	33.3
	2	3 / 45	6.7	7 / 104	6.7	0 / 5	0.0
	3	1 / 3	33.3	1 / 5	20.0	0 / 0	0

Note: Preference Values: 1 = definitely me; 2 = does not matter; 3 = definitely someone else

In Sample 1 nobody preferred that someone else definitely be the group leader. Although the alters were more likely to have been rated negatively when they did not have a preference of who was the leader, the difference was not significant. Of those dyads where each member had a different preference for leadership in Sample 3, those who definitely preferred themselves to lead did not want to work again with those who

definitely preferred someone else besides them lead or those who did not care who the leader was.

QAP Multiple Regressions

Undirected Negative Ties

Next, a multiple regression QAP model was calculated for each sample using undirected negative ties (see Table 2-16 for results). Because this was an exploratory model, all of the independent variables were included in the model at one time. Then, by deleting those variables that greatly decreased the sample size or that were not significant, a significant model was found (see Appendix F for Sample 1 example).

TABLE 2-16. QAP Multiple Regression Results by Sample For Undirected Negative Ties

	Beta	p-value
Sample 1		
Constant	-.057	1.00
Differences in age	.029	.000
Differences in citizenship	.261	.000
Differences in leadership preferences	.216	.001
Sample 2		
Constant	.111	1.00
Differences in age	.007	.019
Differences in leadership preferences	.069	.015
Sample 3		
Constant	-.016	1.00
Differences in age	.015	.002
Differences in physical attractiveness	.045	.038
Differences in leadership preferences	.144	.005

Differences in age and leadership preferences remained significant together in their relationship to undirected negative ties for all samples (see Table 2-16). In Sample 1, citizenship differences were also positively related to undirected negative ties. In

Sample 3, physical attractiveness differences were also positively related to undirected negative ties.

Directed Negative Ties

The same procedure was used for a QAP multiple regression model using the matrix for directed negative ties as the dependent variable (see Table 2-17 for QAP multiple regression results). The matrices that were significant predictors of negative ties remained the same for Samples 1 and 3. However, for Sample 2, none of the matrices remained as a significant predictor of negative ties.

TABLE 2-17. QAP Multiple Regression Results by Sample For Directed Negative Ties

	Beta	p-value
Sample 1		
Constant	-.028	1.00
Differences in age	.016	.006
Differences in citizenship	.127	.016
Differences in leadership preferences	.119	.033
Sample 3		
Constant	-.043	.964
Differences in age	.016	.001
Differences in physical attractiveness	.030	.083
Differences in leadership preferences	.088	.034

Sample 1 results indicated that older participants did not want to work again with younger participants, that citizenship differences are related to negative ties, and that those who preferred to lead did not want to work again with those who did not care who leads. Sample 3 results were consistent with what has already been discussed under the simple QAP results. Younger participants, in this sample, did not want to work with older participants, more attractive participants did not want to work with less attractive

participants again, and those who preferred to lead did not want to work again with those who either did not care or definitely wanted someone else besides them to lead.

Interactions with the Primary Independent Variables

To obtain a better understanding of whether these significant variables behave differently for different people, interactions between differences in age and leadership preferences with the two primary independent variables of interest (gender and physical attractiveness) were explored.

The data were converted from matrix form to standard form with a case for each rating of an alter by an ego (directed negative ties). Whether the ego rated the alter as negative (coded as 1) or not negative (coded as 0) were included in the dataset as well as attributes of both the ego and the alter (see Appendix G for a data sample). The data file was loaded into the statistical software program Stata. Since the level of analysis here was the individual and the dependent variable was a binary variable of whether a directed negative tie existed or not, logit regressions were conducted. For each sample the significant predictor variables, the primary independent variables, and the interaction terms all served as independent variables and the existence of a directed negative tie served as the dependent variable.

While the QAP regressions run earlier take into account the dependency of the observations, the logit regressions used here do not. Therefore, in the following analyses, the p-values are inflated, which in turn means that significance is understated.

Age Heterophily Interactions

Both gender and physical attractiveness for the ego and the alter were entered along with a new variable called age difference and the interaction terms. The age difference variable was created by calculating the difference in ages between egos and alters in the direction that they differed as discussed earlier (i.e., ego age minus alter age for Samples 1 and 2; alter age minus ego age for Sample 3). The logit results for these interactions with age in all of the samples are shown in Table 2-18. Physical attractiveness and its interaction with age was left out of the equation for Sample 1 because of the low number of physical attractiveness ratings in this sample.

TABLE 2-18. Logit Regression Results By Sample for Age Difference Interactions

	Sample 1[b]		Sample 2[b]		Sample 3[b]	
	β	*z*	*β*	*z*	*β*	*z*
Constant	-2.294	-7.17**	-0.680	-0.64	-2.267	-1.94^{+}
Ego Gender	0.034	0.07	-0.111	-0.22	1.21	2.36*
Alter Gender	0.632	1.34	-0.491	-0.88	-0.323	-0.63
Ego Attractiveness	N/A	N/A	-0.039	-0.26	0.178	1.03
Alter Attractiveness	N/A	N/A	-0.280	-1.88^{+}	-0.35	-1.83^{+}
Age Difference[a]	0.131	1.80^{+}	-0.048	-0.34	0.135	0.85
Ego Gdr x Age Diff	0.014	0.19	0.035	0.76	-0.132	-1.44
Alter Gdr x Age Diff	-0.056	-0.84	-0.056	-1.09	0.022	0.37
Ego Attr x Age Diff	N/A	N/A	-0.007	-0.31	0.017	0.88
Alter Attr x Age Diff	N/A	N/A	0.028	1.61	-0.030	-1.55

[a] Age Difference calculation: Ego Age – Alter Age for Samples 1 and 2; Alter Age – Ego Age for Sample 3

[b] Sample size: 1 = 215, 2 = 313, 3 = 248

$^{+}$ indicates $p < .10$, * indicates $p < .05$, ** indicates $p < .01$

For Sample 1, the coefficient for age difference was marginally significant. The greater the difference in age between members of a dyad, the more likely an ego rated an alter negatively (if the ego was older). The odds of a negative tie when the ego was ten

years older than the alter are 3.079 of what they would be if the ego was one year older than the alter. In Samples 2 and 3, the coefficient for alter physical attractiveness was negative and marginally significant. In these samples, the less attractive a participant was, the more likely that participant was rated negatively, holding all other variables constant. In Sample 3, women were more likely to rate others negatively. There were no interactions between age heterophily and the two primary independent variables.

Leadership Preference Heterophily Interactions

Logit regressions were also conducted to examine the interactions of gender and physical attractiveness with leadership preferences on directed negative ties. The gender and physical attractiveness (exception: Sample 1) of the ego and alter were entered along with a variable of whether the ego and alter leadership preferences matched (value = 0) or did not match (value = 1) and the interaction terms. The results are shown in Table 2-19.

TABLE 2-19. Logit Regression Results By Sample for Leadership Preference Interactions

	Sample 1[b]		Sample 2[b]		Sample 3[b]	
	β	z	β	z	β	z
Constant	-2.868	-4.94**	-2.326	-1.40	3.52	1.55
Ego Gender	1.248	1.87^{+}	0.295	0.38	0.103	0.12
Alter Gender	0.297	0.45	0.623	0.80	-0.921	-0.89
Ego Attractiveness	N/A	N/A	0.059	0.26	-0.462	-1.39
Alter Attractiveness	N/A	N/A	-0.180	-0.81	-1.045	-2.15*
Preference Non-match[a]	1.091	1.54	3.243	1.48	-5.774	-2.10*
Ego Gdr x Pref Non	-1.333	-1.30	-0.324	-0.33	1.273	1.16
Alter Gdr x Pref Non	1.216	1.30	-1.932	-1.73^{+}	1.898	1.54
Ego Attr x Pref Non	N/A	N/A	-0.343	-1.15	0.708	1.79^{+}
Alter Attr x Pref Non	N/A	N/A	-0.076	-0.24	0.617	1.17

[a] Preference Non-match calculation: Ego Preference minus Alter Preference recoded that all values other than 1 be 1, except 0 which remained as 0.
[b] Sample size: 1 = 175, 2 = 302, 3 = 200
$^{+}$ indicates $p < .10$, * indicates $p < .05$, ** indicates $p < .01$

In Sample 1, the coefficient for ego gender was positive and marginally significant. Women in this sample were slightly more likely to rate others negatively. There were no interactions for Sample 1. For Sample 2, the coefficient for the interaction of alter gender and a non-match in preferences was negative and marginally significant. As evident from Table 2-20, the net effects of non-matching leadership preferences are much greater for men alters. If preferences in leadership did not match, men alters were more likely to be rated negatively in this sample.

TABLE 2-20. Sample 2 Net Effects of Non-Matching Preferences for Alters by Gender

Ego Gender	Alter Gender	Net Effect
Male	Male	16.84
Male	Female	2.44
Female	Male	12.18
Female	Female	1.76

In Sample 3, the coefficient for physical attractiveness of the alters was negative and significant. The less attractive participants were more likely to be rated negatively. The coefficient for non-matching preferences was also negative and significant. If preferences between the ego and the alter did not match the less likely the ego would rate the alter negatively. The coefficient for the interaction between ego physical attractiveness and non-matching leadership preferences was positive and marginally significant. As evident from Table 2-21, the net effects of non-matching preferences on negative ties was greater for those egos that were more attractive. Attractive egos were more likely to rate others negatively when their leadership preferences did not match.

TABLE 2-21. Sample 3 Net Effects of Non-Matching Preferences for Alters by Attractiveness

Ego Attractiveness[a]	Alter Attractiveness[a]	Net Effect[b]
More	More	33.00
More	Less	9.61
Less	More	8.01
Less	Less	2.33

[a] More attractive = mean (4.80) + 1; Less attractive = mean – 1
[b] Net effect averaged between males and females

Different Patterns for Different Types of People

Labianca and Brass (1997) suggested more research was needed on the differences in the valence of network ties for different people. For example, more investigation into whether women have the same number of negative relationships in their networks as men is unknown. The data used in this study lends itself to this analysis well.

Directed negative ties can come in two forms – directed-from and directed-at. In all previous analyses, the directed-at form of this variable was used. For the following analyses, both forms were used to investigate not only the differences for those being rated, as suggested by Labianca and Brass (1997), but also the differences for participants doing the rating. It is feasible that different people may make ratings differently based on some characteristics. For example, women may rate others more positively or negatively than men.

Each of the dependent variable matrices was transformed into count variables. For the number of undirected negative ties, each row of the matrix of undirected negative ties, which corresponds to one ego, was summed. In Sample 1, 28 participants did not have any undirected negative ties (44%). Twenty had one, nine had two, and six had three

undirected negative ties. In Sample 2, 55 participants did not have any undirected negative ties (56%). Twenty-five had one undirected negative tie, 11 had two, five had three, and three had four. In Sample 3, 66 participants did not have any undirected negative ties (66%). Twenty participants had one, 11 had two, two had three, and one participant had four undirected negative ties.

To get the number of directed-from negative ties, each row of the matrix for directed negative ties was summed. For those egos with zero directed-from negative ties, I investigated whether the zero came from the diagonal value only (i.e., the ego had not rated any other alters). If this was the case, the number of directed-from negative ties was coded as missing. In Sample 1, 13 were coded as missing (21%). Thirty-five participants did not have any directed-from negative ties (56%). Five participants had one, six had two, and four had three directed-from negative ties. In Sample 2, four were coded as missing (4%). Sixty-three participants (64%) did not have any directed-from negative ties. Twenty-six participants had only one, five had two, and one had three. In Sample 3, 24 were coded as missing. Of the remaining 76 participants, 54 did not have any directed-from negative ties (54%). Sixteen of these participants had one, five had two, and one had three.

To get the number of directed-at negative ties, the columns of the directed negative tie matrix were summed. In Sample 1, 64% of the participants did not have any directed-at negative ties (40). Eighteen of the participants had only one directed-at negative tie, four had two, and one had three. In Sample 2, 82% of the participants did not have any directed-at negative ties. Five had one, eight had two, two had three, and

three had four. In Sample 3, 81% of the participants did not have any directed-at negative ties. Eleven had only one, seven had two, and only one participant had four directed-at negative ties.

Variables dealing with personal characteristics that distinguish one person from another were used in this analysis. Characteristics about other people that are easily identifiable and that can be used to tell people apart include gender, age, physical attractiveness, and ethnicity (Fiske & Taylor, 1991).

Table 2-22 shows the correlation matrix of these independent variables along with the dependent variables of the numbers of directed negative ties and the number of undirected negative ties to be explored for Sample 1.

TABLE 2-22. Correlation Matrix for Numbers of Undirected and Directed Negative Ties and Characteristic Variables for Sample 1[a]

Variable	1	2	3	4	5	6
1. Dir. From Ties[b]						
2. Dir. At Ties[b]	-.18					
3. Undirected Ties[b]	.82**	.50**				
4. Gender[c]	.18	.19	.25*			
5. Attractiveness[d]	-.13	-.15	-.14	.19		
6. Age[e]	.52**	.04	.45**	.26*	-.06	
7. Foreign[f]	-.03	.31*	.18	.00	-.16	-.05

[a] Sample 1 n = 63 unless noted otherwise
[b] Count variables ranging from 0 to 5; directed-from n = 50
[c] Male = 0, Female = 1
[d] Average rating on scale from 1 = not at all attractive to 10 = very attractive; n = 34
[e] In years, calculated from birth date given
[f] Domestic student = 0, Foreign student = 1
* indicates $p < .05$, ** indicates $p < .01$

As expected, there was a strong correlation between the numbers of directed and undirected negative ties (directed-from: $r = .82, p < .001$; directed-at: $r = .50, p < .001$).

There were also significant positive relationships between age and both the number of directed-from negative ties and the number of undirected negative ties indicating that older participants had greater numbers of undirected negative ties and that these ties probably results from ratings the older participants made. Gender had a significant positive relationship with the number of undirected negative ties, indicating that women had somewhat more undirected negative ties than men, and also a significant positive relationship with age, indicating that the average woman is older than the average man in this sample. The number of directed-at negative ties was significantly positively related to foreign status, indicating that foreign student participants were rated negatively more often than domestic students.

Table 2-23 shows the correlation matrix of the dependent variables and the independent variables for Sample 2.

TABLE 2-23. Correlation Matrix for Numbers of Undirected and Directed Negative Ties and Characteristic Variables for Sample 2[a]

Variable	1	2	3	4	5	6
1. Dir. From Ties[b]						
2. Dir. At Ties[b]	.03					
3. Undirected Ties[b]	.59**	.82**				
4. Gender[c]	-.03	.01	.01			
5. Attractiveness[d]	-.07	-.12	-.13	.17		
6. Age[e]	.19[+]	.01	.13	.16	-.22*	
7. Foreign[f]	.10	.18[+]	.14	-.03	-.23*	-.09

[a] Sample 2 n = 99 unless noted otherwise
[b] Count variables ranging from 0 to 5; directed-from n = 95
[c] Male = 0, Female = 1; n = 98
[d] Average rating on scale from 1 = not at all attractive to 10 = very attractive; n = 91
[e] In years, calculated from birth date given; n = 98
[f] Domestic student = 0, Foreign student = 1; n = 98
[+] indicates $p < .10$, * indicates $p < .05$, ** indicates $p < .01$

As is the case in Sample 1, the two directed negative tie variables had significant positive correlations with the number of undirected negative ties ($r_{dir\text{-}from} = .59, p < .001$; $r_{dir\text{-}at} = .82, p < .001$). Age was marginally positively correlated with the number of directed-from negative ties, indicating that older participants were more likely to make negative ratings, and foreign student status was marginally positively correlated with the number of directed-at negative ties, indicating that foreign students were rated negatively more often than domestic participants. Physical attractiveness was significantly negatively correlated with both age and foreign status, indicating that older participants and foreign students were rated as less attractive than younger participants and domestic students.

Sample 3 correlations are shown in Table 2-24. In this sample, unlike the others, the number of directed-from negative ties and the number of directed-at negative ties were significantly positively correlated ($r = .23, p < .05$). Consistent with the other two samples, a strong positive correlation occurred between the numbers of directed negative tie variables and the number of undirected ties variable ($r_{dir\text{-}from} = .79, p < .001$; $r_{dir\text{-}at} = .78, p < .001$).

Gender and age were both positively correlated to each the number of directed-from negative ties and the number of undirected negative ties. Generally, women and older participants were more likely to have a greater number of undirected negative ties that most likely resulted from rating others negatively. Age was significantly positively correlated with the number of directed-at negative ties, indicating that the older participants in this sample were rated negatively more often than the younger

participants. Physical attractiveness was significantly negatively correlated with the number of directed-at negative ties, indicating that, in general, less attractive participants were rated negatively more often than attractive participants. Foreign student status was marginally negatively correlated with the number of undirected negative ties, indicating that domestic students had a higher number of undirected negative ties than foreign participants. As in Sample 2, physical attractiveness was negatively correlated with age, indicating that older participants were rated as less attractive than younger participants.

TABLE 2-24. Correlation Matrix for Numbers of Undirected and Directed Negative Ties and Characteristic Variables for Sample 3[a]

Variable	1	2	3	4	5	6
1. Dir. From Ties[b]						
2. Dir. At Ties[b]	.27*					
3. Undirected Ties[b]	.79**	.78**				
4. Gender[c]	.29*	.13	.20*			
5. Attractiveness[d]	.07	-.26*	-.11	.06		
6. Age[e]	.29*	.39**	.31*	.06	-.39**	
7. Foreign[f]	-.15	-.07	-.19[+]	.10	-.11	.16

[a] Sample 3 n = 100 unless noted otherwise
[b] Count variables ranging from 0 to 5; directed-from n = 76
[c] Male = 0, Female = 1
[d] Average rating on scale from 1 = not at all attractive to 10 = very attractive; n = 95
[e] In years, calculated from birth date given
[f] Domestic student = 0, Foreign student = 1
[+] indicates $p < .10$, * indicates $p < .05$, ** indicates $p < .01$

Differences in the Number of Undirected Negative Ties

Analyses with interactions included. The initial correlations indicated that there were several differences based on the characteristics variables. Regression models were necessary to tease apart these differences. However, linear regression models are inefficient and biased when used with count variables (Long, 1997), so regression models

for count outcomes were used instead. The Poisson Regression Model (PRM) was used to regress the number of undirected negative ties on gender, physical attractiveness, age, and foreign status, along with several gender interaction terms, for each of the samples separately. Because there were only physical attractiveness data available for approximately half of the participants in Sample 1, physical attractiveness and the gender by physical attractiveness interaction were left out of that equation (see Table 2-25 for these results). The PRM fit the data well for Samples 1 and 3, but not Sample 2 (Figure 2-1, a through c). The Negative Binomial Regression Model (NBRM), which fit the data for this sample, was used.

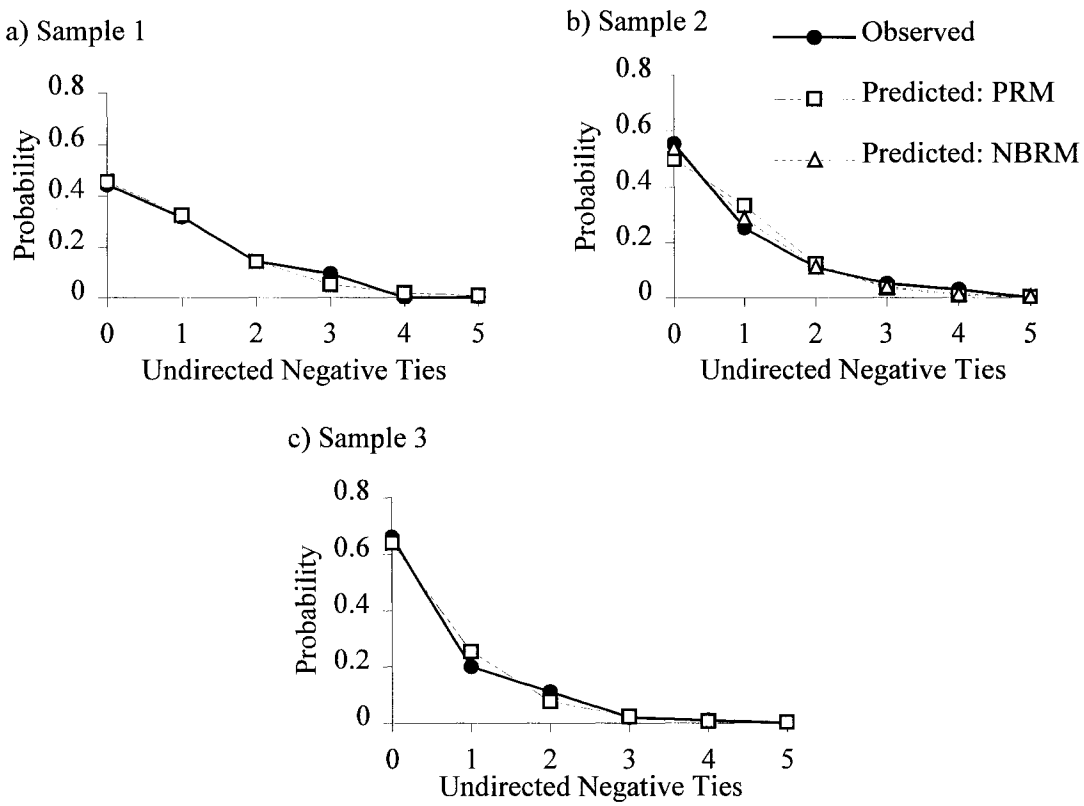
TABLE 2-25. Number of Undirected Negative Ties Results by Model and Sample

		Sample 1	Sample 2		Sample 3
Variable		PRM	PRM	NBRM	PRM
Constant	β	-3.300	-0.708	-0.726	-4.160
	z	-2.76**	-0.71	-0.65	-2.75**
Gender	β	2.073	0.058	-0.113	3.248
	z	1.35	0.03	-0.05	1.52
Attract	β	N/A	-0.008	-0.016	0.109
	z	N/A	-0.06	-0.11	0.65
Age	β	0.115	0.014	0.016	0.123
	z	2.31*	0.52	0.54	2.84**
Foreign	β	0.577	0.477	0.484	-0.919
	z	1.58	1.51	1.35	-1.69^{+}
Gdr x Attract	β	N/A	-0.148	-0.122	-0.244
	z	N/A	-0.73	-0.53	-1.04
Gdr x Age	β	-0.062	0.022	0.024	-0.056
	z	-1.06	0.58	0.49	-0.97
Gdr x For	β	-0.416	-0.659	-0.674	-0.856
	z	-0.67	-0.75	-0.69	-0.92
	χ^2	61.54	111.24*		90.61
Pr = 0		0.46	0.50	0.54	0.64

Note: PRM = Poisson Regression Model; NBRM = Negative Binomial Regression Model, Pr = Probability; β is an unstandardized coefficient; $^{+}$ indicates a p-value < .10, * indicates a p-value < .05, ** indicates a p-value < .01

There were no significant interactions between gender and physical attractiveness, gender and age, or gender and foreign status for the number of undirected negative ties. Gender was not a significant predictor of the number of undirected negative ties a person has in any sample. Physical attractiveness was also not a significant predictor of the number of undirected negative ties.

FIGURE 2-1. Mean Predicted Probabilities From the PRM and NBRM for Number of Undirected Negative Ties



Age was a significant predictor of undirected negative ties in Samples 1 and 3, but not in Sample 2. In Sample 1, a change in age from 23 to 33 caused the expected number of undirected negative ties to increase by approximately 1.55 ties, holding all other

variables at their means. The expected number of undirected negative ties was .72 for the 23-year-old participant and 2.26 for the 33-year-old participant. In Sample 3, a ten-year change in age caused the expected number of undirected negative ties to increase by .93 ties, holding all other variables at their means. The expected number of undirected negative ties for the 23-year-old participant in this sample was .39 and for the 33-year-old it was 1.32.

Foreign student status was a marginally significant predictor of undirected negative ties in Sample 3. For foreign students in Sample 3 the expected number of undirected negative ties was .22. The expected number for non-foreign or domestic students was .56. Therefore, being a foreign student in Sample 3 decreased the expected number of undirected negative ties by .33.

Analyses without interactions included. Because there were no significant gender interactions for this dependent variable, the same analysis was run again to determine if any of the characteristics had an effect once the interactions were removed. As Table 2-26 shows, the characteristics indeed had an effect when the interactions were not included in the model. The PRM model fit the data well for Samples 1 and 3, and the NBRM was used for Sample 2 (see Figure 2-2, a through c).

Physical attractiveness was not a significant predictor of the number of undirected negative ties for any sample. Gender was a significant predictor of the number of undirected negative ties for Sample 3 only. In Sample 3, the expected number of undirected negative ties for women was .60 and the expected number for men was .33.

Being a woman in Sample 3 increased the expected number of undirected negative ties by .26, holding all other variables at their means.

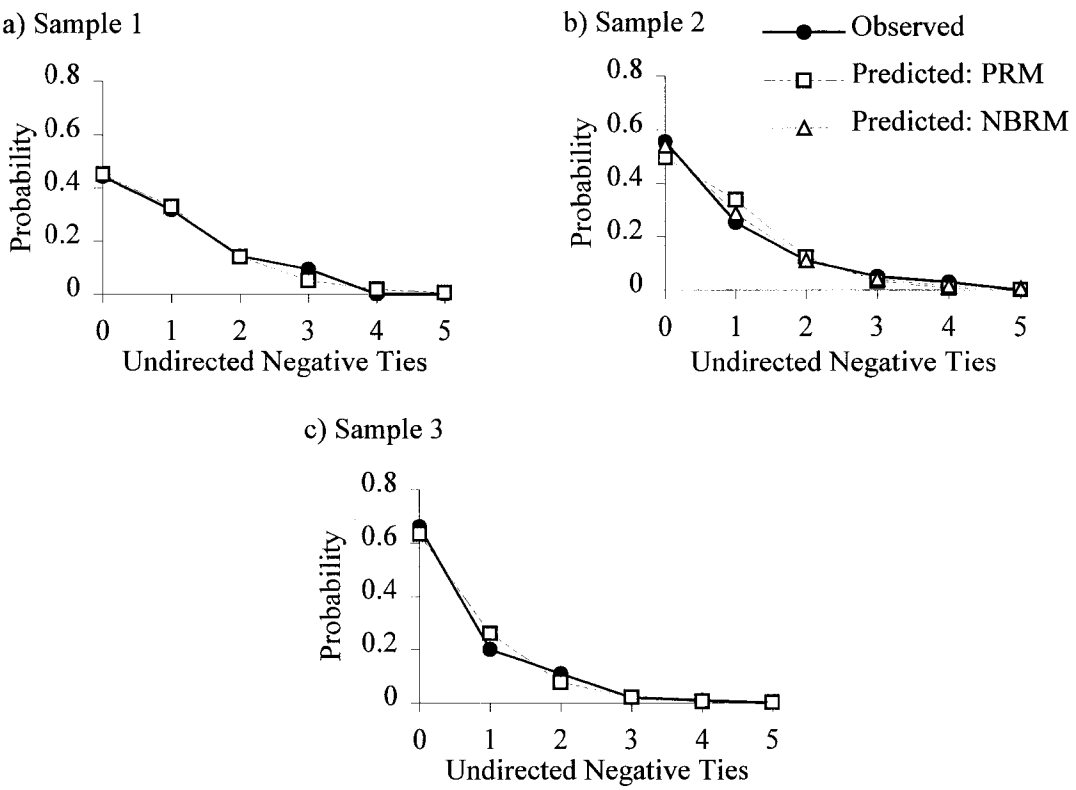
TABLE 2-26. Number of Undirected Negative Ties Results by Model and Sample Without Interactions

		Sample 1	Sample 2		Sample 3
Variable		PRM	PRM	NBRM	PRM
Constant	β	-2.325	-0.624	-0.715	-2.490
	z	-3.58**	-0.82	-0.77	-2.50*
Gender	β	0.330	-0.226	-0.255	0.582
	z	1.13	-0.71	-0.70	1.97*
Attract	β	N/A	-0.082	-0.079	-0.009
	z	N/A	-0.85	-0.72	-0.08
Age	β	0.076	0.027	0.030	0.080
	z	3.13**	1.48	1.32	3.30**
Foreign	β	0.534	0.305	0.333	-1.414
	z	1.92^{+}	1.08	1.01	-3.09**
	χ^2	62.99	113.36*		93.62
Pr = 0		0.45	0.50	0.54	0.63

Note: PRM = Poisson Regression Model; NBRM = Negative Binomial Regression Model, Pr = Probability; β is an unstandardized coefficient; $^{+}$ indicates a p-value < .10, * indicates a p-value < .05, ** indicates a p-value < .01

Age was a significant predictor for the number of undirected negative ties in Samples 1 and 3. In Sample 3, the expected number of undirected negative ties for a 23-year-old participant was .74 and for a 33-year-old participant it was 1.58. A ten-year change in age in this sample increased the expected number of undirected negative ties by .84 ties, holding all other variables at their means. In Sample 3, the expected number for a 23-year-old participant was .47 ties lower (.38) than the expected number for a 33-year-old participant (.85). In both of these samples, older participants were expected to have a greater number of undirected negative ties.

FIGURE 2-2. Mean Predicted Probabilities From the PRM and NBRM for Number of Undirected Negative Ties Without Interactions



Foreign student status was a marginally significant predictor in Sample 1 and a significant predictor in Sample 3. However, the expected number of undirected negative ties was quite different between the two samples. In Sample 1, being a foreign student *increased* the expected number of undirected negative ties by .47 ties, holding all other variables at their means. In Sample 3, being a foreign student *decreased* the expected number by the same amount, holding all other variables at their means.

As was evident from results discussed earlier (e.g., Tables 2-1 and 2-2), sometimes it was the case that certain participants rated others negatively more often and were also rated negatively more often. Therefore, the undirected negative ties variable

holds a "double whammy" for these participants. Similar analyses were conducted using the number of directed negative ties as the dependent variable to examine these differences.

Differences in the Number of Directed-From Negative Ties

Analyses with interactions included. The first of these analyses dealt with the number of times a participant rated another negatively or the number of directed-from negative ties. For this dependent variable, the PRM model fit the data for Samples 2 and 3 (see Table 2-27). The NBRM results were used for Sample 1 (see Figure 2-3, a through c). Physical attractiveness was again left out of the model for Sample 1.

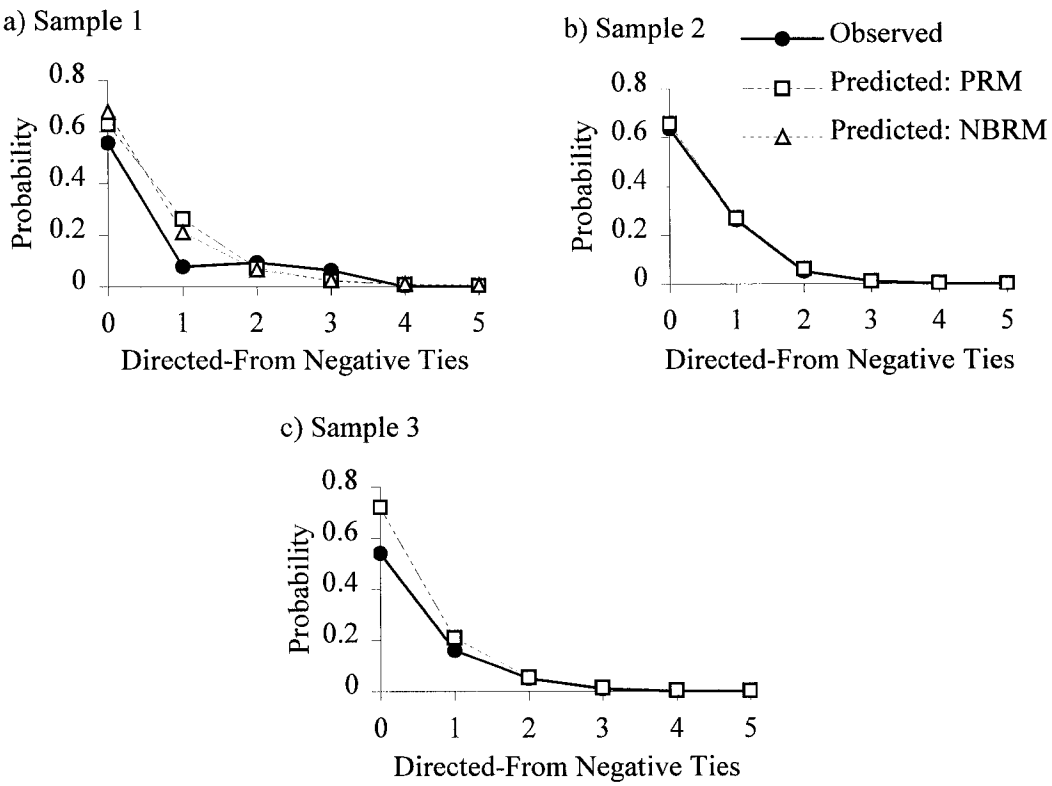
TABLE 2-27. Number of Directed-From Negative Ties Results by Model and Sample

		Sample 1		Sample 2	Sample 3
Variable		PRM	NBRM	PRM	PRM
Constant	*B*	-5.179	-5.549	-2.044	-5.412
	z	-3.13**	-2.49*	-1.66^{+}	-1.87^{+}
Gender	*B*	1.953	2.386	0.007	1.563
	z	0.90	0.84	0.00	0.45
Attract	*B*	N/A	N/A	0.063	0.271
	z	N/A	N/A	0.38	1.15
Age	*B*	0.186	0.200	0.034	0.125
	z	2.78**	2.19*	1.21	1.21
Foreign	*B*	-0.310	-0.199	0.387	-1.158
	z	-0.56	-0.31	0.89	-1.09
Gdr x Attract	*B*	N/A	N/A	-0.168	-0.068
	z	N/A	N/A	-0.62	-0.22
Gdr x Age	β	-0.084	-0.099	0.020	-0.012
	z	-1.07	-0.93	0.42	-0.11
Gdr x For	β	0.654	0.497	0.165	-0.769
	z	0.64	0.41	0.16	-0.50
	χ^2	58.40^{+}		78.59	55.22
Pr = 0		0.63	0.67	0.66	0.72

Note: PRM = Poisson Regression Model; NBRM = Negative Binomial Regression Model, Pr = Probability; β is an unstandardized coefficient; $^{+}$ indicates a p-value < .10, * indicates a p-value < .05, ** indicates a p-value < .01

There were no significant gender interactions for the number of directed-from negative ties. Gender was not a significant predictor of the number of directed-from negative ties for any sample. When all other variables were held at their means, being a woman did not change the expected number of directed-from negative ties. Physical attractiveness and foreign student status were also not significant predictors of the number of directed-from negative ties.

FIGURE 2-3. Mean Predicted Probabilities From the PRM and NBRM for Number of Directed-From Negative Ties



Age was a significant predictor of the number of directed-from negative ties in Sample 1 only. A change in age from 23 to 33 caused the expected number of directed-

from negative ties to increase by 2.44 ties, holding all other variables at their means. The expected number of directed-from negative ties was .38 for the 23-year-old participant and 2.83 for the 33-year-old participant in this sample.

Analyses without interactions included. Because there were no significant gender interactions for the number of directed-from negative ties, the same analysis was run without the interactions. As Table 2-28 shows, several of the characteristics had an effect when the interactions were not included in the model. The PRM model fit the data well for Samples 2 and 3, and the NBRM was used for Sample 1 (see Figure 2-4, a through c).

TABLE 2-28. Number of Directed-From Negative Ties Results by Model and Sample Without Interactions

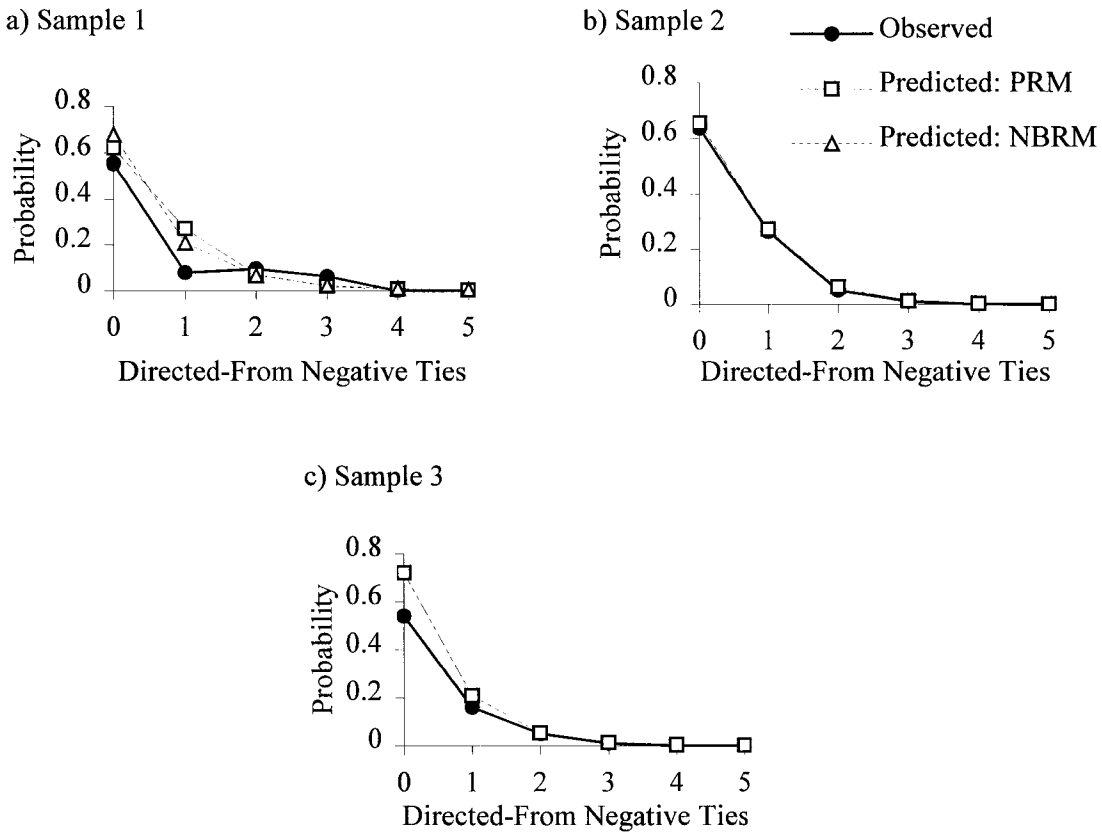
		Sample 1		Sample 2	Sample 3
Variable		PRM	NBRM	PRM	PRM
Constant	β	-3.525	-3.737	-1.886	-4.724
	z	-4.13**	-3.05**	-1.92^{+}	-3.41**
Gender	β	-0.060	-0.004	-0.237	0.866
	z	-0.13	-0.01	-0.57	2.24*
Attract	β	N/A	N/A	-0.006	0.223
	z	N/A	N/A	-0.05	1.53
Age	β	0.115	0.122	0.042	0.108
	z	3.57**	2.56*	1.97*	3.04**
Foreign	β	0.046	0.061	0.332	-1.624
	z	0.11	0.11	0.87	-2.10*
	χ^2	59.94^{+}		79.36	55.56
Pr = 0		0.62	0.68	0.65	0.72

Note: PRM = Poisson Regression Model; NBRM = Negative Binomial Regression Model, Pr = Probability; β is an unstandardized coefficient; $^{+}$ indicates a p-value < .10, * indicates a p-value < .05, ** indicates a p-value < .01

Physical attractiveness was not a significant predictor of the number of directed-from negative ties. Gender was a significant predictor, but only for Sample 3. In this sample, the expected number of directed-from negative ties for women was .47 and the

expected number for men was .20. Being a woman in this sample increased the expected number of directed-at negative ties by .27 ties, holding all other variables at their means.

FIGURE 2-4. Mean Predicted Probabilities From the PRM and NBRM for Number of Directed-From Negative Ties Without Interactions



Age was a significant predictor of the number of directed-from negative ties in all three samples. In Sample 1, the expected number for a 23-year-old participant was .40 and the expected number for a 33-year-old participant was 1.36. A ten-year change in age increased the expected number of directed-from negative ties by .96 ties, holding all other variables at their means. The expected numbers in Sample 2 were .40 and .61, respectively, an increase of .21 ties, holding all other variables at their means. In Sample

3, the expected numbers were .24 and .71, respectively. In all samples, being an older participant increased the expected number of directed-from negative ties.

Foreign students had a different expected number of directed-from negative ties than non-foreign or domestic students in Sample 3 only. In this sample, the expected number of directed-from negative ties for a foreign student was .09 and for a domestic student it was .43. Being a foreign student in this sample decreased the expected number of directed-from negative ties by .34 ties, holding all other variables at their means.

Differences in the Number of Directed-At Negative Ties

Analyses with interactions included. The second analysis using the number of directed ties was conducted to determine if there were differences in the people that were rated negatively. The PRM and NBRM results are shown in Table 2-29. The PRM fit the data well in Samples 1 and 3. In Sample 2, the NBRM was a better choice (see Figure 2-5). The model for Sample 1 does not include physical attractiveness.

Gender was not a significant predictor of the number of directed-at negative ties for Samples 1 or 2. However, being a woman in Sample 3 increased the expected number of directed-at negative ties. Physical attractiveness was also not a significant predictor of the number of directed-at negative ties.

Age was a significant predictor of directed-at negative ties only for Sample 3. In Sample 1 and Sample 2, there was no difference between the expected numbers of directed-at negative ties for a 23-year-old participant versus a 33-year-old participant. In Sample 3, however, the expected number of directed-at negative ties was .64 ties greater

for the 33-year-old participant (expected number was .82) than for the 23-year-old participant (expected number was .18), holding all other variables at their means.

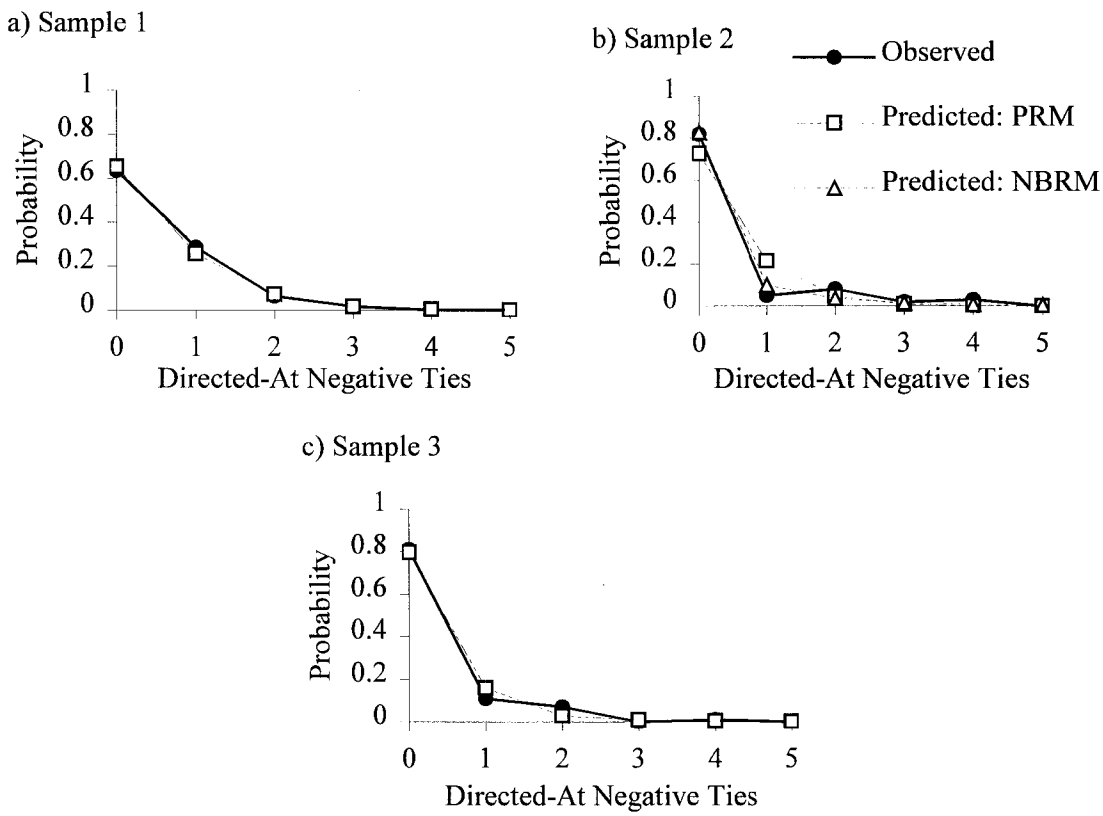
TABLE 2-29. Number of Directed-At Negative Ties Results by Model and Sample

		Sample 1	Sample 2		Sample 3
Variable		PRM	PRM	NBRM	PRM
Constant	β	-2.415	0.656	0.050	-4.834
	z	-1.32	0.33	0.02	-2.53*
Gender	β	2.547	-0.735	1.173	5.386
	z	1.07	-0.26	0.18	1.96^{+}
Attract	β	N/A	-0.111	-0.146	-0.042
	z	N/A	-0.58	-0.49	-0.18
Age	β	0.035	-0.064	-0.029	0.152
	z	0.45	-0.98	-0.33	2.95**
Foreign	β	1.258	1.045	0.956	-0.602
	z	2.43*	2.47*	1.23	-0.93
Gdr x Attract	β	N/A	-0.120	-0.164	-0.533
	z	N/A	-0.40	-0.28	-1.53
Gdr x Age	β	-0.061	0.067	-0.000	-0.107
	z	-0.63	0.81	-0.00	-1.50
Gdr x For	β	-0.991	-15.572	-16.683	-0.817
	z	-1.24	-0.01	-0.01	-0.67
	χ^2	52.78	10.11^{+}		69.75
Pr = 0		0.65	0.73	0.83	0.80

Note: PRM = Poisson Regression Model; NBRM = Negative Binomial Regression Model, Pr = Probability; β is an unstandardized coefficient; $^{+}$ indicates a p-value < .10, * indicates a p-value < .05, ** indicates a p-value < .01

Foreign status was a significant predictor in Sample 1 only. The expected number of directed-at negative ties for a foreign student in Sample 1 was .91. The expected number for a domestic student was .26. Being a foreign student in Sample 1 increased the expected number of directed-at negative ties by .65, when all other variables were held at their means.

FIGURE 2-5. Mean Predicted Probabilities From the PRM and NBRM for Number of Directed-At Negative Ties



Analyses without interactions included. Again, because there were no significant gender interactions for the number of directed-at negative ties, the same analysis was run without the interactions. As Table 2-30 shows, several of the characteristics had an effect when the interactions were not included in the model. The PRM model fit the data well for Samples 1 and 3, and the NBRM was used for Sample 2 (see Figure 2-6, a through c).

Gender was not a significant predictor of the number of directed-at negative ties for any of the samples. Physical attractiveness was a marginally significant predictor of the number of directed-at negative ties for Sample 3 only. In this case, the expected number of directed-at negative ties for a participant whose physical attractiveness score

was one standard deviation above the mean was .14 and the expected number for a participant whose score was one standard deviation below the mean was .28. A change in physical attractiveness scores by two standard deviations decreased the expected number of directed-at negative ties by .14 ties, holding all other variables at their means.

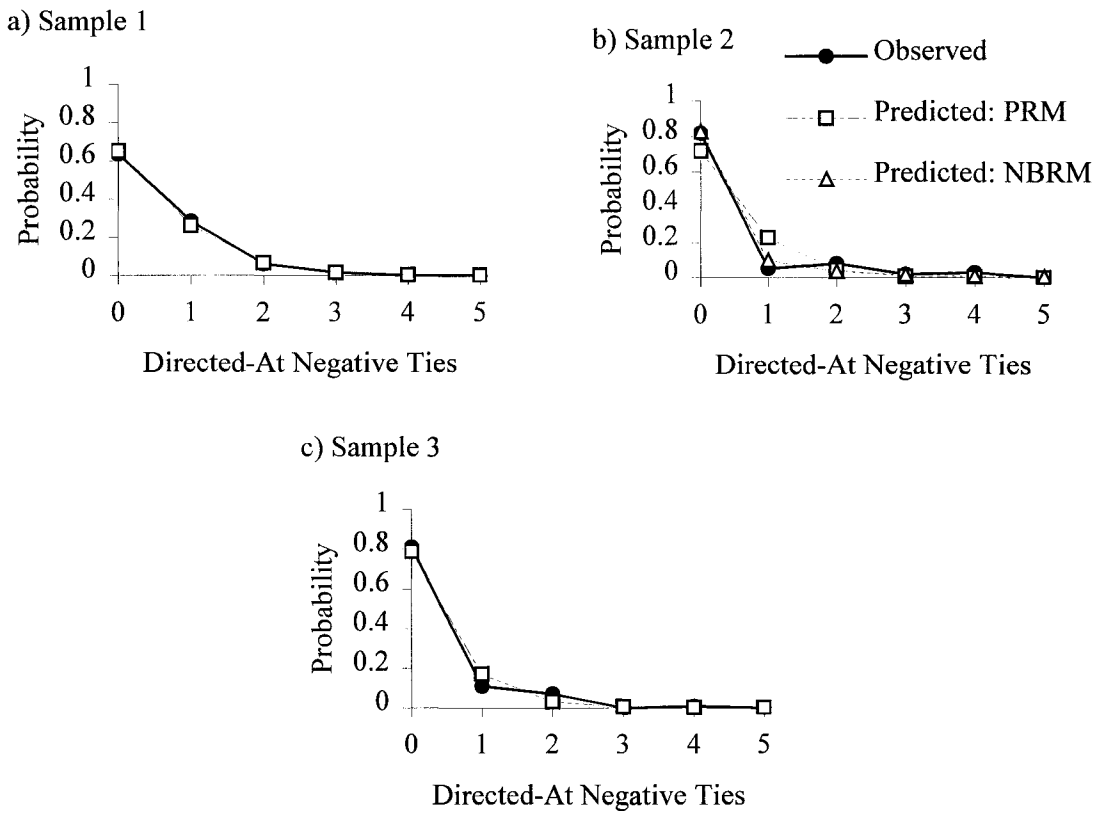
TABLE 2-30. Number of Directed-At Negative Ties Results by Model and Sample Without Interactions

		Sample 1	Sample 2		Sample 3
Variable		PRM	PRM	NBRM	PRM
Constant	β	-1.621	-0.016	0.214	-1.835
	z	-1.44	-0.01	0.08	-1.44
Gender	β	0.555	-0.327	-0.183	0.279
	z	1.45	-0.66	-0.22	0.64
Attract	β	N/A	-0.192	-0.224	-0.275
	z	N/A	-1.31	-0.85	-1.65^{+}
Age	β	0.010	-0.011	-0.015	0.078
	z	0.23	-0.30	-0.20	2.64**
Foreign	β	0.913	0.658	0.588	-1.202
	z	2.42*	1.75^{+}	0.79	-2.01*
	χ^2	54.65	109.86*		74.96
Pr = 0		0.65	0.72	0.83	0.79

Note: PRM = Poisson Regression Model; NBRM = Negative Binomial Regression Model, Pr = Probability; β is an unstandardized coefficient; $^{+}$ indicates a p-value < .10, * indicates a p-value < .05, ** indicates a p-value < .01

Age was also a significant predictor for the number of directed-at negative ties for Sample 3. In this case, the expected number of directed-at negative ties for a 23-year-old participant was .19 and for a 33-year-old participant it was .41. An increase of ten years in age resulted in an increase of the expected number of directed-at negative ties by .22 ties, holding all other variables at their means.

FIGURE 2-6. Mean Predicted Probabilities From the PRM and NBRM for Number of Directed-At Negative Ties Without Interactions



Foreign status was a significant predictor in Samples 1 and 3. For Sample 1, the expected number of directed-at negative ties for a foreign student was .73 and for a domestic student it was .29. A foreign student in Sample 1 was expected to have .44 directed-at negative ties more than a domestic student in Sample 1, holding all other variables at their means. For Sample 3, the results were just the opposite. A foreign student in this sample was expected to have .09 directed-at negative ties while a domestic student was expected to have .29 directed-at negative ties. Being a foreign student in Sample 3 decreased the expected number of directed-at negative ties by .20 ties, holding all other variables at their means.

Discussion

In this study, I have begun the exploration into the bases or antecedents of negative social relationships following the propositions by Brass and Labianca (1999; Labianca & Brass, 1997). Past research has focused solely on social capital or positive social network relationships and homophily in that context. In this study I have examined heterophily or dissimilarities between people as an antecedent to negative ties. While Brass and Labianca's hypotheses were based on undirected negative ties, I found it worthwhile to also study directed negative ties to get a better understanding of what types of people rated others negatively and what types of people were rated negatively by others through the separation of characteristics of the ego and the alter.

I expected gender heterophily and physical attractiveness heterophily to be positively related to negative social relationships. I also expected that a variety of other heterophily variables, including those that signaled status or value, would be positively related to negative ties. The results of this study are summarized in Table 2-31.

TABLE 2-31. Heterophily Results by Hypothesis and Sample

	Undirected			Directed		
Heterophily Hypothesis	1	2	3	1	2	3
Gender	N	N	S	N	N	N
Physical Attractiveness	N	N	S	N	N	S
Status or Actor Variables						
Age	S	S	S	S	N	S
Citizenship	S	N	N	P	N	N
Foreign Status	S	N	N	N	N	N
Grade Point Average	N	S	N/A	N	N	N/A
Value or Attitude Variables						
Masculinity	N	N	N	N	N	N
Femininity	N	N	N	N	N	N
Leadership Preferences	S	N	S	N	N	P

Note: S = Support; P = Partial support; N = no support

When the ties between the members of the group were symmetrical or undirected, there was more support for the hypotheses than when the ties were asymmetrical or directed. This makes sense because there were a greater number of undirected negative ties than directed negative ties. Undirected negative ties occurred when at least one of the dyad members rated the other negatively while directed negative ties, in this case, were only present for the member who was rated negatively.

When networks are formed in sex-segregated situations, there is usually a significant amount of gender homophily (McPherson et al., 2001). Men are especially prone to gender homophily in networks where they are the majority (e.g., Ibarra, 1992; Ibarra, 1997). In a separate unpublished study of these same samples, I found that gender homophily was only related to positive ties in Sample 1 (Douma et al., 2003). I expected that gender heterophily would be positively related to negative ties.

Gender heterophily was not related to negative ties in all cases except for one (Sample 3 using undirected negative ties). When analyses on the number of undirected negative ties were conducted, women in Sample 3 were likely to have a greater number of these ties than men. This difference in genders for negative ties was based on the fact that women in this sample were more likely to rate others negatively than men, not because women were more likely to be rated negatively. This result is interesting because of the gender make-up of the sample - where only about 30% of the participants were women. In many cases, when women are in a traditionally male field (like the participants in this study), they are looked down upon. This was not true for these samples as is evident from the results of the directed analyses. There were no differences

between men and women as to who was being rated negatively. Women, in these samples, may feel like they must compete for attention from the majority and therefore have competitive and negative relationships with other women.

It may be the case that the general ages of the participants (i.e., the early 20s) make up for this difference. People at this age, especially when they are in college, are likely to have many acquaintances of both genders. McPherson et al. (2001) reported that adults' friendship networks are relatively sex-integrated. Also, this may be the point in these participants' lives when they are looking for a mate and so gender differences do not matter as much as in other situations. Also, because these participants were in several classes together in a cohort-based program, it may be that there was a mere exposure effect (Zajonc, 1968). Because the members of these groups knew each other and were familiar with each other, they may have liked each other more. Future research is clearly needed to tease apart the differences in ages of participants in social network studies as well as in settings of the research.

I also expected that dissimilarities in physical attractiveness would be related to negative ties. Physical attractiveness heterophily was only related to negative ties in one sample. In Sample 3, the relationship held for both undirected and directed negative ties. Less attractive participants were more likely to have negative ties, which was due to the more attractive participants rating the less attractive participants more negatively. Part of the reason that this hypothesis was not supported for Sample 1 was that only about half of the participants had physical attractiveness scores available. The participants in Sample 2 seemed to be basing their negative ties more on competence issues (i.e., dissimilarities in

grade point average) rather than physical attractiveness. More and less attractive participants did not differ in their numbers of undirected or directed-from negative ties in Sample 2. In Sample 3, however, less attractive people were likely to have more directed-at negative ties than others.

Being similar in physical attractiveness was not related to positive ties for any of these samples (Douma et al., 2003). The attractiveness ratings were not assessed by the participants but were instead assessed by three raters who did not know the participants. It could be that because the participants knew each other, their ratings of each other's attractiveness would be quite different than the raters. The participants would probably factor in height, weight, experience, and personality factors when making a rating of physical attractiveness, which was impossible for the raters to do. It may be that physical attractiveness would have an effect earlier in the development of the social relationship (i.e., first semester of classes together) before learning effects could take place. Future research is needed to determine whether experience and familiarity with another decreases the effects of attractiveness on the valence of ties.

Differences in age were most related to negative ties. Age heterophily was related to negative social relationships for these samples in all cases except for directed negative ties in Sample 2. The older participants were more likely to have undirected negative ties, however, the direction of these ties was different between Samples 1 and 3. In Sample 1 the older participants did not want to work with the younger participants again and in Sample 3 the younger participants did not want to work with the older participants again. It was not the case that the means of these two samples differed (23.90 and 23.56,

standard deviations of 4.1 and 4.3, respectively). Older students in these samples were an anomaly.

In two of the samples the older participants were likely to have more undirected negative ties. In all of the samples older participants were likely to have more directed-from negative ties and only in Sample 3 were older participants likely to have more directed-at negative ties. Whether the older participant was a man or woman or whether s/he was more attractive or less attractive did not have an effect on the existence of the negative tie. It may be that older students consider themselves "different" from younger students in that they have different work ethic (in order to complete assignments in a timely fashion while taking in family concerns) and have more invested in doing well. Therefore, when younger participants do not share this outlook, the older participants may indicate that they do not want to work with the younger participants again.

To compare this result to positive ties, similarities in age were related to positive ties for Samples 1 and 3 (Douma et al., 2003). This result is consistent with prior research on age homophily that has shown that in friendship networks, age homophily is very strong (e.g., Fischer, 1982). Of course, there is a major baseline component with these findings in this study. Most of the participants were of similar age - within one or two years.

In Sample 1, citizenship and foreign status heterophily were positively related to negative ties. This relationship dropped out totally for foreign status heterophily in the directed negative tie analysis. Foreign student participants were likely to have more undirected negative ties and more directed-at negative ties than domestic students in

Sample 1. This is perhaps the most surprising result of the study. McPherson et al. (2001) stated that race and ethnicity serve as the biggest dividers of social networks. Strong homophily based on race and ethnicity has been found in previous research (e.g., Ibarra, 1995; Shrum et al., 1988). Similarities in citizenship were related to positive ties for Sample 1 and matches for foreign student status were related to positive ties in Sample 3. The fact that the homophily result was not as strong as expected for these samples suggests a different process occurs here. It could be that foreign students rated other foreign students negatively because they wanted to work with domestic students again in order to get a different outlook on the project. For example, foreign students may not have wanted to work with other foreign students because they might not do as well (e.g., language barriers, writing skills, etc.). Future research into foreign students' friendship networks as compared to those currently conceptualized from work groups is needed.

Dissimilarities in grade point average were related to undirected negative ties for Sample 2. While the mean grade point averages were larger for the egos than the alters, this was not a significant difference. It is not clear that grade point average has any effect on the valence of network ties, as grade point average was not a significant predictor of positive ties for either sample (Douma et al., 2003). Future research is needed which can distinguish more between two members performance to study this relationship further.

Dissimilarities in masculinity and femininity were not related to negative ties. Similarities in femininity were related to positive ties for Sample 1 (Douma et al., 2003). It may be that these differences do not matter for this age group or that they do not matter in this particular setting, even though it is a male-dominated field of study and therefore

thought to be more masculine. Maybe it is the case that all participants have higher than average masculinity scores based on characteristics necessary to succeed in the field. The participants may also have relatively similar femininity scores as well.

Differences in leadership preferences were related to negative ties in Samples 1 and 3 for undirected negative ties and somewhat related to directed negative ties in Sample 3. Those who did not care who lead their small group made up a majority of the participants in each sample. Those who preferred to lead did not want to work with those who either did not care or those who preferred someone else besides them lead. These effects were more pronounced when egos rated men alters and also when the egos were more attractive. It is likely that there was not competition for leadership within the small groups, but instead those who liked to lead were in groups with those who did not. The large numbers of participants who did not care who lead the group may be part of the cause of the lack of significant findings here.

Overall, some support was found for heterophily as a base for negative ties. However, this support was not consistent across samples. More research investigating these variables in different settings is needed to get a better understanding of what negative ties are based on and in what situations different characteristics matter more.

CHAPTER III: IMPACTS (NEGATIVE ASYMMETRY)

While investigation of the antecedents or bases for both positive and negative ties is both interesting and important, it only completes part of the overall social network and human resource management puzzles. The missing pieces are those that show how important these different types of ties are to both individual and network outcomes. People with a greater number of negative ties may be more likely to experience more negative outcomes as a result. The effects of both positive and negative relationships on outcomes is a natural next step in expanding our knowledge of the role of social networks in groups and organizations. This chapter focuses on the relationships and impacts of positive and negative ties on different individual and group outcomes.

Theory and Evidence

There are many different outcomes that people in an organization can experience. Typical human resource management outcomes include job satisfaction, power, recruitment and selection, performance, career development, retention, and turnover. The consequences of positive ties are usually positive including access to information, mentoring, references and referrals for better positions, control and mobilization of resources, increased job satisfaction, more power, and promotions into higher-level positions. The consequences of negative ties then are likely to be negative. Withholding information, an absence of referrals, not sharing or controlling resources, lower job satisfaction, lower commitment, increased turnover, and poor performance evaluations may result from having negative social ties (Brass & Labianca, 1999).

There are several studies that have examined the consequences of social networks, specifically social capital, on these different types of outcomes. Positive relationships result in increased job satisfaction, commitment, and performance (e.g., Roberts & O'Reilly, 1979), power (e.g., Brass, 1995), access to information and better information at the right times (e.g., Brass, 1984; Burt, 1992), mentoring and references (e.g., Higgins & Nohria, 1999) and referrals and recruitment for job positions (e.g., Marsden & Gorman, 1999). For instance, Higgins and Nohria found that although having a mentor early on in a career can sometimes be harmful, mentoring relationships after the protégé has established his or her own identity can be very helpful in expanding the social network. Marsden and Gorman showed that positive ties play a significant role in promotion and recruitment inside the organization.

There is only conjecture as to the consequences of negative social ties. Labianca and Brass (1997) presented several different hypotheses regarding human resource management outcomes. For instance, the number of negative ties should be negatively related to outcomes of job satisfaction, affective commitment to the organization, power, and others' perceptions of performance. Because the quality of relationships is important in job satisfaction (Blau, 1981), having negative relationships is likely to decrease satisfaction. On a similar note, negative relationships may decrease the commitment to an organization because employees may feel that they do not want to be a part of an organization where they are treated badly or not liked (Labianca & Brass, 1997).

Since low job satisfaction and a lack of commitment are likely to lead to retention problems and turnover, the number of negative relationships may ultimately result in the

loss of that employee. Therefore, the number of negative relationships or ties should have a positive relationship with negative outcomes such as turnover, absenteeism, and stress (Labianca & Brass, 1997). Labianca and Brass also proposed that when the network is small, dense, and highly task interdependent the number of negative relationships would be more strongly related to outcomes than when the network is large, simplex, and sparse. This is likely to be true as negative ties would be more salient in small, dense networks.

As is evident, both positive and negative consequences can be related to the valence of ties in social networks. But which type of tie is more important or has more impact? Brass and Labianca (1999; Labianca & Brass, 1997) propose that negative asymmetry may exist in the social network, that is that "negative ties may have greater explanatory power than positive ties in organizations" (p. 325). This hypothesis is based on a variety of literatures, including affective, behavioral, and cognitive psychology, evolutionary and developmental psychology, health care and social support.

The two main theoretical approaches as to why negative asymmetry would exist in social networks stem from Skowronski and Carlston (1989). The first is discrepancy theory or the idea of a contrast effect. Because negative information is not expected and contrasts with positive or neutral information, which is expected, negative information is more likely to be attended to and weighted more heavily. The other theoretical approach is ambiguity theory. Positive information tends to be rather ambiguous, whereas negative information is usually very clear. For example, someone might ask, "What is Jerry like?" A person with a positive relationship with Jerry might respond, "Oh, he's pretty nice",

while someone with a negative relationship with Jerry might respond, "Jerry is such a jerk. Do you know what he did to me? He stole my top account when I was out of town on a family vacation." Negative information tends to be very direct. An example used by Brass and Labianca (1999) to illustrate both of these theories is that of a reference letter. The typical letter of reference is positive. A negative letter, then, is both discrepant (contrasting what is expected) and likely to have very unambiguous information (detailing why the person is getting a negative reference).

The study described in this chapter was designed based on the negative asymmetry theory to focus on the relationships and impacts of positive and negative ties on outcomes. The predictions follow from Brass and Labianca's (1999; Labianca & Brass, 1997) suggestions that negative ties may have more influence on outcomes than positive ties. In addition to testing the negative asymmetry theory using undirected negative ties, I also explore self-directed and other-directed outcomes using directed negative ties.

Hypotheses

In order to investigate whether negative ties do indeed have an asymmetric effect on outcomes, several hypotheses were examined.

Hypothesis 3-1: Direction of Tie Relationship with Outcomes

First, it is likely that the number of positive ties will be positively related to positive outcomes and the number of negative ties will be negatively related to these

same outcomes. These relationships should hold for both self-directed outcomes as well as other-directed outcomes.

> *Hypothesis 3-1a.* The number of positive ties will have a positive relationship with positive outcomes and the number of negative ties will have a negative relationship with positive outcomes.

If the outcome is negative, then the opposite relationship pattern is expected. The number of positive ties is likely to be negatively related to negative outcomes and the number of negative ties is likely to be positively related to negative outcomes.

> *Hypothesis 3-1b.* The number of positive ties will have a negative relationship with negative outcomes and the number of negative ties will have a positive relationship with negative outcomes.

Hypotheses 3-2 and 3-3: Negative Asymmetry and Self-Directed Outcomes

The next group of hypotheses dealt with self-directed outcomes, specifically the perception of success of the small group and commitment to the field of study. In terms of difficulty of the group task, a person with positive ties within the group is likely to perceive the task to be less difficult than a person with negative ties. If everything is running smoothly, the task should be perceived as easier than if there are tensions between group members. Therefore, the relationship between the number of negative ties and perception of difficulty of the project should be positive and positive to a greater extent than the relationship between the number of positive ties and perception of difficulty of the project is negative.

Hypothesis 3-2a: The number of negative ties will have a greater relationship with the perception of difficulty of the group project than the number of positive ties.

In terms of satisfaction with the completed task, a person with positive ties within the group is likely to be more satisfied when the task is completed than a person with negative ties. If the group member felt like the team had worked together and had done a good job, the member should be more satisfied with the finished project than a member who felt like the team had struggled.

Hypothesis 3-2b: The number of negative ties will have a greater relationship with the satisfaction with the group project than the number of positive ties.

Finally, along the same lines, a person with positive ties is likely to perceive the task as more interesting than a person with negative ties. The group members are likely to have more of an interest in the task when they get along with other group members and enjoy spending time with them. Group members are also likely to take less of an interest in the group task when they do not want to spend time with the other members of the group.

Hypothesis 3-2c: The number of negative ties will have a greater relationship with interest in the project than the number of positive ties.

People with positive ties are likely to enjoy their experiences more and have a more positive outlook in their field and are therefore likely to be more committed to remaining in this area. People with negative ties may feel like they do not belong or that

they cannot get along with others in the field, so it would not matter if they found something else.

Hypothesis 3-3: The number of negative ties will have more impact on the level of commitment than the number of positive ties.

Hypotheses 3-4 and 3-5: Negative Asymmetry and Other-Directed Outcomes

The next group of hypotheses dealt with other-directed outcomes, including leadership emergence in a small group and job search outcomes. If a group member has a large number of positive ties within the group, it is likely that the group members will see him or her as a leader in the group. If a group member has a large number of negative ties, however, it is also likely that s/he will not be chosen as a group leader. The relationship between the number of negative ties for each person in a group and the number of times that person is chosen as a particular group leader should be negative. According to the negative asymmetry proposition, the negative relationship should be larger than the positive relationship between the number of positive ties and the number of times chosen as a group leader. This hypothesis is split into three different leadership categories, the first of which is the overall leader of the group.

Hypothesis 3-4a: The number of negative ties will have a greater relationship with and more impact on the number of times chosen for overall group leader than the number of positive ties.

The second dimension of leadership to be examined here is task leadership. A meta-analysis by Eagly and Karau (1991) shows that two forms of leaders emerge in small groups – one form that is strictly task-oriented and another that is socially

facilitative. It is likely that a person with positive ties within the group can fill one, if not both, of these leadership needs. It is also likely that a person with negative ties within a small group will not be considered a leader on either of these dimensions.

Hypothesis 3-4b: The number of negative ties will have a greater relationship with and more impact on the number of times chosen for group task leader than the number of positive ties.

Hypothesis 3-4c: The number of negative ties will have a greater relationship with and more impact on the number of times chosen for group relational leader than the number of positive ties.

Positive ties have been shown to be positively related to recruitment and selection and negative ties have been proposed to be negatively related to these variables. People with positive ties are more likely to get referrals for better positions than people with negative ties. Many times seniors graduating from college participate in campus interviews when searching for that first job. Students often hear about these interviews from other students and faculty members. If a student has a number of positive ties with others in the class, it is likely that s/he will hear about interviews from both students and faculty. If a student has a number of negative ties, s/he may not receive this information from others.

Hypothesis 3-5a: The number of negative ties will have more impact on the number of job interviews than the number of positive ties.

Also, along these same lines, people with positive ties are likely to receive more job offers than people with negative ties. Faculty members are often asked to give referrals at

this stage. If a faculty member not only observes but also hears good things about a student, the letter of reference is likely to be positive. If a faculty member observes and/or hears a lot of negative things about the student from other students, a good referral is not likely to be written.

Hypothesis 3-5b: The number of negative ties will have more impact on the number of job offers than the number of positive ties.

Hypothesis 3-6: Explorations into Agency

Hypotheses 3-2 through 3-5 are all proposed in line with Brass and Labianca's (1999; Labianca & Brass, 1997) theory of negative asymmetry. Their ideas are based on the number of undirected negative ties, the negative ties that result from at least one of the dyad members rating the other negatively. Both ego and alter are given a negative tie with the other for these types of ties.

However, as I have argued previously, it may be the case that directed negative ties show even a greater influence on outcome variables. An investigation into directed negative ties along with and compared to undirected negative ties may lead to an even better understanding of how negative ties are related to and impact self-directed and other directed outcomes. Since directed-from negative ties are only counted for the person who makes the negative rating these ties fit with the concept of personal agency.

Hypothesis 3-6a: The number of directed-from negative ties will have greater relationships with and more impact on self-directed outcomes than the number of undirected negative ties.

Along these same lines, directed-at negative ties are only counted for the person who received the negative rating and this perspective fits with the concept of proxy agency.

Hypothesis 3-6b: The number of directed-at negative ties will have greater relationships with and more impact on other-directed outcomes than the number of undirected negative ties.

Previous research findings also suggest that gender may have an influence on some of these outcomes (e.g., women are chosen more as group relational leaders and men are chosen more as group task leaders [Eagly & Karau, 1991]). Whether certain status characteristics such as gender, age, and grade point average have an effect on the outcomes will be explored, along with gender interactions with the numbers of positive and negative ties, for each outcome variable.

Method

Data and Samples

The UM research group described in the introduction provided information on the outcome variables for the same three anonymous samples utilized in the previously discussed study.

Variables

Independent Variables

The independent variables for this study include the number of positive ties and the number of negative ties for each group member. The number of positive ties was determined by summing the number of times that each member of a dyad had rated the other member as a five on the five-point scale of wanting to work with that person on a similar project again. The available values for this variable ranged from zero (no positive ties) to five (all ties with other group members were positive).

The independent variable of the number of negative ties comes in three forms. First, the number of undirected negative ties was determined by summing the number of times *at least one* member of the dyad had rated the other member with a score of less than three on the five-point scale of wanting to work with that member on a similar project again. Here both the ego and the alter are scored as having a negative tie with the other. Available values for this variable also ranged from zero (no negative ties) to five (all ties with other group members were characterized by at least one negative rating).

The next two forms of this independent variable were created by summing the number of times the ego had rated an alter negatively (directed-from negative ties) and the number of times the alter had been rated negatively by an ego (directed-at negative ties). The possible values for these variables are the same as the other form of negative ties (0 to 5).

Dependent Variables

There are several separate dependent variables investigated in this study. First, three self-directed aspects of the group members' perceptions of the group project itself were examined. Participants were asked to indicate on a five-point scale how difficult they perceived the semester's team project to be (negative outcome). The scale for responses ranged from 1 (not at all difficult) to 5 (very difficult). Participants were next asked to assess their satisfaction with the deliverable the team produced. Again, a five-point scale was utilized, ranging from 1 (not at all satisfied) to 5 (very satisfied). Finally, in terms of aspects of the team project, participants indicated how interesting the project was (scale of 1 = not at all interesting to 5 = very interesting). These are each cross-sectional.

The next type of self-directed outcome investigated was commitment to the field of study. The commitment score for each participant is based on an average of the nine positively coded items from the Mowday, Steers, and Porter (1979) scale (see Appendix C). Commitment was not examined for Sample 3.

Next, several other-directed outcomes were investigated. The number of times the person was chosen by himself/herself along with other group members as the one person exhibiting the most leadership on several dimensions was examined. This is a cross-sectional variable as it was included in the same survey as the item used to group the relationships into positive, neutral, or negative ties. Participants were asked to " ... indicate by writing in the name of the <u>one</u> group member (it can be you) who best

exemplifies ..." leadership on one of three dimensions. The names were then coded to make the data anonymous and confidential.

The first dimension is overall group leadership. Participants wrote the name of the person who "was the overall leader of the group." The next dimension is group task leadership. Participants wrote the name of the person who "made the most direct contribution (e.g., solving problems, providing information, making decisions) to the project." The third and final leadership dimension is group relational leadership. Here, participants indicated who "made the most indirect contribution (e.g., interpersonal relations, group morale) to the project." Dependent variables were created for each case by summing the number of times the member was chosen as the group leader on that dimension by all the members of the group (including that member).

Similar longitudinal variables were created for one of the samples that had longitudinal data available (Sample 2). Leadership choice dependent variables were created from data on the same sort of group in the next semester's class.

The final type of other-directed outcome variable used in this study focused on the job search process. In the final semester in the program, participants were asked to indicate how many job interviews and how many job offers s/he had had that year. These numbers served as the job search dependent variables. Again, since Sample 3 was in the second to last semester when surveyed, these variables will not be examined for that sample. The job search variables are cross-sectional for Sample 1 and longitudinal for Sample 2.

Results

Organization of Results Section

This results section is organized slightly different than the standard results section to enable the discussion of the many different hypotheses. First, I will discuss the descriptive statistics and correlations between the independent and dependent variables. The remainder of the results section is organized by dependent variable. For each dependent variable, Hypothesis 3-1 (a or b) and Hypothesis 3-6 (a or b) are tested. The remaining hypotheses are variable-specific so each is tested in accordance with that dependent variable. The investigation into the self-directed outcomes is discussed first and then the investigation into the other-directed outcomes follows.

Descriptives and Correlations

The descriptive statistics for the three samples are shown in Table 3-1. Each sample was not complete in that not all participants had scores for all variables (see Table 3-1). Sample 1 had a larger mean number of undirected negative ties than Sample 3 (see Table 1-1 for differences between samples). There were no differences between samples for the mean number of positive ties, directed-from negative ties, or directed-at negative ties. Sample 1 differed from the other two samples on the mean ratings of difficulty of the project and the interest value of the project. Post-hoc comparisons confirmed each of these interpretations (see Chapter I). These significant differences between samples indicated that each of the samples should be investigated separately.

TABLE 3-1. Descriptive Statistics for the Three Samples

Variable	Mean			Standard Deviation		
	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3
Positive[a]	1.00	1.45	1.42	1.18	1.23	1.49
Und. Negative[a]	.89	.75	.52	.99	1.04	.85
D.F. Negative[a]	.58	.41	.38	.99	.64	.67
D.A. Negative[a]	.46	.39	.29	.69	.95	.69
Difficulty[b]	3.42	4.24	4.14	.79	.65	.61
Satisfied[b]	4.24	4.36	4.12	.80	.78	.85
Interesting[b]	3.92	4.35	4.49	.99	.70	.64
Comm[c]	3.69	3.81	N/A	.95	.76	N/A
Task[a]	.76	.90	.72	1.19	1.23	1.20
Relation[a]	.79	.95	.72	.94	1.17	.88
Overall[a]	.75	.93	.65	1.34	1.31	1.19
Job Int.[d]	2.47	3.35	N/A	3.44	4.41	N/A
Job Offer[d]	.71	1.30	N/A	1.27	2.14	N/A

[a] Sample 1 n range = 50 to 63; Sample 2 n range = 95 to 99; Sample 3 n range = 76 to 100; Und. = undirected, D.F. – directed-from, D.A. = directed-at
[b] Sample 1 n = 50; Sample 2 n = 95; Sample 3 n = 76
[c] Sample 1 n = 60; Sample 2 n = 39; Sample 3 not applicable (N/A)
[d] Sample 1 n = 59; Sample 2 n = 34; Sample 3 not applicable (N/A)

For Sample 1, 44% (28 out of 63) of the participants did not have any undirected negative ties and 37% did not have any positive ties (see Table 1-2 for other frequencies). In this same sample, 63% of the participants did not have any directed-at negative ties and 56% did not have any directed-from negative ties. Thirteen participants did not rate others in their group, but were rated, so they were coded as missing in the number of positive ties and directed-from negative ties. Fifty-six percent of Sample 2 participants did not have any undirected negative ties and 29% did not have any positive ties. Eighty-two percent did not have any directed-at negative ties and 64% did not have any directed-from negative ties. Four participants in this sample did not rate others in their group. In Sample 3, 66% of the participants did not have any undirected negative ties and 26% did not have any positive ties. Eighty-one percent of participants did not have any

directed-at negative ties and 54% did not have any directed-from negative ties. Twenty-four of these participants did not rate others in their group and were coded missing for the number of positive ties and for the number of directed-from negative ties.

Sample 1 Correlations

The correlations between Sample 1 independent and self-directed dependent variables are shown in Table 3-2. As expected, there were significant negative correlations between the number of positive ties and the number of undirected negative ties ($r = -.50, p < .001$) and the number of positive ties and the number of directed-at negative ties ($r = -.38, p < .01$). The correlation between the number of positive ties and the number of directed-from negative ties was negative and only marginally significant ($r = -.26, p < .10$). There was a significant positive correlation between the number of undirected negative ties and both the number of directed-from negative ties ($r = .82, p < .001$) and the number of directed-at negative ties ($r = .50, p < .001$). The number of directed-from negative ties and the number of directed-at negative ties were not correlated.

Table 3-2 further shows that there were a number of significant or marginally significant positive correlations. For example, a significant positive correlation occurred between the independent variable of the number of positive ties and the dependent variable of the level of satisfaction with the group project, indicating that the more positive ties a person had the more satisfied s/he was with the project. The correlation between the number of positive ties and commitment was marginally significant. The numbers of undirected negative ties and of directed-from negative ties were marginally

positively correlated with the interest value of the project. The number of directed-at negative ties was marginally positively correlated with satisfaction with the project. Satisfaction with the project was also correlated with interest in the project, indicating that more satisfied participants were also more interested. Satisfaction was marginally positively correlated and interest was significantly correlated with commitment. The only significant negative correlation was between the number of directed-from negative ties and satisfaction with the project, indicating that those who rated more of the others in their group negatively were not as satisfied with the project.

TABLE 3-2. Sample 1 Correlation Matrix for Self-Directed Outcomes[a,b]

	1	2	3	4	5	6	7
1							
2	-.50**						
3	-.26^{+}	.82**					
4	-.38**	.50**	-.18				
5	.13	-.17	-.11	-.13			
6	.44**	-.17	-.31*	.27^{+}	.23		
7	.11	.25^{+}	.26^{+}	.02	.18	.41**	
8	.25^{+}	-.10	.02	-.14	.24	.25^{+}	.34* (.92)

[a]Variables in order: 1) Positive ties[c], 2) Undirected negative ties[c], 3) Directed-from negative ties[c], 4) Directed-at negative ties[c], 5) Difficulty of the project[d], 6)Satisfaction with the project[d], 7)Interest in the project[d], 8)Commitment[e]

[b] Sample 1 n = 63

[c] Count variables ("number of"); n range = 50 to 63

[d] Score on five-point scale regarding group project (1 = not at all, 5 = very); n =50

[e] Average of nine-item scale adapted from Mowday, Steers, and Porter (1979); n = 60; diagonal is in parentheses

$^{+}$ indicates $p < .10$; * indicates $p < .05$; **indicates $p < .01$

The correlations between Sample 1 independent and other-directed dependent variables are shown in Table 3-3. The number of positive ties had two marginally significant positive correlations; one with the number of times chosen as group task

leader and one with the number of job interviews. The number of undirected negative ties did not have any significant relationships with the other-directed outcomes. The number of directed-from negative ties was significantly correlated with the number of times chosen as the overall group leader, indicating that the person who was most often chosen as the leader also made the most negative ratings of his/her group members. The number of directed-at negative ties was significantly negatively correlated with the number of times chosen as the overall group leader, the number of times chosen as the group task leader, and the number of times chosen as the group relational leader. These correlations indicate that those who received the most negative ratings from other group members were not likely to be chosen as a leader on any of the leadership dimensions.

TABLE 3-3. Sample 1 Correlation Matrix for Other-Directed Outcomes[a,b]

	1	2	3	4	5	6	7	8
1								
2	-.50**							
3	-.26^{+}	.82**						
4	-.38**	.50**	-.18					
5	.18	.08	.31*	-.36**				
6	.26^{+}	-.09	.09	-.38**	.76**			
7	.14	-.04	.07	-.25*	.32*	.20		
8	.26^{+}	-.20	-.18	-.10	.13	.10	.21	
9	.12	-.04	-.08	-.04	-.14	-.01	.28*	.41**

[a]Variables in order: 1) Positive ties[c], 2) Undirected negative ties[c], 3) Directed-from negative ties[c], 4) Directed-at negative ties[c], 5) Overall leader[d], 6) Task leader[d], 7) Relational leader[d], 8)Job Interviews[e], 9) Job Offers[e]

[b] Sample 1 n = 63

[c] Count variables ("number of"); n range = 50 to 63

[d] Number of times chosen for that particular type of group leader; n = 63

[e] Count variables ("number of"); n = 59

$^{+}$ indicates $p < .10$; * indicates $p < .05$; **indicates $p < .01$

The number of times chosen as the overall group leader was significantly correlated with the number of times chosen as the group task leader and the group relational leader. Finally, the number of job offers was significantly correlated with the number of times chosen as group relational leader and the number of job interviews.

Sample 2 Correlations

The correlations between the independent and self-directed dependent variables for Sample 2 are shown in Table 3-4.

TABLE 3-4. Sample 2 Correlation Matrix for Self-Directed Outcomes[a,b]

	1	2	3	4	5	6	7
1							
2	-.53**						
3	-.33**	.59**					
4	-.40**	.82**	.03				
5	.26*	-.13	-.34**	.08			
6	-.03	-.25*	-.40**	-.01	.10		
7	.03	-.00	-.11	.10	.12	.28**	
8	-.06	.14	.04	.11	-.11	.09	.42** (.88)

[a]Variables in order: 1) Positive ties[c], 2) Undirected negative ties[c], 3) Directed-from negative ties[c], 4) Directed-at negative ties[c], 5) Difficulty of the project[d], 6)Satisfaction with the project[d], 7)Interest in the project[d], 8)Commitment[e]

[b] Sample 2 n = 99

[c] Count variables ("number of"); n range = 95 to 99

[d] Score on five-point scale regarding group project (1 = not at all, 5 = very); n = 95

[e] Average of nine-item scale adapted from Mowday, Steers, and Porter (1979); n = 39; diagonal is in parentheses

[+] indicates $p < .10$; * indicates $p < .05$; **indicates $p < .01$

As expected, the number of undirected negative ties had a significant negative correlation with the number of positive ties ($r = -.53, p < .001$), as did the number of directed-from negative ties ($r = -.33, p < .001$) and the number of directed-at negative ties ($r = -.40, p < .001$). The number of undirected negative ties was positively correlated with

the number of directed-from negative ties ($r = .59, p < .001$) and the number of directed-at negative ties ($r = .82, p < .01$).

The number of positive ties was positively correlated with the difficulty rating on the project, indicating that those who had a greater number of positive ties perceived the project to be more difficult. The number of undirected negative ties had a significant negative correlation with satisfaction with the project, indicating that the more undirected negative ties a person had the less satisfied s/he was with the project. The number of directed-from negative ties had significant negative correlations with both perceptions of difficulty of the project and satisfaction with the project. As was evident in Sample 1, interest in the project was significantly correlated with both satisfaction with the project and commitment to the field of study.

The correlations between the independent and other-directed dependent variables for Sample 2 are shown in Table 3-5. There were no significant correlations for either the number of positive ties or the number of undirected negative ties and the other-directed outcomes. The number of directed-from negative ties was significantly positively correlated with the number of job offers. The number of directed-at negative ties was negatively correlated with each of the leadership choice variables; marginal correlations with the number of times chosen as overall group leader and group relational leader and a significant correlation with the number of times chosen as group task leader.

TABLE 3-5. Sample 2 Correlation Matrix for Other-Directed Outcomes[a,b]

	1	2	3	4	5	6	7	8
1								
2	-.53**							
3	-.33**	.59**						
4	-.40**	.82**	.03					
5	.14	-.08	.06	-.17^{+}				
6	.12	-.11	.11	-.21*	.53**			
7	.04	-.09	.07	-.19^{+}	-.05	-.28**		
8	.10	.08	.17	-.03	.44**	.27	.02	
9	.18	.18	.39*	.02	.50**	.44*	-.13	.50**

[a]Variables in order: 1) Positive ties[c], 2) Undirected negative ties[c], 3) Directed-from negative ties[c], 4) Directed-at negative ties[c], 5) Overall leader[d], 6) Task leader[d], 7) Relational leader[d], 8)Job Interviews[e], 9) Job Offers[e]

[b] Sample 2 n = 99

[c] Count variables ("number of"); n range = 95 to 99

[d] Number of times chosen for that particular type of group leader; n = 99

[e] Count variables ("number of"); n = 34

[+] indicates $p < .10$; * indicates $p < .05$; **indicates $p < .01$

The number of times chosen as the overall group leader was significantly positively correlated with the number of times chosen as the group task leader, the number of job interviews, and the number of job offers. The number of times chosen for group task leader was negatively correlated with the number of times chosen for group relational leader, indicating that these two types of leadership were perceived to be different in this sample. The number of job offers was positively correlated with the number of times chosen as group task leader and the number of job interviews.

Sample 3 Correlations

The correlations between the independent and self-directed dependent variables for Sample 3 are shown in Table 3-6. Like the other samples, the number of positive ties was significantly negatively correlated with the number of undirected negative ties (r = -

.41, $p < .001$) and with the number of directed-from negative ties ($r = -.31$, $p < .01$) and the number of directed-at negative ties ($r = -.32$, $p < .01$). The numbers of undirected negative ties and both the numbers of directed-from negative ties and the numbers of directed-at negative ties were strongly positively correlated ($r = .79$, $p < .001$ and $r = .78$, $p < .001$, respectively). The number of directed-from negative ties was also significantly correlated with the number of directed-at negative ties.

TABLE 3-6. Sample 3 Correlation Matrix for Self-Directed Outcomes[a,b]

	1	2	3	4	5	6
1						
2	-.41**					
3	-.31**	.79**				
4	-.32**	.78**	.27*			
5	.04	.14	.06	.12		
6	.34**	-.27*	-.36*	-.10	.02	
7	.16	-.21^{+}	-.25*	-.11	-.01	.41**

[a]Variables in order: 1) Positive ties[c], 2) Undirected negative ties[c], 3) Directed-from negative ties[c], 4) Directed-at negative ties[c], 5) Difficulty of the project[d], 6) Satisfaction with the project[d], 7) Interest in the project[d]

[b] Sample 3 n = 100

[c] Count variables ("number of"); n range = 76 to 100

[d] Score on five-point scale regarding group project (1 = not at all, 5 = very); n = 76

$^{+}$ indicates $p < .10$; * indicates $p < .05$; **indicates $p < .01$

The number of positive ties was significantly positively correlated with satisfaction with the project, indicating that those with more positive ties in their groups were more satisfied with the work their group turned in. The number of undirected negative ties was significantly negatively correlated with satisfaction and was marginally correlated with interest in the project. The number of directed-from negative ties was significantly negatively correlated with both satisfaction and interest, indicating those

who rated more others in the group negatively were less satisfied and less interested in the project. Satisfaction and interest were again positively correlated.

The correlations for the independent variables and the other-directed dependent variables for Sample 3 are shown in Table 3-7. The numbers of positive ties, undirected negative ties, and directed-at negative ties were not correlated with any of the other-directed outcomes. The number of directed-from negative ties was correlated with the number of times chosen as group task leader, indicating that the participants that were chosen most often for this type of group leadership also rated more others in the group negatively. The number of times chosen as group task leader was also correlated with the number of times chosen as the overall group leader.

TABLE 3-7. Sample 3 Correlation Matrix for Other-Directed Outcomes[a,b]

	1	2	3	4	5	6
1						
2	-.41**					
3	-.31**	.79**				
4	-.32**	.78**	.27*			
5	.10	.07	.19	-.09		
6	.07	.08	.23*	-.12	.72**	
7	.18	-.01	.08	-.10	.12	-.01

[a]Variables in order: 1) Positive ties[c], 2) Undirected negative ties[c], 3) Directed-from negative ties[c], 4) Directed-at negative ties[c], 5) Overall leader[d], 6) Task leader[d], 7) Relational leader[d]
[b] Sample 3 n = 100
[c] Count variables ("number of"); n range = 76 to 100
[d] Number of times chosen for that particular type of group leader; n = 100
[+] indicates $p < .10$; * indicates $p < .05$; **indicates $p < .01$

The correlation matrices indicated some initial support for Hypothesis 3-1 (a and b). For instance, the number of positive ties had all positive correlations with the dependent variables in Sample 1 and Sample 3 and mostly positive correlations with the

dependent variables in Sample 2. Not all of these were significant, however. The number of undirected negative ties had both positive and negative correlations with the dependent variables, a majority of which were negative. The number of directed-from negative ties also had a mixture of positive and negative correlations. The number of directed-at negative ties also had a mixture, but mostly negative correlations with the other-directed outcomes.

The correlations showed very little initial support for the negative asymmetry hypotheses (Hypotheses 3-2 through 3-5) using undirected negative ties. For instance, in Sample 2 for the self-directed outcome of satisfaction with the project, the number of undirected negative ties was negatively correlated with satisfaction while the number of positive ties was not correlated with this variable.

When using the different forms of the directed negative ties, however, there was more support for negative asymmetry. For example, in the Sample 1 correlations for other-directed outcomes, the correlations between number of directed-at negative ties and the three leadership choice variables are all significant while the correlations between these variables and the number of positive ties are not. This same pattern occurred in Sample 2. These types of results can also be interpreted as initial support for Hypothesis 3-6 (a or b).

Regression models were run to enable the comparison of coefficients when the effects of both the number of positive ties and the number of negative ties were entered simultaneously, along with several control variables and interactions terms.

Analyses of Self-Directed Outcome Variables

Project Evaluations

Each of the dependent project evaluation variables, difficulty of the project, satisfaction with the deliverable, and how interesting the project was, were scores on a scale of 1 (not at all) to 5 (very). Fifty participants in Sample 1, 95 in Sample 2, and 76 in Sample 3 had scores for these items. Standard regression models, regressing the project evaluation score on the numbers of positive and negative ties, along with the control variables and interaction terms, were conducted.

Difficulty. This variable is a negative outcome variable, therefore Hypothesis 3-1b, predicting a negative relationship with the number of positive ties and a positive relationship with the number of negative ties, was tested. The regression results for each sample using the number of undirected negative ties as one of the independent variables are shown in Table 3-8.

Hypothesis 3-1b was partially supported in Sample 3. In each sample both the coefficient for the number of positive ties and the coefficient for the number of undirected negative ties were positive, but not significant. In Sample 3 the coefficient for the number of undirected negative ties was significant.

TABLE 3-8. Results by Sample for Difficulty of Project (Undirected)

Variable		Sample 1	Sample 2	Sample 3
Constant	β	2.666	3.403	4.390
	t	2.645*	8.22**	10.94**
Positive	β	0.081	0.113	0.066
	t	0.65	1.54	1.10
Und. Negative	β	0.024	0.046	0.302
	t	0.13	0.51	2.39*
Gender	β	0.263	-0.284	-0.145
	t	0.40	-0.86	-0.46
Age	β	-0.000	-0.004	-0.017
	t	-0.01	-0.31	-1.07
GPA	β	0.200	0.227	N/A
	t	1.34	2.90**	N/A
Gdr x Pos	β	-0.042	0.115	-0.018
	t	-0.12	0.82	-0.15
Gdr x Neg	β	-0.219	-0.019	-0.200
	t	-0.66	-0.12	-1.08

Note: GPA = Grade point average; β is an unstandardized coefficient; $^{+}$ indicates a p-value < .10, * indicates a p-value < .05, ** indicates a p-value < .01.

Hypothesis 3-2a, predicting that the number of negative ties would have a greater relationship with the perceived difficulty of the project than the number of positive ties, was supported for Sample 3. The coefficient for the number of undirected negative ties was larger than the coefficient for the number of positive ties, $t_{adj}(74) = -1.77, p < .05$. In this case, the number of undirected negative ties increased the expected value for difficulty of the project by 35%, holding all other variables constant. The number of positive ties increased this value by 7%, holding all other variables constant. The coefficients in Sample 1 and 2 were not significantly different, $t_{adj}(46) = .28, p = .39$ and $t_{adj}(92) = .61, p = .27$, respectively.

The regression results using the number of directed-from negative ties as one of the independent variables are shown in Table 3-9.

TABLE 3-9. Results by Sample for Difficulty of Project (Directed)

Variable		Sample 1	Sample 2	Sample 3
Constant	β	2.774	3.522	4.457
	t	2.64*	8.99**	10.78**
Positive	β	0.062	0.060	0.038
	t	0.55	0.95	0.65
Dir. Negative	β	-0.052	-0.232	0.267
	t	-0.28	-1.86^{+}	1.59
Gender	β	-0.092	-0.232	-0.162
	t	-0.22	-0.87	-0.54
Age	β	-0.002	0.004	-0.016
	t	-0.07	0.33	-0.93
GPA	β	0.200	0.201	N/A
	t	1.31	2.65**	N/A
Gdr x Pos	β	0.094	0.087	-0.015
	t	0.35	0.72	-0.13
Gdr x Neg	β	-0.020	-0.091	-0.198
	t	-0.07	-0.42	-0.81

Note: Dir. = directed-from, GPA = Grade point average; β is an unstandardized coefficient; $^{+}$ indicates a p-value < .10, * indicates a p-value < .05, ** indicates a p-value < .01.

Hypothesis 3-1b was not supported in any sample. In Samples 1 and 2, the coefficients were in the opposite direction than hypothesized. In Sample 2, the negative coefficient for the number of directed-from negative ties was marginally significant. Both coefficients were positive in Sample 3 and neither coefficient was significant.

Hypothesis 3-2a, predicting that negative asymmetry would be evident for difficulty, was not supported in Samples 1 and 2, and partially supported for Sample 3 when using directed-from negative ties. The coefficients for the number of positive ties and for the number of directed negative ties were similar in both Samples 1 and 2, $t_{adj}(46)$

= .05, p = .48 and $t_{adj}(92)$ = -1.26, p = .10, respectively. In Sample 3, the coefficient for the number of directed-from negative ties was marginally larger than the coefficient for the number of positive ties, $t_{adj}(74)$ = -1.32, $p < .10$. In this case, the number of directed-from negative ties increased the expected value of difficulty of the project by 31%, holding all other variables constant, and the number of positive ties only increased this expected value by 4%, holding all other variables constant.

In Sample 2, the coefficient for grade point average was positive and significant when both the number of undirected negative ties was used and when the number of directed-from negative ties was used. In this sample, participants with higher grade point averages were likely to rate the project as more difficult than those with lower grade point averages.

Hypothesis 3-6a was not supported in any of the samples. Neither of the coefficients was significant in Sample 1 (β_{dir} = -.176, p = .53, β_{und} = .16, p = .57) and the coefficient for the number of directed-from negative ties was not larger than the coefficient for the number of undirected negative ties, $t_{adj}(46)$ = -.02, p = .49. In Sample 2, the coefficient for the number of directed-from negative ties was negative and significant (β_{dir} = -.373, $p < .05$), but it was not greater than the coefficient for the number of undirected negative ties (β_{und} = .187, $p < .10$), $t_{adj}(92)$ = -.96, p = .17. The coefficient for the number of undirected negative ties in Sample 3 was positive and marginally significant (β_{und} = .309, $p < .10$) and the coefficient for the number of directed-from negative ties was negative and not significant ((β_{dir} = -.014, p = .95). These coefficients were not different from each other, $t_{adj}(74)$ = .83, p = .21.

Satisfaction. The regression results for satisfaction with the project when the number of undirected negative ties was used are shown in Table 3-10. Hypothesis 3-1a was partially supported in all samples. The coefficient for the number of positive ties was positive and significant in Sample 1 and positive and marginally significant in Sample 3. In Sample 2 both the coefficient for the number of positive ties and for the number of undirected negative ties were negative and the coefficient for the number of undirected negative ties was significant.

TABLE 3-10. Results by Sample for Satisfaction with Project Deliverable (Undirected)

Variable		Sample 1	Sample 2	Sample 3
Constant	β	4.591	4.537	4.234
	t	5.08**	8.91**	7.82**
Positive	β	0.359	-0.107	0.152
	t	3.22**	-1.18	1.88^{+}
Und. Negative	β	0.078	-0.270	0.092
	t	0.46	-2.46*	0.54
Gender	β	0.434	-0.184	0.112
	t	0.73	-0.46	0.26
Age	β	-0.002	-0.012	-0.014
	t	-0.08	-0.84	-0.64
GPA	β	-0.232	0.153	N/A
	t	-1.74^{+}	1.59	N/A
Gdr x Pos	β	-0.120	-0.075	0.021
	t	-0.40	-0.44	0.13
Gdr x Neg	β	-0.052	0.075	-0.364
	t	-0.17	0.38	-1.46

Note: GPA = Grade point average; β is an unstandardized coefficient; $^{+}$ indicates a p-value < .10, * indicates a p-value < .05, ** indicates a p-value < .01.

Hypothesis 3-2b, predicting that the number of negative ties would have a greater relationship with project satisfaction than the number of positive ties, was not supported in any sample. In fact, evidence for the direct opposite relationship was shown in Sample

1 where the coefficient for the number of positive ties was marginally larger than the coefficient for the number of undirected negative ties, $t_{adj}(46) = 1.53, p < .10$. In Sample 2, the coefficient for the number of undirected negative ties was not larger than the coefficient for the number of positive ties, $t_{adj}(92) = -1.23, p = .11$. The coefficients were not different in Sample 3, $t_{adj}(74) = .34, p = .37$.

In Sample 1, the coefficient for grade point average was negative and significant. For this sample, when the number of undirected negative ties was included in the model, the participants with lower grade point averages were more satisfied with the project deliverable.

The regression results using the number of directed-from negative ties as one of the independent variables are shown in Table 3-11. Hypothesis 3-1a was partially supported in all samples. With the exception of Sample 2, in which both the coefficient for the number of positive ties was negative, the coefficients are all in the hypothesized direction. In Samples 1 and 3, only the coefficient for the number of positive ties was significant (Sample 3 was marginal). In Sample 2, only the coefficient for the number of directed-from negative ties was significant.

Hypothesis 3-2b was supported for Sample 2 only. In Sample 1, the coefficient for the number of directed-from negative ties was not different from the coefficient for the number of positive ties, $t_{adj}(46) = .49, p = .31$. In Sample 2, where both coefficients were negative, the coefficient for the number of directed-from negative ties was significantly larger than the coefficient for the number of positive ties, $t_{adj}(92) = -2.35, p$

< .05. The results of Sample 3 were similar to those of Sample 1. The coefficients were not different from each other, $t_{adj}(74) = .33, p = .37$.

TABLE 3-11. Results by Sample for Satisfaction with Project Deliverable (Directed)

Variable		Sample 1	Sample 2	Sample 3
Constant	β	3.951	4.264	4.117
	t	4.31**	9.16**	7.78**
Positive	β	0.301	-0.053	0.153
	t	3.06**	-0.70	1.77^{+}
Dir. Negative	β	-0.203	-0.429	-0.062
	t	-1.24	-2.90**	-0.29
Gender	β	0.421	0.119	0.245
	t	1.17	0.38	0.64
Age	β	0.027	-0.002	-0.005
	t	0.90	-0.15	-0.25
GPA	β	-0.187	0.140	N/A
	t	-1.41	1.56	N/A
Gdr x Pos	β	-0.139	-0.202	-0.008
	t	-0.60	-1.41	-0.06
Gdr x Neg	β	-0.009	-0.339	-0.529
	t	-0.04	-1.30	-1.69^{+}

Note: Dir. = directed-from, GPA = Grade point average; β is an unstandardized coefficient; $^{+}$ indicates a p-value < .10, * indicates a p-value < .05, ** indicates a p-value < .01.

The interaction of gender and the number of directed-from negative ties was marginally significant in Sample 3. In this sample, when using the number of directed-from negative ties in the model, I found women with a greater number of directed-from negative ties to be less satisfied with the project.

Hypothesis 3-6a was not supported for any sample. In Sample 1, the difference between the coefficients for the number of undirected negative ties ($\beta_{und} = .431, p < .10$) and the number of directed-from negative ties ($\beta_{dir} = -.505, p < .05$) was not significant, $t_{adj}(46) = -.18, p = .43$. In the other samples, the difference between coefficients was also

not significant. In Sample 2, both the coefficient for the number of directed-from negative ties and the coefficient for the number of undirected negative ties were negative (β_{dir} = -.309, $p < .10$; β_{und} = -.153, $p = .21$). There was no difference in the size of these coefficients, $t_{adj}(92) = -.65$, $p = .26$. In Sample 3, the coefficients were in the hypothesized direction (β_{dir} = -.282, $p = .35$; $\beta_{und} = .242$, $p = .30$), but there was no difference in the size of these coefficients, $t_{adj}(74) = -.08$, $p = .47$.

Interest Value. The regression results using the number of undirected negative ties as one of the independent variables are shown in Table 3-12. Hypothesis 3-1a was not supported for any of the samples. While all positive, none of the coefficients for the number of positive ties were significant. Only one of the coefficients for the number of undirected negative ties was negative (Sample 3) and none of the coefficients for the number of undirected negative ties was significant.

Hypothesis 3-2c was not supported for any sample. In Sample 3, where the coefficients are in the hypothesized direction, the coefficient for the number of undirected negative ties was not significantly larger than the coefficient for the number of positive ties, $t_{adj}(74) = -.26$, $p = .40$. The coefficients in Samples 1 and 2 were similar to each other, $t_{adj}(46) = -.07$, $p = .47$ and $t_{adj}(92) = .06$, p = .48, respectively.

TABLE 3-12. Results by Sample for Interest Value of the Project (Undirected)

Variable		Sample 1	Sample 2	Sample 3
Constant	β	2.602	3.707	4.978
	t	2.07*	8.01**	11.54**
Positive	β	0.215	0.033	0.006
	t	1.39	0.40	0.09
Und. Negative	β	0.231	0.025	-0.043
	t	0.98	0.26	-0.32
Gender	β	-0.416	-0.356	-0.360
	t	-0.50	-0.96	-1.06
Age	β	0.038	0.008	-0.018
	t	0.90	0.63	-1.06
GPA	β	-0.022	0.139	N/A
	t	-0.12	1.58	N/A
Gdr x Pos	β	0.188	0.013	0.143
	t	0.45	0.08	1.14
Gdr x Neg	β	0.274	0.001	0.001
	t	0.66	0.01	0.01

Note: GPA = Grade point average; β is an unstandardized coefficient; $^{+}$ indicates a p-value < .10, * indicates a p-value < .05, ** indicates a p-value < .01.

The regression results for the same analysis, but using the number of directed-from negative ties instead, are shown in Table 3-13. Hypothesis 3-1a was not supported for any of the samples. In Sample 1, both the coefficient for the number of positive ties and the coefficient for the number of directed-from negative ties were positive. Both coefficients were negative in Sample 2 and the coefficients were in the hypothesized direction in Sample 3. In none of the samples were either of these coefficients significant.

Hypothesis 3-2c was not supported for any of the samples. None of the coefficients for the number of directed-from negative ties were larger than the coefficient for the number of positive ties (Sample 1 $t_{adj}(46) = .06$, $p = .48$, Sample 2 $t_{adj}(92) = -1.16$, $p = .12$, Sample 3 $t_{adj}(74) = -.74$, $p = .23$.

TABLE 3-13. Results by Sample for Interest Value of the Project (Directed)

Variable		Sample 1	Sample 2	Sample 3
Constant	β	2.542	3.876	4.957
	t	1.92^{+}	8.62**	11.48**
Positive	β	0.167	-0.007	0.003
	t	1.17	-0.10	0.04
Dir. Negative	β	0.152	-0.187	-0.136
	t	0.64	-1.31	-0.78
Gender	β	0.096	-0.461	-0.332
	t	0.18	-1.51	-1.06
Age	β	0.050	0.010	-0.017
	t	1.14	0.82	-0.95
GPA	β	-0.039	0.119	N/A
	t	-0.20	1.37	N/A
Gdr x Pos	β	-0.043	0.038	0.136
	t	-0.13	0.27	1.14
Gdr x Neg	β	0.090	0.176	0.032
	t	0.26	0.70	0.12

Note: Dir = directed-from, GPA = Grade point average; β is an unstandardized coefficient; $^{+}$ indicates a p-value < .10, * indicates a p-value < .05, ** indicates a p-value < .01.

Hypothesis 3-6a, predicting that the number of directed-from negative ties would have more of an effect than the number of undirected negative ties, was not supported for any of the samples. In Sample 1, the coefficient for the number of directed-from negative ties was positive and not significant (β_{dir} = .004, p = .99). The coefficient for the number of undirected negative ties was positive and not significant (β_{und} = .219, p = .54). There was no difference between these coefficients, $t_{adj}(46)$ = .31, p = .38. In Sample 2, the coefficients were in the hypothesized direction. The coefficient for the number of directed-from negative ties was negative and marginally significant (β_{dir} = -.292, p < .10) and the coefficient for the number of undirected negative ties was positive and not significant (β_{und} = .136, p = .26). There was also no difference between these coefficients, $t_{adj}(92)$ = -.68, p = .25. The coefficients in Sample 3 followed the same pattern as in

Sample 2 without any significance (β_{dir} = -.190, p = .45; β_{und} = .059, p = .76). Again, there was no difference between the coefficients, $t_{adj}(74)$ = -.34, p = .37.

To recap the results for the project evaluation variables, Hypothesis 3-1a about the direction of the tie relationship was partially supported in all samples for the satisfaction variable when either the number of undirected negative ties or the number of directed-from negative ties were used. There were no supporting results for the interest variable. Results from Sample 3 partially support Hypothesis 3-1b, predicting the tie relationship with negative outcomes, only when the number of undirected negative ties was used with the difficulty outcome variable.

Hypothesis 3-2a was supported in Sample 3 for the number of undirected negative ties and partially supported in Sample 3 for the number of directed-from negative ties. Hypothesis 3-2b, negative asymmetry for the satisfaction outcome, was supported only for Sample 2 when the number of directed-from negative ties was used. Hypothesis 3-2c, negative asymmetry for interest, was not supported in any sample. Hypothesis 3-6a was also supported in any of the samples for any of the project evaluation outcome variables.

Commitment

Sixty out of the 63 participants in Sample 1, and 39 out of the 99 participants in Sample 2 answered questions about commitment. Standard regression models, with the commitment score regressed on the number of positive ties and the number of negative ties, along with the control variables and interactions, were run for each of these samples separately.

The regression results when the number of undirected negative ties was used are shown in Table 3-14. Hypothesis 3-1a, predicting the tie relationship with commitment, was not supported for either of the samples. The coefficients were both positive in Sample 1 and neither was significant. Both coefficients were negative in Sample 2 and neither was significant.

TABLE 3-14. Results by Sample for Commitment (Undirected)

Variable		Sample 1	Sample 2
Constant	β	2.519	2.969
	t	1.76^{+}	4.38**
Positive	β	0.245	-0.040
	t	1.49	-0.24
Und. Negative	β	0.314	-0.018
	t	1.25	-0.11
Gender	β	-0.719	0.275
	t	-0.85	0.39
Age	β	0.003	0.020
	t	0.07	1.16
GPA	β	0.188	0.092
	t	0.79	0.75
Gdr x Pos	β	0.392	-0.074
	t	0.91	-0.25
Gdr x Neg	β	-0.128	0.229
	t	-0.11	0.60

Note: GPA = Grade point average; β is an unstandardized coefficient; $^{+}$ indicates a p-value < .10, * indicates a p-value < .05, ** indicates a p-value < .01.

Hypothesis 3-3, predicting negative asymmetry, was not supported for either sample. In neither of Samples 1 or 2 were the coefficients significantly different, $t_{adj}(44) = -.27, p = .39$ and $t_{adj}(36) = .10, p = .46$, respectively.

The regression results using the number of directed-from negative ties are shown in Table 3-15. Hypothesis 3-1a was not supported for any sample. In Sample 1 both

coefficients were positive and in Sample 2 both coefficients were negative. None of the coefficients for the numbers of positive or directed-from negative ties was different from zero.

TABLE 3-15. Results by Sample for Commitment (Directed)

Variable		Sample 1	Sample 2
Constant	*B*	2.896	3.046
	t	1.96^{+}	4.66**
Positive	*B*	0.160	-0.044
	t	1.09	-0.28
Dir. Negative	*B*	0.156	-0.255
	t	0.65	-0.99
Gender	*B*	-0.822	0.293
	t	-1.54	0.47
Age	*B*	0.007	0.024
	t	0.16	1.36
GPA	*B*	0.129	0.075
	t	0.54	0.61
Gdr x Pos	*B*	0.405	-0.109
	t	1.18	-0.39
Gdr x Neg	*B*	-0.015	0.395
	t	-0.04	1.00

Note: Dir = directed-from, GPA = Grade point average; β is an unstandardized coefficient; + indicates a p-value < .10, * indicates a p-value < .05, ** indicates a p-value < .01.

Hypothesis 3-3 was not supported for any sample. In neither sample was the coefficient for the number of directed-from negative ties different from the coefficient for the number of positive ties, $t_{adj}(44) = .02, p = .49$ and $t_{adj}(36) = -.71, p = .24$.

Hypothesis 3-6a was not supported for either of the samples. In Sample 1, the coefficient for the number of directed-from negative ties was negative and not significant ($\beta_{dir} = -.143, p = .69$). The coefficient for the number of undirected negative ties was positive and not significant ($\beta_{und} = .432, p = .26$). There was no difference between these

coefficients, $t_{adj}(44) = .89, p = .19$. In Sample 2, the coefficient for the number of directed-from negative ties was negative and the coefficient for the number of undirected negative ties was positive ($\beta_{dir} = -.507, p = .20$; $\beta_{und} = .220, p = .38$). There was no difference between these coefficients, $t_{adj}(36) = -.48, p = .32$.

To recap the results for the commitment outcome variable, Hypothesis 3-1a was not supported and Hypothesis 3-3 was not supported for either sample using either the number of undirected negative ties or the number of directed-from negative ties. Hypothesis 3-6a was also not supported for either of the samples.

Analyses of Other-Directed Outcome Variables

Cross-Sectional Leadership Choice

Each of the leadership choice dependent variables are counts of the number of times each individual participant was chosen for that particular dimension of leader within their small group. Linear regression models are inefficient and biased when used with count variables (Long, 1997), so regression models for count outcomes were used instead. Analyses were first conducted using the most basic regression model for counts, the Poisson Regression Model (PRM).

To test the hypotheses, a data file containing the number of times each person was chosen for each of the leadership dimensions, the number of positive ties and the number of undirected and directed-at negative ties each person had, along with several control variables (gender, age, grade point average, and gender interactions) was opened in the program Stata. These control variables were chosen in order to nullify their effects on the

dependent variables and show more clearly the relationships between the valence of ties and outcomes. Analyses were run accordingly and the results are described in detail below (a complete description of the steps used in these analyses are listed in Appendix H).

Overall group leadership. The PRM results for overall group leadership in each sample using undirected negative ties are shown in Table 3-16. As can be seen from the goodness of fit chi-square values in Table 3-16, as well as the graphical images of the observed and predicted values shown in Figure 3-1 (a through c), the PRM was not a good fit for these data.

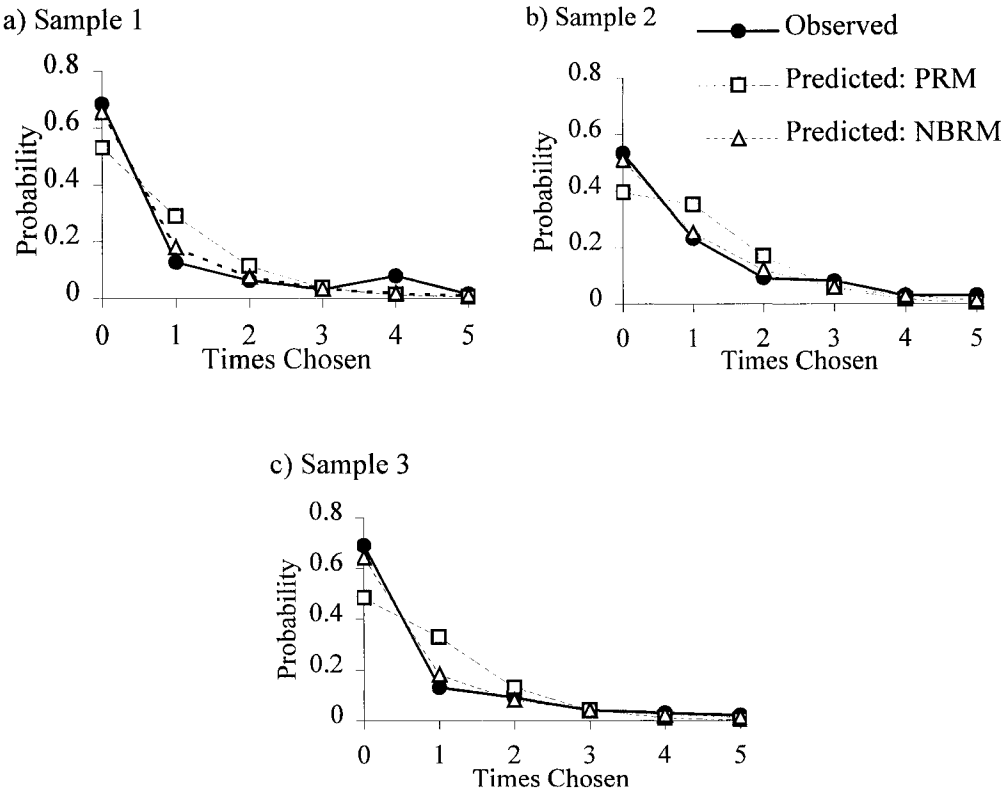
TABLE 3-16. Overall Group Leadership Results by Model and Sample (Undirected)

		Sample 1		Sample 2		Sample 3	
Variable		PRM	NBRM	PRM	NBRM	PRM	NBRM
Constant	β	-3.679	-6.282	-0.714	-0.715	0.659	0.705
	z	-2.35*	-1.72^{+}	-1.18	-0.83	0.61	0.43
Positive	β	0.194	0.137	0.169	0.190	0.113	0.139
	z	1.13	0.55	1.37	1.06	0.93	0.71
Und. Negative	β	0.004	-0.127	0.010	-0.009	-0.030	-0.026
	z	0.01	-0.31	0.06	-0.04	-0.10	-0.06
Gender	β	-3.987	-6.051	0.104	0.141	0.136	0.064
	z	-2.18*	-1.61	0.17	0.17	0.22	0.06
Age	β	0.069	0.136	0.030	0.026	-0.056	-0.060
	z	1.63	1.43	1.93^{+}	1.15	-1.25	-0.86
GPA	β	0.463	0.788	-0.100	-0.075	N/A	N/A
	z	1.53	1.36	-0.82	-0.49	N/A	N/A
Gdr x Pos	β	1.527	2.750	-0.045	-0.075	0.073	0.068
	z	2.43*	1.48	-0.20	-0.22	0.35	0.17
Gdr x Neg	β	1.135	1.554	-0.132	-0.100	0.365	0.433
	z	1.89^{+}	1.53	-0.44	-0.24	1.01	0.70
	χ^2	68.72**		157.10**		133.59**	
Pr (y=0)		0.53	0.65	0.39	0.51	0.48	0.64

Note: PRM = Poisson Regression Model, NBRM = Negative Binomial Regression Model, GPA = Grade point average, Pr = probability; β is an unstandardized coefficient; $^{+}$ indicates a p-value < .10, * indicates a p-value < .05, ** indicates a p-value < .01

In each case, the PRM underpredicted the occurrence of 0's. This happens in many instances where overdispersion is present, meaning that the conditional mean does not equal the conditional variance as assumed by the PRM (Long, 1997). Therefore, analyses were conducted using the negative binomial regression model (NBRM), which allows for overdispersion (Long). The fit of the NBRM was much better than that of the PRM in these samples (see Figure 3-1, a through c).

FIGURE 3-1. Mean Predicted Probabilities From the PRM and NBRM for Choice of Overall Group Leader in the Three Samples (Undirected)



Hypothesis 3-1a, that the number of positive ties would have a positive relationship and that the number of negative ties would have a negative relationship with

this positive outcome was not supported for any sample. The coefficients for the number of positive ties are all positive and the coefficients for the number of undirected negative ties are all negative, but none of these coefficients are significant.

Hypothesis 3-4a, that the number of negative ties would have a greater relationship than the number of positive ties with the number of times chosen for overall group leader, was not supported for any sample. The coefficients for the number of undirected negative ties were larger in the negative direction than the coefficients for the number of positive ties were positive in any of the samples. While each of the coefficients was in the hypothesized direction, there was no difference in the sizes of these coefficients, $t_{adj}(47) = .03, p = .49$; $t_{adj}(94) = .72, p = .24$; $t_{adj}(75) = .28, p = .39$. The t-values have been adjusted for covariance.

The same analysis was conducted using the number of directed negative ties instead of the number of undirected negative ties. The PRM and NBRM results for overall group leadership in each sample using the number of directed negative ties are shown in Table 3-17. The PRM was not a good fit for any sample (see Figure 3-2, a through c), so the NBRM results were used for all samples.

Hypothesis 3-1a was partially supported in Sample 1. The coefficient for the number of positive ties was positive, but not significant, and the coefficient for the number of directed-at negative ties was negative and significant. Therefore, the number of directed-at negative ties was negatively related to this positive outcome. In the other samples the coefficients were in the hypothesized direction, but significance was not reached in either case.

TABLE 3-17. Overall Group Leadership Results by Model and Sample (Directed)

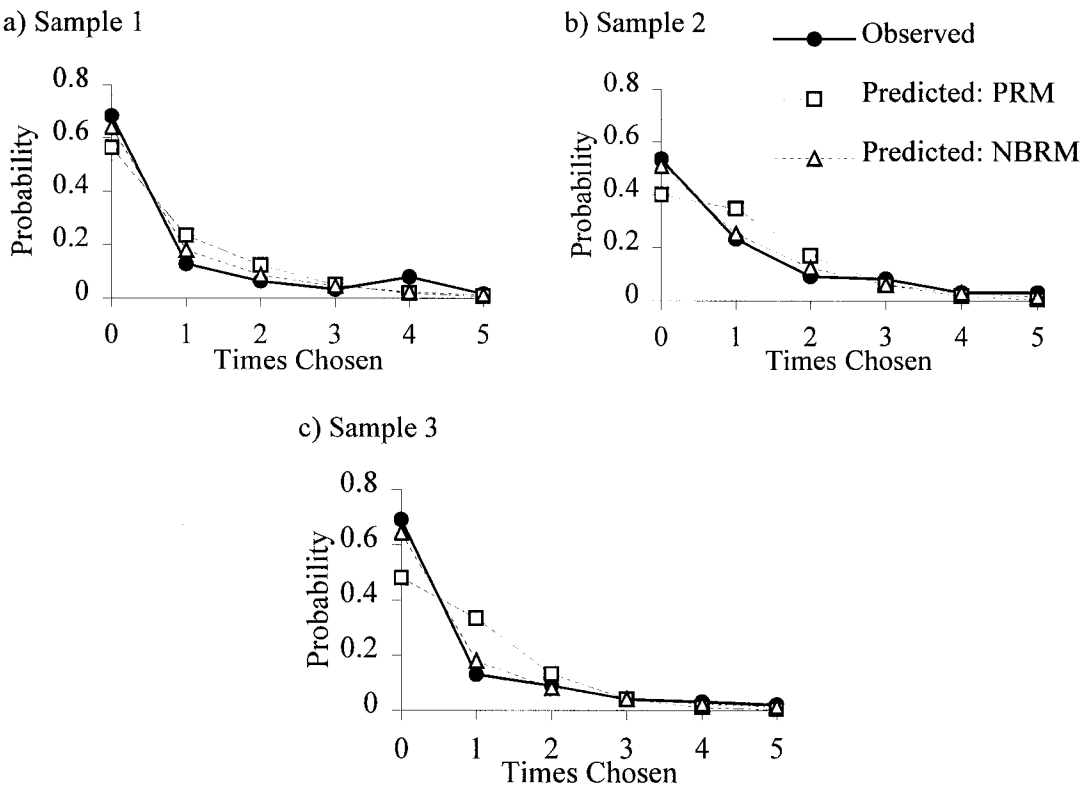
		Sample 1		Sample 2		Sample 3	
Variable		PRM	NBRM	PRM	NBRM	PRM	NBRM
Constant	β	-2.540	-3.611	-0.464	-0.429	0.195	0.605
	z	-1.49	-1.24	-0.82	-0.53	0.20	0.35
Positive	β	0.084	0.104	0.087	0.098	0.099	0.119
	z	0.61	0.56	0.77	0.58	0.85	0.61
Dir. Negative	β	-2.361	-2.322	-0.388	-0.374	-0.297	-0.353
	z	-2.34*	-2.18*	-1.50	-1.25	-0.67	-0.55
Gender	β	-1.024	-0.935	-0.205	-0.156	0.767	0.884
	z	-1.37	-0.83	-0.43	-0.24	1.73^{+}	1.10
Age	β	0.085	0.104	0.026	0.021	-0.034	-0.052
	z	2.02*	1.55	1.73^{+}	0.99	-0.82	-0.73
GPA	β	0.163	0.325	-0.079	-0.064	N/A	N/A
	z	0.49	0.62	-0.68	-0.42	N/A	N/A
Gdr x Pos	β	0.435	0.414	0.074	0.053	-0.101	-0.158
	z	1.38	0.67	0.36	0.18	-0.56	-0.46
Gdr x Neg	β	-11.891	-13.137	0.275	0.261	0.160	0.130
	z	-0.01	-0.01	0.70	0.54	0.30	0.16
	χ^2	56.21*		154.14**		135.21**	
Pr (y=0)		0.56	0.64	0.40	0.51	0.48	0.64

Note: PRM = Poisson Regression Model, NBRM = Negative Binomial Regression Model, Dir = directed-at, GPA = Grade point average, Pr = probability; β is an unstandardized coefficient; $^{+}$ indicates a p-value < .10, * indicates a p-value < .05, ** indicates a p-value < .01

Hypothesis 3-4a was supported in Sample 1, but not in the other samples. In Sample 1, the coefficient for the number of directed-at negative ties (β_{neg} = -2.322) was significantly greater than the coefficient for the number of positive ties (β_{pos} = .104), $t_{adj}(47) = -2.10$, $p < .05$. The number of directed-at negative ties in Sample 1 decreased the expected number of times chosen for overall group leader by 90%, holding all other variables constant, while the number of positive ties increased the expected number of times chosen for overall group leader by almost 11%, holding all other variables constant. In Samples 2 and 3, the coefficient for the number of directed-at negative ties was not

greater than the coefficient for the number of positive ties, $t_{adj}(93) = -.90$, $p = .18$ and $t_{adj}(75) = -.38$, $p = .35$, respectively.

FIGURE 3-2. Mean Predicted Probabilities From the PRM and NBRM for Choice of Overall Group Leader in the Three Samples (Directed)



Hypothesis 3-6b, that the number of directed-at negative ties would have greater relationships and more impact on outcomes than the number of undirected negative ties, was supported for Sample 1 and partially supported for Sample 2. In Sample 1, NBRM results with both types of negative ties entered along with all of the previous variables showed that the coefficient for the number of directed-at negative ties was negative and significant ($\beta_{dir} = -2.535$) while the coefficient for the number of undirected negative ties was positive and not significant ($\beta_{und} = .336$). The coefficient for the number of directed-

at negative ties was larger than the coefficient for the number of undirected negative ties, $t_{adj}(47) = -2.06, p < .05$. In this case, the number of directed-at negative ties decreased the expected number of times chosen as overall group leader by 92%, holding all other variables constant. The number of undirected negative ties actually increased the expected number of times chosen as overall group leader by 40%, holding all other variables constant. In Sample 2, the coefficient for the number of directed-at negative ties was negative, and marginally significant ($\beta_{dir} = -.694$), and the coefficient for the number of undirected negative ties was positive and not significant ($\beta_{und} = .410$). However, there was no difference between these coefficients, $t_{adj}(93) = -.60, p = .27$.

In Sample 3, the coefficient for the number of directed-at negative ties was negative and not significant ($\beta_{dir} = -.579$) and the coefficient for the number of undirected negative ties was positive and not significant ($\beta_{und} = .215$). There was no difference between these coefficients, $t_{adj}(75) = -.38, p = .35$.

Group task leadership. The PRM and NBRM results for choices of group task leader for each sample using the number of undirected negative ties are shown in Table 3-18. Similar to the overall group leadership results, the PRM was not a good fit for group task leadership. Again, there was evidence of overdispersion, as evident in Figure 3-3 (a through c), so the NBRM results were used.

Hypothesis 3-1a was partially supported in Sample 2. In Sample 1, the coefficients were in the hypothesized direction, but neither the coefficient for the number of positive ties nor the coefficient for the number of undirected negative ties was significant. In Sample 2, both coefficients were positive and the coefficient for the

number of positive ties was marginally significant. In Sample 3, both coefficients were negative and neither was significant.

TABLE 3-18. Task Leadership Results by Model and Sample (Undirected)

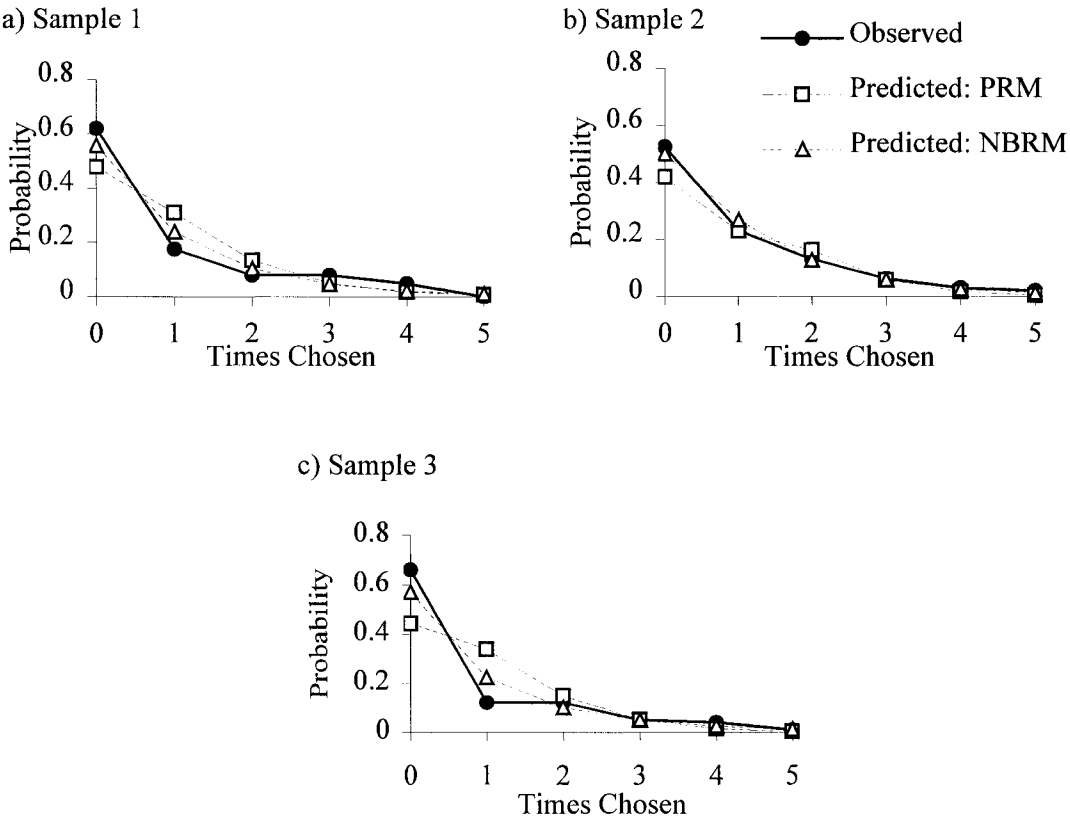
		Sample 1		Sample 2		Sample 3	
Variable		PRM	NBRM	PRM	NBRM	PRM	NBRM
Constant	β	-3.918	-5.225	0.411	0.415	1.366	0.617
	z	-2.39*	-2.05*	0.49	0.41	1.20	0.54
Positive	β	0.186	0.168	0.283	0.278	-0.024	-0.010
	z	1.19	0.81	2.31*	1.81^{+}	-0.21	-0.07
Und. Negative	β	-0.220	-0.224	0.127	0.106	-0.015	-0.015
	z	-0.79	-0.64	0.81	0.53	-0.06	-0.05
Gender	β	-1.143	-1.814	0.852	0.842	-1.407	-1.643
	z	-0.94	-1.05	1.63	1.24	-1.85^{+}	-1.48
Age	β	0.066	0.099	-0.035	-0.037	-0.067	-0.035
	z	1.42	1.51	-1.25	-1.11	-1.38	-0.74
GPA	β	0.627	0.777	-0.037	-0.020	N/A	N/A
	z	2.03*	1.79^{+}	-0.30	-0.13	N/A	N/A
Gdr x Pos	β	0.445	0.91	-0.586	-0.597	0.522	0.575
	z	0.87	1.06	-2.27*	-1.87^{+}	2.20*	1.61
Gdr x Neg	β	0.391	0.482	-0.435	-0.413	0.684	0.826
	z	0.72	0.73	-1.34	-1.03	1.94^{+}	1.49
	χ^2	62.38*		138.95**		125.50**	
Pr (y=0)		0.48	0.56	0.42	0.50	0.44	0.57

Note: PRM = Poisson Regression Model, NBRM = Negative Binomial Regression Model, GPA = Grade point average, Pr = probability; β is an unstandardized coefficient; $^{+}$ indicates a p-value < .10, * indicates a p-value < .05, ** indicates a p-value < .01

Hypothesis 3-4b, that the number of negative ties would have a greater relationship than the number of positive ties with the number of times chosen as group task leader, was not supported for any of the samples. Although in the right direction in Sample 1, the coefficients were not different, $t_{adj}(47) = .17, p = .43$. In Samples 2 and 3, the coefficients were also not different, $t_{adj}(93) = .78, p = .22$ and $t_{adj}(75) = .01, p = .49$, respectively.

Several of the control variables or interactions were marginally significant in the NBRM. In Sample 1, grade point average was positively related to the number of times a participant was chosen as the group task leader. In Sample 2, the interaction of gender and the number of positive ties was negatively related to the number of times a participant was chosen as the group task leader. In this sample a woman with the same number of positive ties as a man was not chosen as the group task leader as often.

FIGURE 3-3. Mean Predicted Probabilities From the PRM and NBRM for Choice of Task Leader in the Three Samples (Undirected)



The PRM and NBRM results for group task leadership in each sample using the number of directed-at negative ties are shown in Table 3-19. The PRM was a good fit for

Sample 1 data. It was not a good fit for Samples 2 and 3 (see Figure 3-4, b and c), so the NBRM results were used for those two samples.

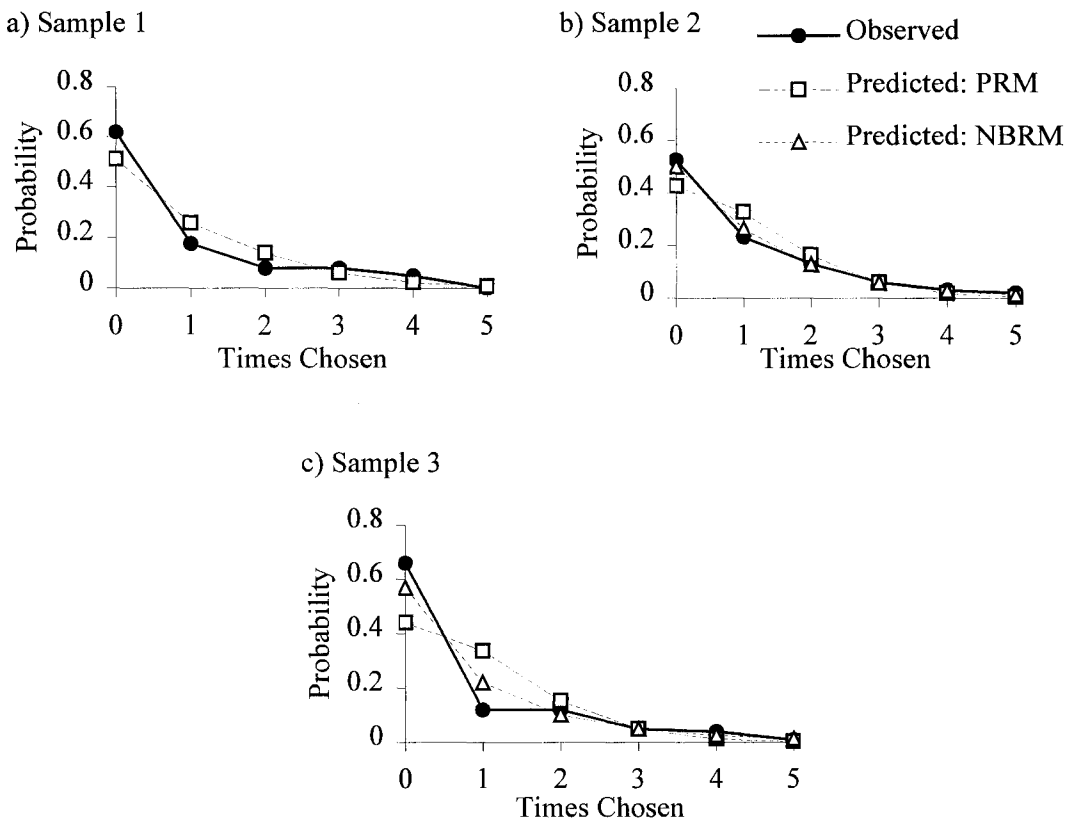
TABLE 3-19. Task Leadership Results by Model and Sample (Directed)

		Sample 1		Sample 2		Sample 3	
Variable		PRM	NBRM	PRM	NBRM	PRM	NBRM
Constant	β	-2.780	N/A	0.748	0.805	1.032	0.672
	z	-1.77^{+}		0.96	0.86	1.02	0.59
Positive	β	0.160		0.182	0.183	-0.079	-0.065
	z	1.20		1.64	1.31	-0.72	-0.41
Dir. Negative	β	-1.176		-0.212	-0.207	-1.197	-1.226
	z	-0.01		-0.97	-0.85	-1.85^{+}	-1.65^{+}
Gender	β	-0.008		0.584	0.622	-0.403	-0.367
	z	1.15		1.38	1.14	-0.87	-0.54
Age	β	0.044		-0.036	-0.039	-0.044	-0.029
	z	1.15		-1.37	-1.28	-1.03	-0.61
GPA	β	0.487		-0.046	-0.037	N/A	N/A
	z	1.47		-0.38	-0.25	N/A	N/A
Gdr x Pos	β	0.043		-0.477	-0.506	0.262	0.246
	z	0.14		-2.04*	-1.75^{+}	1.45	0.88
Gdr x Neg	β	-14.075		-14.652	-13.785	1.348	1.383
	z	-0.01		-0.01	-0.01	1.93^{+}	1.64
	χ^2	50.42		132.71**		125.87**	
Pr (y=0)		0.51		0.43	0.50	0.44	0.57

Note: PRM = Poisson Regression Model, NBRM = Negative Binomial Regression Model, Dir = directed-at, GPA = Grade point average, Pr = probability; β is an unstandardized coefficient; $^{+}$ indicates a p-value < .10, * indicates a p-value < .05, ** indicates a p-value < .01

Hypothesis 3-1a was partially supported for Sample 3. In Samples 1 and 2, the coefficients for the number of positive ties were positive and not significant. The coefficients for the number of directed-at negative ties were negative and not significant. In Sample 3, both coefficients were negative and the coefficient for the number of directed-at negative ties was marginally significant.

FIGURE 3-4. Mean Predicted Probabilities From the PRM and NBRM for Choice of Task Leader in the Three Samples (Directed)



Hypothesis 3-4b was supported in Sample 1 and partially supported in Sample 3. The coefficient for the number of directed-at negative ties (β_{neg} = -1.176) was larger than the coefficient for the number of positive ties in Sample 1 (β_{pos} = .160), $t_{adj}(47)$ = -1.74, $p < .05$. The number of directed-at negative ties decreased the expected number of times chosen for group task leader by 69%, holding all other variables constant. The number of positive ties increased the expected number of times chosen for group task leader by 17%, holding all other variables constant. In Sample 2, there was no difference between the coefficients, $t_{adj}(93)$ = -.09, p = .46. In Sample 3, the coefficient for the number of

directed-at negative ties was marginally larger than the coefficient for the number of positive ties, $t_{adj}(75) = -1.61, p < .10$.

The interaction between gender and the number of positive ties was marginally significant for Sample 2. For this sample, a woman was not chosen as the group task leader as often as a man with the same number of positive ties.

Hypothesis 3-6b was supported for Samples 1 and 3. In Sample 1, the coefficient for the number of directed-at negative ties was negative and marginally significant ($\beta_{dir} = -1.188, p < .10$) while the coefficient for the number of undirected negative ties was positive and not significant ($\beta_{und} = .068, p = .82$). The coefficient for the number of directed-at negative ties was larger than the coefficient for undirected negative ties, $t_{adj}(47) = -1.71, p < .05$. The number of directed-at negative ties decreased the expected number of times chosen as group task leader by 70%, holding all other variables constant. The number of undirected negative ties increased the expected number of times chosen as group task leader by 7%, holding all other variables constant. In Sample 3, the coefficient for the number of directed-at negative ties was negative and significant ($\beta_{dir} = -1.682, p < .05$) and the coefficient for the number of undirected negative ties was positive and not significant ($\beta_{und} = .464, p = .23$). The coefficient for the number of directed-at negative ties was marginally larger than the coefficient for the number of undirected negative ties, $t_{adj}(75) = -1.36, p < .10$.

In Sample 2, the coefficient for the number of directed-at negative ties was negative and marginally significant ($\beta_{dir} = -.598, p < .10$), and the coefficient for the

number of undirected negative ties was positive and also marginally significant (β_{und} = .497, $p < .10$). There was no difference between these coefficients, $t_{adj}(93) = -.26$, $p = .40$.

Group relational leadership. The PRM and NBRM results for group relational leadership for each sample using the number of undirected negative ties are shown in Table 3-20. The PRM fit the data well in Samples 1 and 3 (see Figure 3-5, a and c). There was evidence of overdispersion in Sample 2, as evident in Figure 3-5 (b), so the NBRM results were used for that sample.

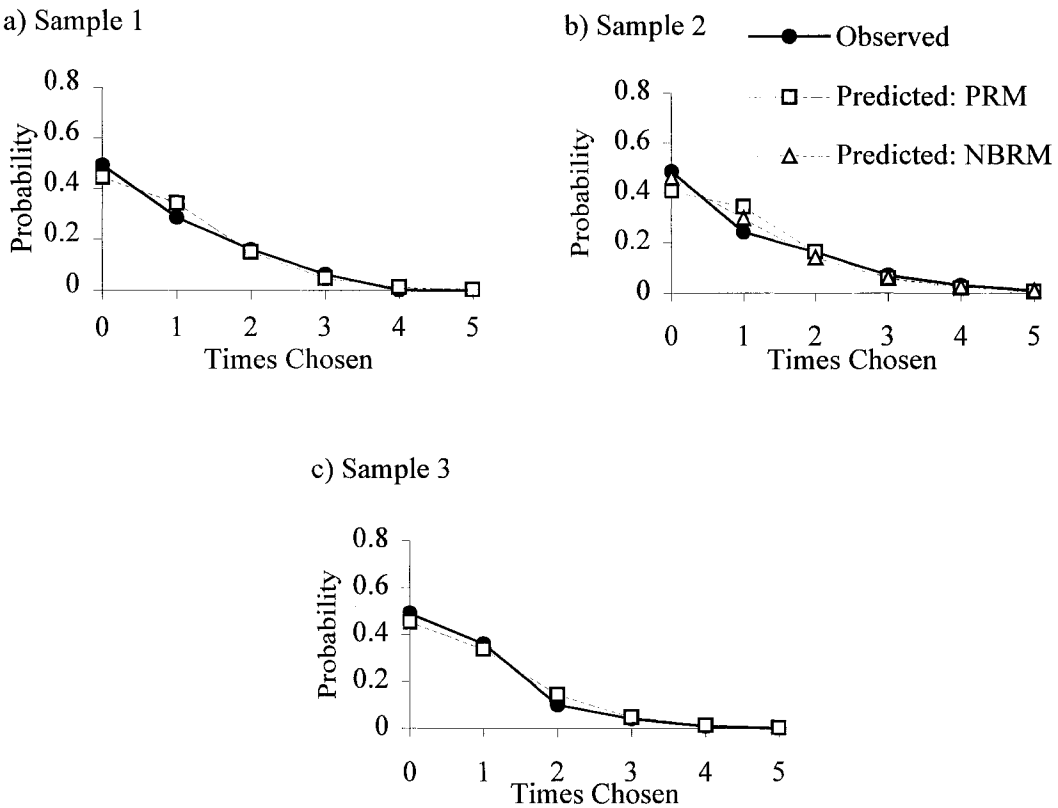
TABLE 3-20. Relational Leadership Results by Model and Sample (Undirected)

		Sample 1		Sample 2		Sample 3	
Variable		PRM	NBRM	PRM	NBRM	PRM	NBRM
Constant	β	-0.705	N/A	-0.978	-1.041	-0.710	N/A
	z	-0.41		-1.59	-1.38	-1.10	
Positive	β	0.146		-0.043	-0.032	0.219	
	z	0.83		-0.36	-0.23	2.18*	
Und. Negative	β	0.112		-0.340	-0.337	-0.239	
	z	0.39		-1.81^{+}	-1.63	-0.83	
Gender	β	1.597		-0.036	-0.041	0.312	
	z	1.60		-0.07	-0.07	0.53	
Age	β	0.011		0.048	0.049	0.012	
	z	0.17		3.46**	2.69**	0.48	
GPA	β	-0.010		-0.010	-0.007	N/A	
	z	-0.05		-0.08	-0.05	N/A	
Gdr x Pos	β	-0.423		-0.034	-0.020	-0.335	
	z	-0.84		-0.15	-0.08	-1.49	
Gdr x Neg	β	-0.909		0.288	0.275	0.323	
	z	-1.53		1.05	0.86	0.88	
	χ^2	52.48		130.63**		75.06	
Pr (y=0)		0.44		0.41	0.46	0.45	

Note: PRM = Poisson Regression Model, NBRM = Negative Binomial Regression Model, GPA = Grade point average, Pr = probability; β is an unstandardized coefficient; $^{+}$ indicates a p-value < .10, * indicates a p-value < .05, ** indicates a p-value < .01

Hypothesis 3-1a was partially supported for Sample 3. In Sample 1, the coefficients were both positive and neither was significant. In Sample 2, both coefficients were negative and not significant. In Sample 3, both coefficients were in the hypothesized direction and only the coefficient for the number of positive ties was significant.

FIGURE 3-5. Mean Predicted Probabilities From the PRM and NBRM for Choice of Relational Leader in the Three Samples (Undirected)



Hypothesis 3-4c, that the number of negative ties would have a greater relationship than the number of positive ties with the number of times chosen as group relational leader, was partially supported for Sample 2 only. The coefficients were not significantly different in Sample 1, $t_{adj}(47) = .12, p = .45$ or in Sample 3, $t_{adj}(75) = -.07, p$

= .47. In Sample 2, although both coefficients were negative, the coefficient for the number of undirected negative ties was marginally larger than the coefficient for the number of positive ties, $t_{adj}(93) = -1.36, p < .10$.

The control variable age was significant for Sample 2. For this sample, older participants were more likely to be chosen as the group relational leader.

The PRM and NBRM results for group relational leadership in each sample using the number of directed-at negative ties are shown in Table 3-21. The PRM was a good fit for Sample 1 and Sample 3 data (see Figure 3-6, a and c). It was not a good fit for Sample 2 data (see Figure 3-6, b), so the NBRM results were used for that sample.

Hypothesis 3-1a was partially supported for Sample 3. In Sample 1, both coefficients were in the hypothesized direction but neither coefficient was significant. In Sample 2, both coefficients were negative and not significant. In Sample 3, the coefficients were in the hypothesized direction and the coefficient for the number of positive ties was significant.

Hypothesis 3-4c was partially supported for Sample 2. In Sample 2, even though both coefficients were negative, the coefficient for the number of directed-at negative ties was marginally larger than the coefficient for the number of positive ties, $t_{adj}(93) = -1.60$, $p < .10$. The number of directed-at negative ties decreased the expected number of times chosen as group relational leader by 38%, holding all other variables constant. The number of positive ties also decreased the expected number of times chosen for group relational leader, by 2%, holding all other variables constant. The difference between the

coefficients was not significant in Samples 1 and 3, $t_{adj}(47) = -.38$, $p = .35$ and $t_{adj}(47) = -.04$, $p = .48$.

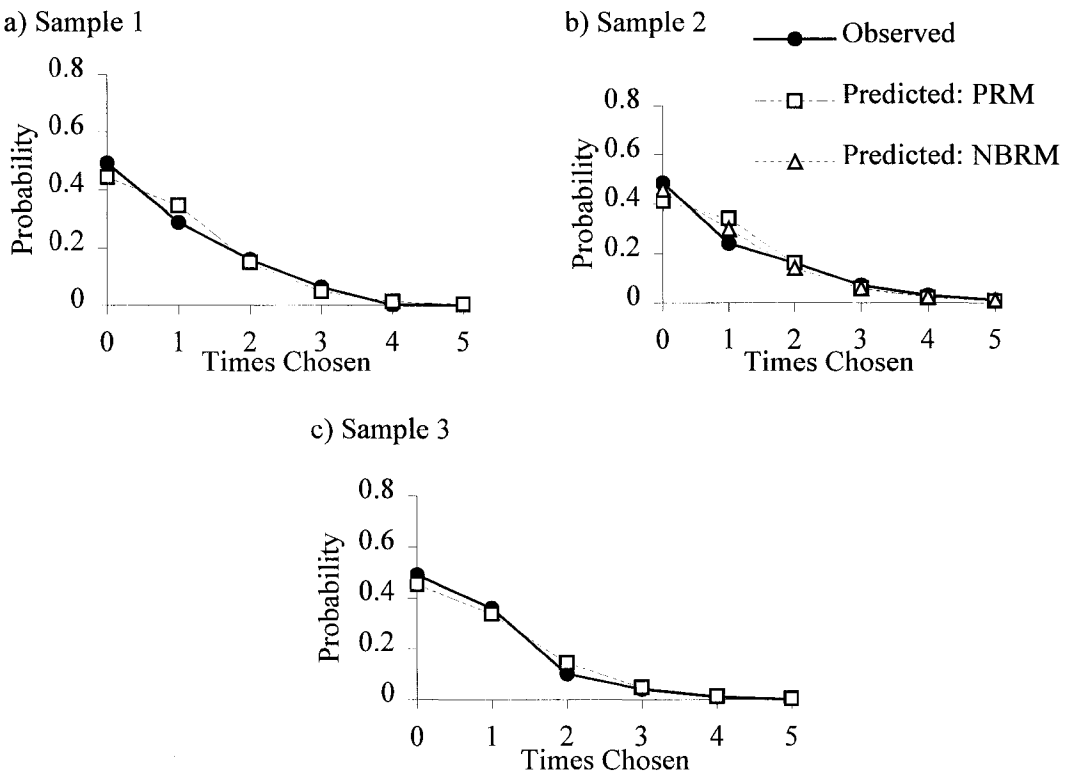
TABLE 3-21. Relational Leadership Results by Model and Sample (Directed)

		Sample 1		Sample 2		Sample 3	
Variable		PRM	NBRM	PRM	NBRM	PRM	NBRM
Constant	β	1.060	N/A	-1.081	-1.105	-1.072	N/A
	z	0.77		-1.86^{+}	-1.56	-1.53	
Positive	β	0.065		-0.017	-0.012	0.239	
	z	0.43		-0.15	-0.09	2.46*	
Dir. Negative	β	-0.210		-0.491	-0.475	-0.256	
	z	-0.53		-1.75^{+}	-1.64	-0.64	
Gender	β	0.825		0.241	0.206	0.739	
	z	1.13		0.62	0.44	1.62	
Age	β	-0.041		0.044	0.045	0.024	
	z	-0.96		3.44**	2.65**	0.88	
GPA	β	-0.102		0.008	0.007	N/A	
	z	-0.47		0.06	0.04	N/A	
Gdr x Pos	β	-0.166		-0.091	-0.069	-0.464	
	z	-0.39		-0.48	-0.31	-2.24*	
Gdr x Neg	β	-0.706		0.160	0.151	-0.017	
	z	-0.91		0.39	0.34	-0.03	
	χ^2	52.81		128.12**		74.66	
Pr (y=0)		0.44		0.41	0.46	0.45	

Note: PRM = Poisson Regression Model, NBRM = Negative Binomial Regression Model, Dir = directed-at, GPA = Grade point average, Pr = probability; β is an unstandardized coefficient; $^{+}$ indicates a p-value < .10, * indicates a p-value < .05, ** indicates a p-value < .01

In Sample 2, the coefficient for the characteristic variable of age was positive and significant. In this sample, older participants were likely to be chosen more often as the group relational leader. In Sample 3, one of the gender interactions, gender by the number of positive ties, was negative and significant. In this sample, women were chosen as the group relational leader significantly less often than men with the same number of positive ties.

FIGURE 3-6. Mean Predicted Probabilities From the PRM and NBRM for Choice of Relational Leader in the Three Samples (Directed)



Hypothesis 3-6b was not supported in any sample. For Sample 1, the coefficient for the number of directed-at negative ties was negative, but not significant (β_{dir} = -.331, p = .42) and the coefficient for the number of undirected negative ties was positive and not significant (β_{und} = .227, p = .45). The coefficient for the number of directed-at negative ties was not larger than the coefficient for the number of undirected negative ties, $t_{adj}(47)$ = -.18, p = .43. In Sample 2, the coefficient for the number of directed-at negative ties was negative and not significant (β_{dir} = -.367, p = .31). The coefficient for the number of undirected negative ties was also negative and not significant (β_{und} = -.144, p = .60). The coefficient for the number of directed-at negative ties was not larger than

the coefficient for the number of undirected negative ties, $t_{adj}(93) = -.39, p = .35$. In Sample 3, the coefficient for the number of directed-at negative ties was negative and not significant ($\beta_{dir} = -.078, p = .88$). The coefficient for the number of undirected negative ties was also negative and not significant ($\beta_{und} = -.210, p = .57$). There was no difference between the coefficients, $t_{adj}(75) = .15, p = .44$.

Because these data are cross-sectional in nature, conclusions about the relationships are possible, but conclusions about the actual impacts of the number of positive and negative ties are not. For Hypothesis 3-1a, the most support came when the number of directed-at negative ties was used. Here, there was partial support for this hypothesis in Sample 1 for the number of times chosen as the overall group leader. There was also partial support in Sample 3 for the number of times chosen as the group task leader and the number of times chosen as the group relational leader. This hypothesis was not fully supported in any sample. Sample 2 and 3 both offer partial support when using the number of undirected negative ties. In these samples, partial support was shown in the number of times chosen as group task leader (Sample 2) and the number of times chosen as group relational leader (Sample 3).

For Hypotheses 3-4 (a-c), there was practically no support when the number of undirected negative ties was used. The only exception was a partial support of Hypothesis 3-4c in Sample 2. When the number of directed-at negative ties was used, Sample 1 provided support for two of the three hypotheses (number of times chosen as overall group leader and group task leader). Sample 2 provided partial support in the number of

times chosen as group relational leader. Sample 3 provided partial support in the number of times chosen as group task leader.

For Sample 1, the number of directed-at negative ties had a greater relationship than the number of undirected negative ties with two of the leadership choice variables, the number of times chosen as overall group leader and the number of times chosen as task leader (support for Hypothesis 3-6b). Sample 2 provided partial support for this hypothesis in the number of times chosen as overall group leader and Sample 3 provided support in the number of times chosen as group task leader.

Longitudinal Leadership Choice

One of the samples, Sample 2, had data available for another group project the next semester. Participants were supposed to keep the same groups as they had in the first group project course so these data are longitudinal. Although not all groups stayed exactly the same, most remained relatively intact (i.e., at least half of the original group members were in the next semester group). Ten participants from Sample 2 changed groups in the next course and five did not take the course (i.e., dropped out of program, repeated last group project course, or other reason).

Table 3-22 shows the mean numbers of positive ties, undirected negative ties, and directed-at negative ties for these participants. The group differences between means were calculated using the Kruskal-Wallis test. The difference between groups was significant for each variable ($\chi^2_{und} = 14.60, p < .01; \chi^2_{dir} = 16.89, p < .01; \chi^2_{pos} = 7.70, p < .05$). Mann-Whitney tests for each variable show that this difference occurred between the participants who stayed in the same group and those who changed groups in the next

year ($U_{und} = 216.5, p < .01$; $U_{dir} = 251.5, p < .01$; $U_{pos} = 241.0, p < .05$) as well as between those who stayed in the same group and those who dropped out of the sample ($U_{und} = 67.5, p < .01$; $U_{dir} = 99.0, p < .01$; $U_{pos} = 114.0, p < .10$). There were no differences between those who changed groups and those who dropped out of the sample ($U_{und} = 17.5, p = .35$; $U_{dir} = 20.0, p = .52$; $U_{pos} = 23.0, p = .75$).

TABLE 3-22. Mean Numbers of Valence Ties for Sample 2 By Future Group

	Remained in Original Group n = 84		Changed Groups n = 10		Dropped Out n = 5	
Ties	Mean	S.D.	Mean	S.D.	Mean	S.D
Positive	1.52	1.19	.70	1.34	.60	1.34
Undirected	.54	.80	1.70	1.42	2.40	1.52
Directed	.21	.66	1.20	1.48	1.80	1.79

For the 84 participants who remained in the same groups in the next course, 51 did not have any undirected negative ties. Twenty-four participants had one, seven had two, one had three, and one participant had four undirected negative ties. Out of the 10 participants who changed groups, three did not have any undirected negative ties. One participant had one, three had two, two had three, and one participant had four undirected negative ties. For those five participants who were not in the next course, one did not have any undirected negative ties. One had two, two had three, and one participant had four undirected negative ties.

Of those who stayed in the same groups, 74 did not have any negative ties directed at them. Four of these participants had one directed-at negative tie, five had two, and one had four. Five of those who changed groups did not have any directed-at negative ties. One of the participants who changed groups had one, two had two, one had

three, and one had four directed-at negative ties. Two of the five participants who did not take the next course did not have any directed-at negative ties, one had two, one had three, and one had four.

Out of the 84 participants who stayed in the same group, 19 did not have any positive ties. Twenty-two of the participants who stayed in their group had one positive tie, 20 had two, 18 had three and three had four positive ties. Two of these participants did not rate others so they were coded as missing. Six of the 10 who changed groups did not have any positive ties, one had one, one had two, and one had four. One participant was coded as missing for this variable. Three of the five who did not take the course the next semester did not have any positive ties and one of those participants had three positive ties. The remaining participant did not rate others and was coded as missing this variable.

Using only those participants who remained in the program, either in same or different groups the next year, analyses were conducted to address the impacts of positive and negative ties within the small group from the first course on leadership choices at a later time rather than simply the relationships at the present. For the following three analyses, the number of positive ties and the number of negative ties from one course were used to predict leadership choice in a course that took place the next semester. The characteristics variables and interactions with gender were also included.

Overall group leadership in future choice. The PRM and NBRM results for leadership choice of the overall group leader in the next semester's course using undirected and directed-at negative ties are shown in Table 3-23. The chi-square values

for the PRM, as well as the evidence of overdispersion in Figure 3-7 (a and b) indicate that the PRM did not fit the data well. Therefore, the NBRM results were used.

TABLE 3-23. Future Overall Group Leader Choice by Model

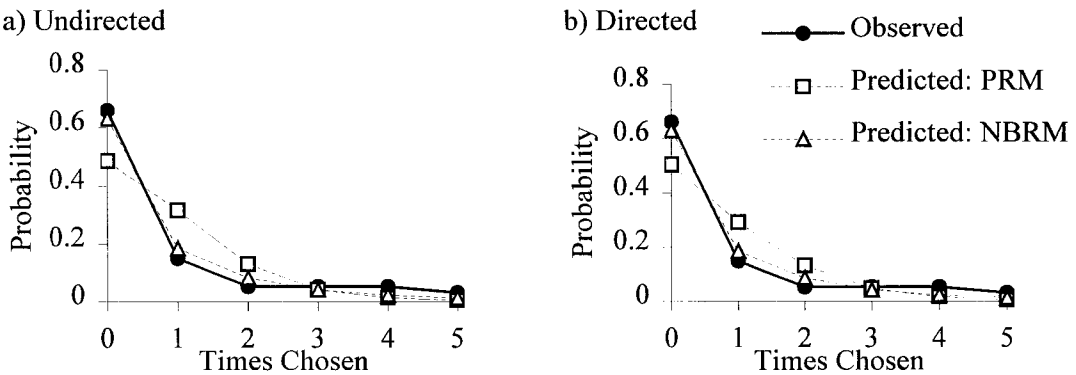
		Undirected		Directed	
Variable		PRM	NBRM	PRM	NBRM
Constant	*B*	-1.729	-1.530	-1.524	-1.313
	Z	-2.47*	-1.41	-2.22*	-1.30
Positive Ties	*B*	0.041	0.094	-0.035	-0.019
	z	0.31	0.44	-0.28	-0.09
Negative Ties	*β*	-0.231	-0.369	-14.831	-14.761
	z	-1.04	-1.00	-0.02	-0.02
Group change	*β*	-1.867	-1.939	-2.016	-1.960
	z	-1.84^{+}	-1.67^{+}	-1.95^{+}	-1.70^{+}
Gender	*β*	-0.154	-0.189	-0.859	-0.764
	z	-0.24	-0.20	-1.50	-0.93
Age	*β*	0.057	0.055	0.046	0.041
	z	3.98**	1.90^{+}	3.42**	1.56
GPA	*β*	0.080	0.028	0.135	0.105
	z	0.50	0.14	0.87	0.57
Gdr x Pos	*β*	-0.021	-0.012	0.236	0.218
	z	-0.08	-0.03	1.01	0.58
Gdr x Neg	*β*	-0.078	0.106	15.296	15.094
	z	-0.19	0.17	0.02	0.02
	χ^2	152.33**		139.73**	
Pr (y=0)		0.49	0.63	0.50	0.63

Note: PRM = Poisson Regression Model, NBRM = Negative Binomial Regression Model, GPA = Grade point average, Pr = probability; *β* is an unstandardized coefficient; Group change variable coded 0 if same group and 1 if different group in the next semesters; $^{+}$ indicates a p-value < .10, * indicates a p-value < .05, ** indicates a p-value < .01

Hypothesis 3-1a was not supported when the number of undirected negative ties was used or when the number of directed-at negative ties was used. The coefficients using the number of undirected negative ties were in the hypothesized direction; the coefficient for the number of positive ties was positive and the coefficient for the number of negative ties was negative. However, neither was significant. Both of the coefficients

when using the number of directed-at negative ties were negative and neither was significant.

FIGURE 3-7. Mean Predicted Probabilities From the PRM and NBRM for Future Choice of Overall Group Leader



Hypothesis 3-4a was not supported for impact on future choice of overall group leader when either the number of undirected negative ties or the number of directed-at negative ties was used. The coefficient for the number of undirected negative ties was not larger than the coefficient for the number of positive ties in the first model, $t_{adj}(89) = -.70$, $p = .24$. The same was true for the directed-at negative tie model, $t_{adj}(89) = -.02$, $p = .49$. Although the coefficients at first glance seemed to be very different, a large standard error is associated with the coefficient for the number of directed-at negative ties (902.02).

When either the number of undirected negative ties or the number of directed-at negative ties is used the coefficient for whether the participant changed groups was negative and marginally significant. In both cases, having changed groups decreased the expected number of times chosen for overall group leader by 86%, holding all other

variables constant. The control variable age was also marginally significant when the number of undirected negative ties was used. In this case, older participants were likely to be chosen more as the overall group leader in the next course.

Hypothesis 3-6b was not supported in this case. The NBRM results when both the number of undirected negative ties and the number of directed-at negative ties were put into the model together indicated that the coefficient for the number of directed-at negative ties was negative and not significant (β_{dir} = -14.929, p = .99). The coefficient for the number of undirected negative ties was positive and not significant (β_{und} = .195, p = .66). The coefficient for the number of directed-at negative ties was not significantly larger than the coefficient for the number of undirected negative ties, $t_{adj}(89)$ = -.02, p = .49.

Group task leadership in future choice. Results for the PRM and NBRM for future choice of the group task leader when the number of undirected negative ties and the number of directed-at negative ties were used are shown in Table 3-24. The NBRM results were used as they produced the best fit (see Figure 3-8, a and b).

Hypothesis 3-1a was not supported for this variable. The coefficients were in the hypothesized direction, but neither the coefficient for the number of positive ties nor either of the coefficients for the number of negative ties was significant.

Hypothesis 3-4b was not supported for this variable. The coefficient for the number of undirected negative ties was not larger than the coefficient for the number of positive ties and the coefficients were not different, $t_{adj}(89)$ = .80, p = .21. The coefficient

for the number of directed-at negative ties was not significantly larger than the coefficient for the number of positive ties, $t_{adj}(89) = -.54, p = .29$.

TABLE 3-24. Future Group Task Leader Choice by Model

		Undirected		Directed	
Variable		PRM	NBRM	PRM	NBRM
Constant	*B*	-2.154	-1.973	-1.797	-1.685
	Z	-2.80**	-1.95^{+}	-2.42*	-1.74^{+}
Positive Ties	*B*	0.256	0.319	0.173	0.244
	z	1.85^{+}	1.58	1.36	1.24
Negative Ties	*β*	-0.034	-0.066	-0.648	-0.489
	z	-0.16	-0.22	-1.44	-1.04
Group Change	*β*	-0.701	-0.708	-0.560	-0.479
	z	-1.16	-0.91	-0.94	-0.60
Gender	*β*	0.890	0.960	0.241	0.456
	z	1.58	1.15	0.50	0.63
Age	*β*	0.046	0.041	0.036	0.033
	z	2.94**	1.67^{+}	2.40*	1.40
GPA	*β*	0.129	0.090	0.157	0.102
	z	0.76	0.47	0.93	0.55
Gdr x Pos	*β*	-0.371	-0.380	-0.137	-0.211
	z	-1.58	-1.07	-0.64	-0.62
Gdr x Neg	*β*	-0.845	-0.897	-12.462	-13.307
	z	-1.67^{+}	-1.34	-0.02	-0.01
	χ^2	142.46**		140.28**	
Pr (y=0)		0.48	0.60	0.48	0.59

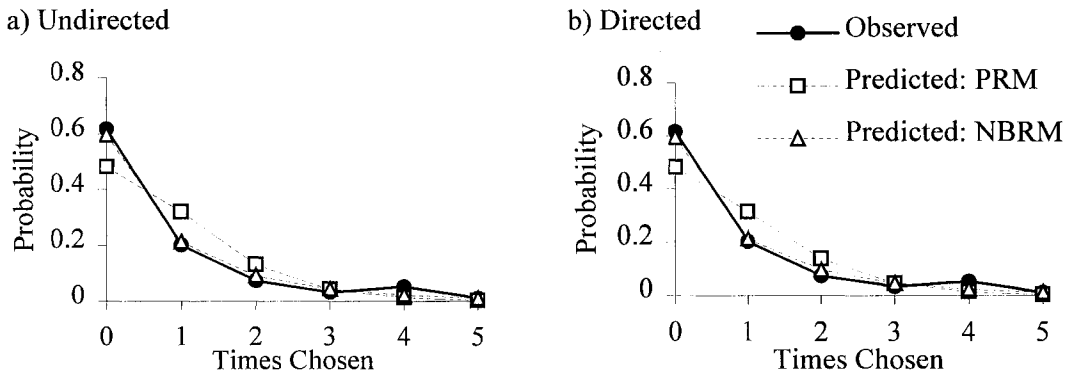
Note: PRM = Poisson Regression Model, NBRM = Negative Binomial Regression Model, GPA = Grade point average, Pr = probability; *β* is an unstandardized coefficient; Group change variable coded 0 if same group and 1 if different group in the next semesters; $^{+}$ indicates a p-value < .10, * indicates a p-value < .05, ** indicates a p-value < .01

Again, the coefficient for age was positive and marginally significant when using the number of undirected negative ties. Older participants were likely to be chosen more often for the group task leader.

Hypothesis 3-6b was not supported for this variable. Neither the coefficient for the number of directed-at negative ties, nor the coefficient for the number of undirected

negative ties, was significant (β_{dir} = -.708, p = .20; β_{und} = .285, p = .48). There was not a difference in these coefficients, $t_{adj}(89)$ = -.46, p = .32.

FIGURE 3-8. Mean Predicted Probabilities From the PRM and NBRM for Future Choice of Group Task Leader



Group relational leadership in future choice. The PRM and NBRM results for future choice of group relational leader are shown in Table 3-25. Consistent with the other leadership choice results, the NBRM fit the data better than the PRM (see Figure 3-9, a and b), so the results of the NBRM were used.

Hypothesis 3-1a was not supported for this variable. In both cases, the coefficients were in the hypothesized direction. Neither the coefficient for the number of positive ties nor the coefficient for the number of undirected negative ties was significant in either model.

Hypothesis 3-4c was not supported for this variable. In the model where the number of undirected negative ties was used, the coefficient for the number of negative ties was not significantly larger than the coefficient for the number of positive ties, $t_{adj}(89)$ = -.57, p = .29. In the model where the number of directed-at negative ties was

used, the negative tie coefficient was not larger than the coefficient for the number of positive ties, $t_{adj}(89) = -1.21, p = .11$.

TABLE 3-25. Future Group Relational Leader Choice by Model

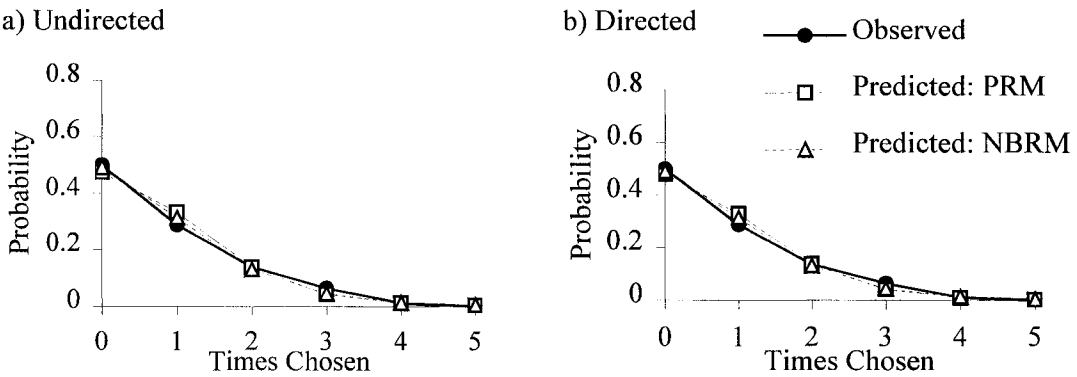
		Undirected		Directed	
Variable		PRM	NBRM	PRM	NBRM
Constant	β	-0.198	-0.260	-0.239	-0.271
	z	-0.30	-0.36	-0.38	-0.41
Positive Ties	β	0.050	0.056	0.030	0.035
	z	0.36	0.38	0.22	0.25
Negative Ties	β	-0.210	-0.197	-0.515	-0.496
	z	-0.93	-0.84	-1.35	-1.28
Group Change	β	-1.102	-1.098	-1.091	-1.079
	z	-1.50	-1.46	-1.47	-1.43
Gender	β	-0.164	-0.146	-0.150	-0.147
	z	-0.25	-0.21	-0.29	-0.28
Age	β	0.022	0.023	0.019	0.020
	z	1.22	1.18	1.14	1.11
GPA	β	-0.160	-0.156	-0.130	-0.130
	z	-1.30	-1.18	-1.07	-1.01
Gdr x Pos	β	0.117	0.110	0.135	0.132
	z	0.46	0.41	0.60	0.57
Gdr x Neg	β	0.271	0.244	0.662	0.637
	z	0.73	0.62	1.15	1.07
	χ^2	106.15*		104.33*	
Pr (y=0)		0.48	0.49	0.48	0.49

Note: PRM = Poisson Regression Model, NBRM = Negative Binomial Regression Model, GPA = Grade point average, Pr = probability; β is an unstandardized coefficient; Group change variable coded 0 if same group and 1 if different group in the next semesters; $^{+}$ indicates a p-value < .10, * indicates a p-value < .05, ** indicates a p-value < .01

Hypothesis 3-6b was not supported for this variable. The coefficient for the number of directed-at negative ties, when all the variables were entered into the NBRM together, was negative but not significant ($\beta_{dir} = -.523, p = .24$). The coefficient for the number of undirected negative ties was positive and not significant ($\beta_{und} = .035, p = .90$).

The coefficient for the number of directed-at negative ties was not larger than the coefficient for the number of undirected negative ties, $t_{adj}(89) = -.74, p = .22$.

FIGURE 3-9. Mean Predicted Probabilities From the PRM and NBRM for Future Choice of Group Relational Leader



To recap for testing the impacts of the numbers of undirected and directed-at negative ties and the number of positive ties on future leadership choice, Hypothesis 3-1a was not supported for any variable. Hypothesis 3-4a was not supported in the future choice of overall group leadership, Hypothesis 3-4b was not supported in future choice of group task leadership, and Hypothesis 3-4c was not supported in future choice of group relational leadership. Hypothesis 3-6b was also not supported in any of the future choice variables.

Job Search Process

Fifty-nine out of 63 participants in Sample 1 and 34 out of the 99 participants in Sample 2 answered questions about the job search process, including how many job interviews they had had that semester and how many job offers had resulted. Sample 3 was left out of these analyses because the participants had not yet completed a survey

about the job search process. Standard regression models, with the number of job interviews and job offers regressed on the number of positive ties and the number of negative ties, along with the control variable and gender interactions, were run for the two samples separately.

Job Interviews. The regression results are shown in Table 3-26. Hypothesis 3-1a was partially supported in Sample 1 when the number of directed-at negative ties was used. In all cases, the coefficient for the number of positive ties was positive, but only in Sample 1 when directed-at negative ties were used was the coefficient even marginally significant. None of the coefficients for the number of negative ties were different from zero.

TABLE 3-26. Results by Sample for Number of Job Interviews

		Undirected		Directed-At	
Variable		Sample 1	Sample 2	Sample 1	Sample 2
Constant	β	-2.502	-3.082	-2.617	-1.356
	t	-0.45	-0.59	-0.49	-0.25
Positive	β	0.841	1.151	1.031	0.762
	t	1.28	1.16	1.77^{+}	0.74
Negative	β	-0.231	1.284	0.746	0.141
	t	-0.24	1.23	0.60	0.13
Gender	β	2.438	-0.267	1.811	-2.050
	t	0.74	-0.06	0.68	-0.56
Age	β	-0.018	0.012	-0.064	0.004
	t	-0.11	0.11	-0.48	0.04
GPA	β	1.418	1.279	1.568	1.221
	t	1.52	1.13	1.64	1.02
Gdr x Pos	β	-1.221	-0.896	-0.893	-0.366
	t	-0.73	-0.50	-0.56	-0.22
Gdr x Neg	β	-0.452	-1.451	-0.556	0.721
	t	-0.28	-0.62	-0.25	0.13

Note: GPA = Grade point average; β is an unstandardized coefficient; $^{+}$ indicates a p-value < .10, * indicates a p-value < .05, ** indicates a p-value < .01.

Hypothesis 3-5a, that the number of negative ties would have more impact on the number of job interviews than the number of positive ties, was not supported using either the number of undirected negative ties or the number of directed-at negative ties. The only case where the coefficient for the number of negative ties was negative was in Sample 1 using the number of undirected negative ties. This coefficient was not larger than the coefficient for the number of positive ties. The coefficients for the number of positive ties and the number of undirected negative ties were not different in either sample, $t_{adj}(43) = 1.27, p = .10$ and $t_{adj}(31) = -.19, p = .42$, respectively. The coefficients for the number of positive ties and the number of directed-at negative ties were also not different from each other for either sample, $t_{adj}(43) = .32, p = .38$ and $t_{adj}(31) = .96, p = .17$, respectively.

Hypothesis 3-6b was not supported for either sample. In Sample 1, the coefficients were in the opposite direction and neither was significant ($\beta_{dir} = 1.013, p = .47$; $\beta_{und} = -.544, p = .62$). There was no difference between these coefficients, $t_{adj}(43) = -.16, p = .44$. In Sample 2, the coefficients were in the hypothesized direction, and both were significant ($\beta_{dir} = -4.150, p < .10$; $\beta_{und} = 4.901, p < .05$). There was no difference between these coefficients, $t_{adj}(31) = .07, p = .47$.

Job Offers. The regression results using both the number of undirected negative ties and the number of directed-at negative ties are shown in Table 3-27. Hypothesis 3-1a was partially supported for Sample 2 only when using the number of undirected negative ties. All of the coefficients for the numbers of positive ties and the coefficients for the number of negative ties were positive. Only in Sample 2 using the number of undirected

negative ties was the coefficient for the number of positive ties significant. The coefficient for the number of undirected negative ties was marginally significant in Sample 1.

TABLE 3-27. Results by Sample for Number of Job Offers

		Undirected		Directed	
Variable		Sample 1	Sample 2	Sample 1	Sample 2
Constant	β	0.070	-2.197	0.176	-1.202
	t	0.03	-0.92	0.09	-0.49
Positive	β	0.190	0.951	0.194	0.779
	t	0.73	2.19*	0.86	1.68
Negative	β	0.203	0.834	0.563	0.322
	t	0.53	1.83^{+}	1.16	0.66
Gender	β	0.543	-0.366	0.796	-1.222
	t	0.42	-0.19	0.77	-0.56
Age	β	0.005	-0.027	-0.012	-0.030
	t	0.08	-0.55	-0.23	-0.57
GPA	β	0.102	0.797	0.168	0.729
	t	0.28	1.58	0.45	1.35
Gdr x Pos	β	-0.234	-0.649	-0.396	-0.376
	t	-0.35	-0.80	-0.64	-0.41
Gdr x Neg	β	-0.504	-0.235	-1.255	0.603
	t	-0.77	-0.13	-1.46	0-22

Note: GPA = Grade point average; β is an unstandardized coefficient; + indicates a p-value < .10, * indicates a p-value < .05, ** indicates a p-value < .01.

Hypothesis 3-5b, that the number of negative ties would have more impact on the number of job offers, was not supported for either sample using the number of undirected negative ties or the number of directed-at negative ties. The coefficients were all positive and similar. When the number of undirected negative ties was used, there was no difference in the coefficients in either sample, $t_{adj}(43) = -.04, p = .49$ and $t_{adj}(31) = .24, p = .41$, respectively. When the number of directed-at negative ties was used, there was no

difference in the coefficients in either sample, $t_{adj}(43) = -.80, p = .21$ and $t_{adj}(31) = .92, p = .18$, respectively.

Hypothesis 3-6b was not supported for either sample. In Sample 1, both the coefficient for the number of directed-at negative ties ($\beta_{dir} = .534, p = .33$) and the coefficient for the number of undirected negative ties ($\beta_{und} = .047, p = .91$) were both positive and not significant. There were no differences between these coefficients, $t_{adj}(43) = -.57, p = .29$. In Sample 2, the coefficient for the number of directed-at negative ties was negative and marginally significant ($\beta_{dir} = -1.744, p < .10$) and the coefficient for the number of undirected negative ties was positive and significant ($\beta_{und} = 2.348, p < .05$). There was no difference between these coefficients, $t_{adj}(31) = .22, p = .41$.

To recap the results for the job search outcome variables, Hypothesis 3-1a was partially supported in Sample 1 for the number of job interviews only when the number of directed-at negative ties was used. For the job offer variable, Sample 2 provided partial support for this hypothesis when using only the number of undirected negative ties. Hypothesis 3-5 (a and b) and Hypothesis 3-6b were not supported in either sample.

Discussion

In this study, I have initiated the exploration into the relationships of the number of negative ties, along with the number of positive ties, with various outcomes, as well as the impacts of these variables on assorted outcomes. Past research has focused solely on social capital or positive social network relationships and the consequences of those. Here I have included not only the number of positive social ties within a small group but also the number of negative social ties. This enables the exploration of whether the

number of negative ties have a greater relationship with or impact on outcomes via negative asymmetry as theorized by Brass and Labianca (1999; Labianca & Brass, 1997).

Four different types of outcome variables were directly examined (two were self-directed outcomes and two were other-directed). Self-directed outcomes included perceptions based on the group project (difficulty, satisfaction, and interest) and commitment to the field of study. Other-directed outcomes included leadership choice within small course project groups (overall, task, and relational) and job search variables. Both current choices and choices in the future of group members who were chosen as the overall group leader, the group task leader, and the group relational leader were investigated. Retention in terms of group composition in a later class, which could be either a self-directed or other-directed outcome, was also examined indirectly.

Each of these variables was investigated in three distinct samples. Each of the samples was taken from a group of students who started a particular program of study at the same time. Because these groups were made up of different students with different experiences, variance between samples was expected. Sample 1 had fewer participants as the participants were not in a particular cohort and therefore, did not take most of the classes in this program at the same times. The participants started the program at the same time, but did not necessarily follow the same path. This may have influenced choices and outcomes. Samples 2 and 3 consisted of approximately the same number of similar students who had entered and gone through the program in cohort form. Samples 2 and 3 data were collected in a junior-level course, while data for Sample 1 were

collected in a senior-level course. Results were not consistent across the three samples and I hesitate to speculate as to the reasons for the differences.

The ideas of Brass and Labianca's (1999; Labianca & Brass, 1997) that I tested are based on the concept of the undirected negative tie. If one person in a dyad has a negative tie with another (either rates someone else negatively or is rated negatively by someone else), then both members of the dyad are considered to have that negative tie. For each outcome, I first tested the number of undirected negative ties against the number of positive ties. This was a direct test of the negative asymmetry theory (Brass & Labianca, 1999; Labianca & Brass, 1997).

I also explored the relationships with and impacts of the number of directed-from negative ties (those in which only the person rating another negatively is considered to have a negative tie) on self-directed outcomes and the relationships with and impacts of the number of directed-at negative ties (those in which only the person receiving a negative rating is considered to have a negative tie with the person doing the rating) on other-directed outcomes. I not only tested the number of directed negative ties against the number of positive ties for each outcome, but I also tested whether the effect was larger for directed negative ties than for undirected negative ties. I expected that the number of directed negative ties would have more impact than the number of undirected negative ties on outcomes.

Although no formal hypotheses were made concerning the different types of directed negative ties, I explored directed-from and directed-at negative ties for self-directed and other-directed outcomes, respectively. Negative ties flowing from a person

would be likely to affect outcomes that s/he had some control over. Negative ties directed at a person would be likely to affect outcomes for the individual that others in the small group had control over. The ability to compare the effects of both undirected and directed negative ties for both self-directed and other directed outcomes allows me to expand on the negative asymmetry theory proposed by Brass and Labianca (1999), which I attempt in the next chapter. In the next four sections, I review the results of the tests of my hypotheses for these outcomes.

Direction of Tie Relationship With Outcomes

I expected there would be a consistent directional relationship between the numbers of positive and negative ties and the outcomes. I proposed, in Hypothesis 3-1, that the number of positive ties would have a positive relationship with positive outcome variables and that the number of negative ties would have a negative relationship with positive outcomes (part a). The other side of this hypothesis (part b) was that the number of positive ties would have a negative relationship with negative outcome variables and the number of negative ties would have a positive relationship with negative outcomes.

A summary of the results of these tests for each of the outcome variables is shown in Table 3-28. Partial support of this hypothesis was found in two of the project evaluation outcome variables (difficulty and satisfaction). There was not support for this hypothesis in any sample for the self-directed outcome of interest. For difficulty, the number of positive ties was proposed to have a negative relationship with this negative outcome, but in no case was this found. The one instance of partial support (Sample 3 undirected) was when the number of negative ties was positively related to this outcome.

The coefficients for the number of positive and negative ties in all samples for this variable were not both in the hypothesized direction.

TABLE 3-28. Summary of Tie Relationships With Outcomes for Hypothesis 3-1 (a and b)

Variable	Undirected Negative is IV[c]	Directed Negative is IV[c]
Self-Directed Outcomes		
Project Evaluation		
Difficulty[a]	N1, N2, P3	N1, N2, N3
Satisfaction	P1, P2, P3	P1, P2, P3
Interest	N1, N2, N3	N1, N2, N3
Commitment[b]	N1, N2	N1, N2
Other-Directed Outcomes		
Leadership Choice		
Overall Leader	N1, N2, N3	P1, N2, N3
Group Task Leader	N1, P2, N3	N1, N2, P3
Group Relational Leader	N1, N2, P3	N1, N2, P3
Future Overall Leader[b]	N2	N2
Future Task Leader[b]	N2	N2
Future Relation Leader[b]	N2	N2
Job Search Process		
Number of Job Interviews[b]	N1, N2	P1, N2
Number of Job Offers[b]	N1, P2	N1, N2

[a] Negative outcome variable – Hypothesis 3-1b; all others are for Hypothesis 3-1a
[b] Longitudinal variables, all others are cross-sectional
[c] P = Partial support, N = No support; Numbers correspond to samples

When using the number of undirected negative ties as the independent variable and satisfaction with the project as the dependent variable, partial support for this hypothesis was found in all three samples. In Sample 1 the number of positive ties was positively related to satisfaction and in Sample 3 the number of positive ties was marginally positively related to satisfaction. In Sample 2 the number of undirected negative ties was negatively related to satisfaction.

When the number of directed-from negative ties was the independent variable, partial support for this hypothesis was again found in all three samples for the self-directed outcome of satisfaction. Samples 1 and 3 had coefficients in the hypothesized direction and the number of positive ties was positively related to satisfaction in Sample 1 and marginally positively related to satisfaction in Sample 3. In Sample 2 both coefficients were negative and only the coefficient for the number of directed-from negative ties was significant.

It may be that for these participants the existence of positive and negative ties did not influence their evaluations of their semester project as much as other variables. Since these questions were asked where an instructor might read them, the demand characteristics may have been quite strong. Participants may have been more inclined to rate the project as difficult so that the instructor would not think they did not work hard enough. This, in conjunction with the scale only being made up of five response options, could contribute to the non-significance for many of the samples and variables. Also, the lack of supporting results for the interest variable may have occurred because of these same demand characteristics. How can a student tell a professor that the project that was assigned was uninteresting (especially if s/he thinks the professor will be giving her/him a grade based on the answer)?

There was no support for this hypothesis for the longitudinal self-directed outcome variable of commitment. Because the participant would not be working with the others for several years in a row following this evaluation, the existence of ties in either direction may not have affected how the participant felt about continuing in the field.

Commitment to the field may instead be based more on dreams and goals that others cannot take away.

For the cross-sectional other-directed variables of leadership choice, there was sporadic partial support for Hypothesis 3-1. In both cases of partial support for this hypothesis when the number of undirected negative ties was used, the number of positive ties either was significant or marginally significant and the number of undirected negative ties did not have a significant negative relationship with the outcome. For these leadership choice variables, having a larger number of positive ties was related to the number of times chosen as a leader in several samples.

When the number of directed-at negative ties was used, the coefficient for the number of directed-at negative ties was significant for the number of times chosen as overall group leader (Sample 1) and marginally significant in Sample 3 for the number of times chosen as group task leader. In the third sample for the choice of group relational leader, the coefficient for the number of positive ties was significant. In this sample, a larger number of positive ties was related to the number of times chosen for group relational leader.

It may be that participants made leadership choices based on other information besides whether they want to work with the other person again. In some cases, participants may have written their own name in as the leader even if they did not honestly contribute the most to that type of leadership in order to influence the instructor's evaluation of them. It is also possible that separate processes occurred in making the decision of who was a leader in the group and whom they want to work with

again. Participants may have made ratings of whether they wanted to work with others again based on an affective process (i.e., I like or do not like this person) while they made choices of leadership based on a cognitive process - specifically on competence (i.e., I may not like her but she did a good job of leading us).

I used groups from the following semester for Sample 2 to investigate whether the ties in one group would be related to the number of times chosen for leadership in a similar group later in time. Hypothesis 3-1 was not supported for any of the future leadership choice variables. A majority of the results (five out of six) showed coefficients in the hypothesized direction.

Finally, the number of positive ties was marginally related to the number of job interviews for Sample 1 (using the number of directed-at negative ties as an independent variable) and the number of job offers for Sample 2 (using the number of undirected negative ties as an independent variable). It may be that the word was not circulating about those with negative ties to the professor giving the recommendation. It may also have been the case that some of the traits that cause negative ties among college students are also the same traits that can be desired for potential employees (i.e., assertiveness, competitiveness).

Overall, the hypothesis about the direction of the relationship that the number of positive ties and the number of negative ties would have with outcomes was not very well supported. There was the same number of samples where results partially supported the hypothesis when using the number of undirected negative ties as when using the number of directed negative ties.

Negative Asymmetry

For each of the different types of outcome variables there was also a hypothesis about negative asymmetry. In each case it was proposed that the number of negative ties would have a greater relationship with or a greater impact on the outcome variable than the number of positive ties. For each outcome variable each hypothesis was tested first using the number of undirected negative ties in the model and then using the number of directed negative ties in the model instead of the number of undirected negative ties. These results will be discussed separately for self-directed outcomes and other-directed outcomes.

Self-Directed Outcomes

A summary of the results for two hypotheses dealing with negative asymmetry for the self-directed outcomes (project evaluations – Hypothesis 3-2 and commitment – Hypothesis 3-3) are shown in Table 3-29.

TABLE 3-29. Summary of Negative Asymmetry for Self-Directed Outcomes

Variable	Undirected Negative is IV[a]	Directed Negative is IV[a]
Project Evaluation		
Difficulty	N1, N2, S3	N1, N2, P3
Satisfaction	N1, N2, N3	N1, S2, N3
Interest	N1, N2, N3	N1, N2, N3
Commitment	N1, N2	N1, N2

[a] S = Support, P = Partial support, N = No support; Numbers correspond to samples

Only one instance of support was found when comparing the number of undirected negative ties and the number of positive ties to study negative asymmetry for the self-directed outcomes. Full support of this hypothesis was found in Sample 3 for the

difficulty variable. In this case, the number of undirected negative ties was more related to perceptions of difficulty on the project than the number of positive ties. In Sample 3, partial support of the negative asymmetry hypothesis was found for the difficulty variable when using directed-from negative ties. Here, the coefficient for the number of directed-from negative ties was marginally larger than the coefficient for the number of positive ties. For satisfaction, the negative asymmetry hypothesis was supported in Sample 2. The number of directed-from negative ties had a larger impact on satisfaction with the project than the number of positive ties.

Overall, the negative asymmetry hypothesis was not well supported for the self-directed outcomes in this study.

Other-Directed Outcomes

A summary of the results for the two hypotheses dealing with negative asymmetry for other-directed outcomes (leadership choices – Hypothesis 3-4 and job search variables – Hypothesis 3-5) are shown in Table 3-30.

TABLE 3-30. Summary of Negative Asymmetry for Other-Directed Outcomes

Variable	Undirected Negative is IV[a]	Directed Negative is IV[a]
Leadership Choice		
Overall Leader	N1, N2, N3	S1, N2, N3
Group Task Leader	N1, N2, N3	S1, N2, P3
Group Relation Leader	N1, P2, N3	N1, P2, N3
Future Overall Leader	N2	N2
Future Task Leader	N2	N2
Future Relation Leader	N2	N2
Job Search Process		
Number of Job Interviews	N1, N2	N1, N2
Number of Job Offers	N1, N2	N1, N2

[a] S = Support, P = Partial support, N = No support; Numbers correspond to samples

There was only one instance when using the number of undirected negative ties where partial support for the negative asymmetry hypotheses was found. Partial support was found in Sample 2 for the number of times chosen as group relational leader. In this case, the number of undirected negative ties had a marginally larger relationship with the number of times chosen than the number of positive ties.

There was more support and some partial support for the negative asymmetry hypothesis when the number of directed-at negative ties was used instead. For Sample 1, support was found for negative asymmetry in the number of times chosen as overall group leader and group task leader. In Sample 2, partial support for this hypothesis was found for the number of times chosen as group relational leader. In Sample 3, partial support was found for the number of times chosen for group task leader and for perceptions of difficulty of the project. There was some evidence for the direct opposite relationship than hypothesized for satisfaction with the project in Sample 1. The number of positive ties may be more related to satisfaction in this case because of the group members got along very well.

Overall, the negative asymmetry hypothesis was not supported very well when the numbers of undirected negative ties were used. When the numbers of directed-at negative ties were used instead, there were several instances of support for the cross-sectional leadership variables.

Explorations into Agency

Finally I proposed that the number of directed negative ties would have a greater relationship with and more impact on outcomes than the number of undirected negative

ties. Directed negative ties were expected to show a greater influence on outcome variables because they contain more information. Because these ties can be asymmetrical rather than only symmetrical like the undirected negative ties, teasing apart personal agency from proxy agency is possible. This hypothesis was tested for all outcome variables. A summary of the results is shown in Table 3-31.

TABLE 3-31. Summary of Results for Directed versus Undirected Influences

Variable	Cross-sectional[a]	Longitudinal[a]
Self-Directed Outcomes		
Project Evaluation		
Difficulty	N1, N2, N3	
Satisfaction	N1, N2, N3	
Interest	N1, N2, N3	
Commitment		N1, N2
Other-Directed Outcomes		
Leadership Choice		
Overall Leader	S1, P2, N3	N2
Group Task Leader	S1, N2, S3	N2
Group Relational Leader	N1, N2, N3	N2
Job Search Process		
Number of Job Interviews		N1, N2
Number of Job Offers		N1, N2

[a] S = Support, P = Partial support, N = No support; Numbers correspond to Samples

This hypothesis was supported for Sample 1 in the leadership choice outcome variables of the number of times chosen as overall group leader and group task leader and in Sample 2 for the number of times chosen as group task leader. Again, it was not clear if the processes were different between picking a leader and rating whether the participant wants to work with another member of the group again. In the cases where this hypothesis was not supported, it could be that participants who were choosing themselves to be the leader also rated others negatively. Future research into this issue is

necessary as this would contribute to an increased number of undirected negative ties for those who were chosen as leaders. Therefore, this would make the difference between the effects of directed negative ties and undirected negative ties indistinguishable. There was not any support for this hypothesis for the other outcome variables.

It is possible that the setting and ages of the participants in this study was not as conducive to finding negative asymmetry as a study of employees in an organization might. All three samples utilized in this study were made up of students who interact with each other in project groups. However, these groups were quite small (size three to six) and a larger network may show different results. A study in an organization-type setting with a larger number of participants in each group or network is suggested.

It is also quite possible that the processes for deciding who a person wants to work with again and who was the leader in a group are different. For example, a person may want to work with someone else again because of several different reasons (e.g., I like her a lot, she made the group fun, she is smart) whereas the choice of leader might be based on specific behaviors.

The lack of supportive results for the job search variables may be because there was not a strong enough tie between those who made the ratings and those who recommended the participants for the interviews. I would expect that negative information about someone would be passed through an existing network (by direct, indirect, or third-party interaction). There was a leap in this study from the network of college students to the network of interviewers. If this were an organizational setting, I would expect negative information would be passed through the network to those

responsible for promotion and performance evaluations. It is also possible that characteristics that are the bases for negative ties, such as differences in age and leadership preferences, are characteristics that employers look for. The older participant may not be valued among peers in group work, but may be valued by potential employees because of life or prior experience. Future research that controls for personality and experience factors is suggested to further understand this issue.

Along these lines, the variables used in this study, although chosen because similar, are still quite different from the variables hypothesized to be affected by Brass and Labianca (1999; Labianca & Brass, 1997). For example, it is unlikely that students would drop out of a particular field of study based on poor relationships with only four other students. Further analyses examining each participant's position in the overall network is necessary. Turnover in a college program may be quite different than turnover in an organization. There are also some severe demand issues that could have affected some of the responses to the questions asked about project evaluations. Great care should be taken in the future to ensure that participants understand the survey is completely confidential.

Overall, Brass and Labianca's negative asymmetry theory, as outlined by them (Brass & Labianca, 1999; Labianca & Brass, 1997), was not strongly supported in this study. There was more evidence to support the negative asymmetry idea when the number of directed negative ties was used rather than when the number of undirected negative ties was used. However, under closer examination, it seems that this occurred only in the leadership choice variables. Something else may be happening, instead of

simple negative asymmetry using undirected ties like Brass and Labianca (1999) proposed. I suggest that Brass and Labianca's theory should be expanded to include differences in the relationships of negative and positive ties with self-directed versus other-directed outcomes.

CHAPTER IV: CONCLUSION

Brass and Labianca (1999; Labianca & Brass, 1997) made an effort to fill a major gap in the sociological and organizational literatures when they set forth propositions about negative social relationships. In this dissertation I develop that effort further by testing several of Brass and Labianca's ideas and also attempting to provide evidence necessary for expanding their ideas, specifically their definition of negative ties and their theory of negative asymmetry. In Chapter II, I tested several characteristics to determine which attributes were related to negative social relationships. In Chapter III, I tested their theory of negative asymmetry on various self-directed and other-directed outcomes.

Survey data for three samples of undergraduate business students collected as part of a larger network study were provided to me and then broken down by small-group networks. Participants chose the group in which they were members. I first tested dissimilarities in several different attributes of the participants, using techniques of social network analysis, to determine which attributes were related to negative social relationships within the small groups.

Based on Brass and Labianca's (1999) definition of negative ties, I initially tested the characteristics on *undirected* negative ties. Both members of the dyad were scored as having these negative ties if at least one member of the dyad rated the other negatively. While the results varied between samples, dissimilarities in age and dissimilarities in leadership preferences were consistently related to the existence of undirected negative ties.

By definition, direction of the tie is ignored with undirected negative ties. The only way to examine the differences in ego and alter characteristics is through directed ties. Therefore, I then tested each of the characteristics on *directed* negative ties. For directed negative ties, only the member of the dyad who was rated negatively was scored as having a negative tie. Again, the results varied among the three samples, with dissimilarities in age being the only heterophilous variable to be related to the existence of directed negative ties in two of the three samples. For this study, then, I conclude that dissimilarities in age between group members were related to negative ties.

Next, I tested Brass and Labianca's (1999, Labianca & Brass, 1997) theory of negative asymmetry. They proposed that the number of negative ties a person has would have a greater impact on outcomes than the number of positive ties. I first investigated whether the number of negative ties had a negative impact on these variables and whether the number of positive ties had a positive impact (the opposite relationship was hypothesized for negative outcomes). My first step was to look at the relationship of the number of undirected negative ties with these variables. There were many inconsistencies within the samples and no sample fully supported this idea of tie relationships.

I next approached this proposition from the directed negative tie angle. Since different types of outcomes exist for a person (self-directed, other-directed, and network-directed), I proposed that negative ties would impact these outcomes differently. For instance, when a person has control over an outcome, such as how one feels, that person's interpretations of experiences or relationships are likely to impact that outcome. Therefore, I expected the number of negative ties directed from a group member to other

group members to be related to outcomes that were self-directed. For individual outcomes that others had control over, I expected a relationship with the number of negative ties directed at the individual. I examined the relationships of the numbers of directed-from negative ties on self-directed outcomes and the numbers of directed-at negative ties on other-directed outcomes. The same inconsistency between samples was present. Therefore, for this study, the direction and significance of the relationship between the number of positive ties and the number of negative ties with outcomes was not consistent.

Next, I investigated negative asymmetry for each of the outcome variables first using undirected negative ties and then using directed-from negative ties for the self-directed outcomes and directed-at negative ties for the other-directed outcomes. Overall, there was no consistent support between samples for the negative asymmetry hypothesis using undirected or directed-from negative ties for self-directed outcomes. There was also no consistent support between samples for the negative asymmetry hypothesis using undirected or directed-at negative ties for other-directed outcomes. However, there was more support for negative asymmetry in the leadership choice variables when using directed-at negative ties.

Finally, I investigated whether directed negative ties, whether they be directed-from or directed-at, had stronger relationships with or greater impacts on the outcomes than the number of undirected negative ties. For the self-directed outcomes there was no support for this proposition. For the other-directed outcomes, however, there were several instances of support and partial support (the cross-sectional leadership choice variables).

Theoretical Implications

Brass and Labianca (1999) defined negative ties as "relationships in which at least one person has a negative affective judgment of the other" (p. 324). This definition is too vague and needs to be enhanced in order for the study of negative ties to proceed in one collective direction. I argue that the definition should be changed in several ways. First, negative ties should not be constrained to only include undirected negative ties. For several of the outcome variables I examined, the number of directed negative ties had more of a relationship with the outcome than the number of undirected negative ties.

When a member of a dyad has an undirected negative tie, it is unclear where that tie originated. It may be the case that the person has undirected negative ties from rating others in a negative manner. Therefore, that person does not like, or in this case does not want to work again with, the other group member. It may also be the case that the person was rated negatively by another. In that case, the member rated negatively is not liked or is not wanted to be part of the rater's group again. The direction of the tie (whether it is being directed from or directed at the group member) should have a different effect on the different types of outcomes. For example, the participants in this study rated the other members of their group and also had made choices about the leadership of the group members. In some cases, those with a greater number of directed-at negative ties were less likely to be chosen as a specific type of leader. This is valuable information that is not available using only undirected negative ties.

Next, I argue that the definition should be changed to encompass more attitudinal judgments made up of both affective and cognitive judgments rather than restrict these

judgments to affect only. The 'valence of a person' can depend on several different things according to Tagiuri (1958). These include the reward or punishment value of that person's actions, the changes in tension level that the person brings to the dyad, and other causal factors beyond actions (such as race, gender, and other stereotypes). Thibaut and Kelley (1959) suggested that others would be rejected if they are not helpful or if they produce anxiety. Here, these types of characteristics (not just affectivity) of negative relationships could not be distinguished. Also, it is extremely difficult for researchers to get participants to answer questions about whom they do not like (e.g., White, 1961) or which person makes them feel tense or uneasy. Researchers could infer negative relationships from survey formats such as checking the appropriate box for whether the other person is considered a friend, considered an acquaintance, is unknown to him/her, or is someone s/he prefers to avoid (e.g., White) or from scaled responses to a variety of items.

Finally, Brass and Labianca's (1999; Labianca & Brass) theory of negative asymmetry should be expanded to include a distinction between self-directed, other-directed, and network- or structure-directed outcomes. It is likely that these different types of outcomes will be affected differently by the various forms of directed and undirected negative ties. While I did not investigate network-directed outcomes in this study, there exists some evidence, mainly in the leadership choice (other-directed) and satisfaction (self-directed) variables, to support this idea of separation.

Limitations and Directions for Future Research

There are several limitations to this study. First, the participants knew each other before they chose their groups. Therefore, it is likely that the groups were based on some sort of positive information. People who do not like each other probably would not choose to work together on a project. This aspect of the group composition is especially important in interpreting the lack of supporting results in Chapter II. The characteristics that were examined are those attributes that are bound to be noticed when people first meet each other. The salience of these characteristics is likely to have decreased over time as the group members got to know each other. For example, there was no support for gender heterophily being related to negative ties in Chapter II even though this particular field of study is very male-dominated. However, people self-select into groups in many instances and not all relationships within these "choice" groups are positive. Future research on the bases of negative social relationships, then, should focus also on brand-new and developing networks, not only on networks that have been partially in place for some time.

Next, there were several strong demand characteristics for the outcomes that were studied. The participants answered questions on an instrument that was passed out to them by their instructor. While the instructions stated that the information would be confidential, the participants might have thought that the instructor would look at their answers. For example, participants could write in their own names for the person who exhibited the most leadership for the different dimensions. Again, since the instrument was passed out and collected by an instructor, a participant might have thought that

his/her name in the leader position would help his/her grade. In the future, instruments designed to assess negative social ties and their relationships with outcomes should appear strictly confidential.

Finally, the samples used for this study do not allow for generalizations to be made to other business settings. The size of the networks, as well as the types of outcomes studied, are likely to be quite different in actual business situations. The numbers of negative ties were capped at six in each of the samples. It could be that someone could have negative ties with the people they work closest with on group projects, but have a larger amount of positive ties elsewhere. Outcomes such as turnover in a major field of study in college are likely to be very different in college than in an organization. Students are unlikely to drop out of a field of study based on poor relationships with a handful of other students.

However, studying these ties within the larger network is important. For example, participants in this study who have two negative ties might have 15 positive ties within the overall network. These positive ties would be likely to overwhelm any effect of the negative ties from one workgroup. It may be, also, that the denseness of the overall network would have some influence on how ties spread through the network. For instance, the more dense a network is, the more connections between the people, and the easier it is to transfer information about others. Finally, ties with certain people in the network might have different influences on outcomes. For example, if a person has a directed negative tie from someone who is central in the overall network, the negative tie is more likely to spread than if that tie came from someone who was not central. Also, if

a person who is central in the network has a directed negative tie from someone who is not central, the effect of that tie will likely be dampened. Therefore, examining each participant's position in the overall network as well as in the small group network is suggested. This would allow for further investigation of network-directed outcomes as well.

In sum, the studies discussed here are a first step towards balancing the research on different aspects of the social ledger. Although the results were not overwhelmingly supportive of the propositions made, an enhancement of the negative asymmetry theory and several ideas for further research in this area have emerged.

APPENDIX A.

List of Countries of Citizenship and Number of Participants by Sample

Country	Sample 1	Sample 2	Sample 3
Bahrain	1	0	0
Belarus	1	0	0
Belize	0	1	0
Brazil	0	1	0
Cameroon	0	0	1
Canada	0	2	0
China	1	5	4
Cyprus	0	0	3
Egypt	0	0	1
Hong Kong	1	2	1
Iceland	0	1	0
Indonesia	1	2	3
India	3	2	7
Japan	1	0	3
Jordan	0	2	1
Kenya	0	1	0
Korea	0	4	6
Kuwait	1	0	0
Oman	2	1	0
Mexico	0	1	0
Malaysia	0	1	0
Pakistan	2	2	2
Portugal	1	0	0
Singapore	0	0	1
Sri Lanka	1	0	0
Sweden	1	0	0
Taiwan	0	1	1
Thailand	0	0	1
United Arab Emirates	1	0	0
United States	42	68	65
Vietnam	2	1	0
Zambia	1	0	0
(Missing)	0	1	0
Totals	63	99	100

APPENDIX B.

Masculinity and Femininity Items from the Personal Attributes Questionnaire
(Spence & Helmreich, 1978)

(Instructions) The items below inquire about what kind of a person you think you are. Each item consists of a pair of characteristics, with the letters A-E in between. For example:

	(0) (1) (2) (3) (4)	
Not at all artistic	A.....B.....C.....D.....E	Very artistic

Each pair describes contradictory characteristics – that is, you cannot be both at the same time, such as very artistic and not at all artistic.

The letters form a scale between the two extremes. You are to choose a letter that describes where you fall on the scale. For example, if you think you have no artistic ability, you would choose A, if you think you are pretty good, you might choose D. If you are only medium, you might choose C, and so forth.

Masculinity Items

Not at all independent	A.....B.....C.....D.....E	Very independent
Very passive	A.....B.....C.....D.....E	Very active
Not at all competitive	A.....B.....C.....D.....E	Very competitive
Can make decisions easily (reverse coded)	A.....B.....C.....D.....E	Has difficulty making decisions
Gives up very easily	A.....B.....C.....D.....E	Never gives up easily
Not at all self-confident	A.....B.....C.....D.....E	Very self-confident
Feels very inferior	A.....B.....C.....D.....E	Feels very superior
Goes to pieces under pressure	A.....B.....C.....D.....E	Stands up well under pressure

Femininity Items

Not at all emotional	A.....B.....C.....D.....E	Very emotional
Not at all able to devote self completely to others	A.....B.....C.....D.....E	Able to devote self completely to others
Very rough	A.....B.....C.....D.....E	Very gentle
Not at all helpful to others	A.....B.....C.....D.....E	Very helpful to others
Not at all kind	A.....B.....C.....D.....E	Very kind
Not at all aware of others' feelings	A.....B.....C.....D.....E	Very aware of others' feelings
Not at all understanding of others	A.....B.....C.....D.....E	Very understanding of others
Very cold in relations with others	A.....B.....C.....D.....E	Very warm in relations with others

APPENDIX C.

Items Used to Measure Commitment to the Field of Study

1. I am willing to put forth a great deal of effort beyond that normally expected in order to succeed in Management Information Systems (MIS).
2. I talk up MIS to my friends as a great field to study.
3. I would accept almost any kind of job in order to stay in the field of MIS.
4. I find that my values and the values of others in MIS are very similar.
5. I am proud to tell others that I am in MIS.
6. MIS really inspires me to perform at my very best.
7. I am extremely glad that I chose MIS as my major over other fields I was considering.
8. I really care about the fate of MIS.
9. For me, MIS is the best of all possible fields of study.

Adapted from Mowday, Steers, and Porter (1979).
Response scale is 1 (strongly disagree) to 5 (strongly agree).
Commitment score is average of responses (all positively coded)

APPENDIX D.

Sample of Data Received from UM Research Group

CODE	SAMPLE	GEND	P_ATT	AGE	CITZ	FOR	·
1275	1	0	5.035	24	1	1	·
1302	1	1	4.092	23	5	1	·
1496	2	1	7.676	23	1	0	·
1043	2	0	3.855	35	7	0	·
1165	3	0	6.048	26	1	1	·
1821	3	0	5.304	24	1	0	·
1642	2	0	5.112	23	21	0	·
·	·	·	·	·	·	·	·
·	·	·	·	·	·	·	·

APPENDIX E.

Description of the Steps in Making Dissimilarity Matrices

1. Make an Excel file with one column for the identification codes and another column for the variable of interest (e.g., gender). Save this file as Excel 5.0 (e.g., gender.xls).

	CODE	GEND
Excel	1642	0
	1821	0
	.	.
	.	.

2. Import file into Ucinet 5 from Excel. In Ucinet 5, click on Data, then Import, then Excel. Enter the name of the Excel input file (e.g., gender.xls) and the desired name for the output file (gender).

	CODE	GEND
Ucinet	1642	0
	1821	0
	.	.
	.	.

3. Make a dissimilarity matrix. In Ucinet 5, click on Tools, then Dissimilarities. Enter the name of the input dataset (e.g., gender). Choose the type of dissimilarity (choices are Euclidean, Manhattan, Normed sum of squared differences, Non-matches, Positive non-matches). For a binary variable like gender, non-match is a good choice. Next, indicate that dissimilarities should be calculated for rows (cases), indicate whether the diagonals are valid (in all cases in this dissertation diagonals are not valid), and what the output dataset or matrix should be named (e.g., gender_nonmatch). The resulting matrix contains a cell value of 1 if the gender of the two members of the dyad does not match and a 0 if the two members match on gender.

	1 1275	2 1302	3 1642	4 1821	.
1 1275	0	1	0	0	.
2 1302	1	0	1	1	.
3 1642	0	1	0	0	.
4 1821	0	1	0	0	.
.	.	.	.	.	.

APPENDIX F.

QAP Multiple Regressions (in Matlab 6.1)

Each matrix was exported from Ucinet 5 into a text editor (e.g., TextPad) in its raw form (i.e., three columns: first is row place as an integer, second is column place as an integer, and third is the value for the row by column cell). Any missing values were assigned the value of –1. Each file was then saved as a text file (e.g., *.txt).

In Matlab, a program was run to turn these text files into datasets again. The program is shown for the gender non-match matrix below.

```
1. load gender_nonmatch.txt
2.
3. a=find((gender_nonmatch(:,1)~=gender_nonmatch(:,2)));
4. gender_nonmatch=gender_nonmatch(a,3);
5.
6. save negmats gender_nonmatch
```

Next, each of the new datasets had to be loaded into Matlab to run the QAP regressions or multiple regressions. By typing "load negmats", these files would be loaded into Matlab.

Next, QAP regressions and multiple regressions were conducted using the following Matlab program written by Kenneth W. Koput.

```
1.  function [bo,pval] = qap(y,x,nits,mv)
2.
3.  %QAP regression
4.
5.  m=sum((x==mv),2)==0;
6.  x=x(m,:);y=y(m,:);ny=length(y);ny
7.  X=[ones(ny,1) x];
8.
9.  [n,p]=size(X);
10. psum=zeros(p,1);
11.
12. % Find the least squares solution.
13. [Q R]=qr(X);
14. b = R\Q'*y;
15. bo=b;
16.
17. for i=1:nits
18.
19.   yp(:,1)=y(randperm(n)',1);
20.
21.   [Q R]=qr(X);
22.   b = R\Q'*yp;
23.   psum=psum+(abs(b)>=abs(bo));
24. end
25. pval=psum./nits;
```

For Sample 1, QAP multiple regressions using undirected negative ties were conducted as follows:

Step 1:
Independent variables: Dissimilarity matrices for age, citizenship, femininity, foreign student status, gender, grade point average, masculinity, physical attractiveness, and leadership preferences.
Dependent variable: Matrix for undirected negative ties

Input as:
X=[1_AGEEUC_IV, 1_CITNON_IV, 1_FEMEUC_IV, 1_FORNON_IV, 1_GDRNON_IV, 1_GPAEUC_IV, 1_MASEUC_IV, 1_PAEUC_IV, 1_PREFSNON_IV]; y=Sym1_neg_dv;
[b,p]=qap(y,X,2000,-1)

Output:
ny = 46

X Variable	b	p
Constant	0.3269	0.1610
Age	0.0110	0.7320
Citizenship	0.0410	0.8670
Femininity	-0.7364	0.0065
Foreign	0.0851	0.7250
Gender	-0.0063	0.9790
Grade Point Average	-0.2129	0.0240
Masculinity	-0.0005	0.9980
Physical Attractiveness	0.0551	0.5035
Leadership Preferences	0.2686	0.0365

Action Taken:
Removed physical attractiveness because it brought the sample size down dramatically

Step 2:
Independent variables: Dissimilarity matrices for age, citizenship, femininity, foreign student status, gender, grade point average, masculinity, and leadership preferences.
Dependent variable: Matrix for undirected negative ties

Input as:
X=[1_AGEEUC_IV, 1_CITNON_IV, 1_FEMEUC_IV, 1_FORNON_IV, 1_GDRNON_IV, 1_GPAEUC_IV, 1_MASEUC_IV, 1_PREFSNON_IV];
y=Sym1_neg_dv;
[b,p]=qap(y,X,2000,-1)

Output:
ny = 154

X Variable	b	p
Constant	-0.0980	0.9525
Age	0.0292	0
Citizenship	0.3201	0.0030
Femininity	0.0768	0.3380
Foreign	-0.1253	0.3175
Gender	0.0426	0.6000
Grade Point Average	-0.0773	0.1630
Masculinity	0.0853	0.3305
Leadership Preferences	0.1827	0.0120

Action Taken:
Removed gender because it had no effect

Step 3:
Independent variables: Dissimilarity matrices for age, citizenship, femininity, foreign student status, grade point average, masculinity, and leadership preferences.
Dependent variable: Matrix for undirected negative ties

Input as:
X=[1_AGEEUC_IV, 1_CITNON_IV, 1_FEMEUC_IV, 1_FORNON_IV, 1_GPAEUC_IV, 1_MASEUC_IV, 1_PREFSNON_IV]; y=Sym1_neg_dv; [b,p]=qap(y,X,2000,-1)

Output:
ny = 154

X Variable	b	p
Constant	-0.0893	0.9650
Age	0.0295	0
Citizenship	0.3214	0.0050
Femininity	0.0948	0.1820
Foreign	-0.1257	0.3210
Grade Point Average	-0.0745	0.1840
Masculinity	0.0777	0.3840
Leadership Preferences	0.1762	0.0185

Action Taken:
Removed masculinity because it had no effect

Step 4:
Independent variables: Dissimilarity matrices for age, citizenship, femininity, foreign student status, grade point average, and leadership preferences.
Dependent variable: Matrix for undirected negative ties

Input as:
X=[1_AGEEUC_IV, 1_CITNON_IV, 1_FEMEUC_IV, 1_FORNON_IV, 1_GPAEUC_IV, 1_PREFSNON_IV]; y=Sym1_neg_dv;
[b,p]=qap(y,X,2000,-1)

Output:
ny = 154

X Variable	b	p
Constant	-0.0694	0.9835
Age	0.0303	0
Citizenship	0.3060	0.0040
Femininity	0.0987	0.1590
Foreign	-0.0898	0.4580
Grade Point Average	-0.0629	0.2445
Leadership Preferences	0.1792	0.0195

Action Taken:
Removed foreign status because it had no effect

Step 5:
Independent variables: Dissimilarity matrices for age, citizenship, femininity, grade point average, and leadership preferences.
Dependent variable: Matrix for undirected negative ties

Input as:
X=[1_AGEEUC_IV, 1_CITNON_IV, 1_FEMEUC_IV, 1_GPAEUC_IV, 1_PREFSNON_IV]; y=Sym1_neg_dv;
[b,p]=qap(y,X,2000,-1)

Output:
ny = 154

X Variable	b	p
Constant	-0.0760	0.9795
Age	0.0307	0
Citizenship	0.2419	0.0020
Femininity	0.1001	0.1655
Grade Point Average	-0.0616	0.2620
Leadership Preferences	0.1865	0.0085

Action Taken:
Removed grade point average because it had no effect

Step 6:
Independent variables: Dissimilarity matrices for age, citizenship, femininity, and leadership preferences.
Dependent variable: Matrix for undirected negative ties

Input as:
X=[1_AGEEUC_IV, 1_CITNON_IV, 1_FEMEUC_IV, 1_PREFSNON_IV];
y=Sym1_neg_dv;
[b,p]=qap(y,X,2000,-1)

Output:
ny = 168

X Variable	b	p
Constant	-0.1105	0.9840
Age	0.0284	0
Citizenship	0.2788	0.0005
Femininity	0.0991	0.1700
Leadership Preferences	0.1975	0.0050

Action Taken:
Removed femininity because it had no effect

Step 6:
Independent variables: Dissimilarity matrices for age, citizenship, and leadership preferences.
Dependent variable: Matrix for undirected negative ties

Input as:
X=[1_AGEEUC_IV, 1_CITNON_IV, 1_PREFSNON_IV]; y=Sym1_neg_dv;
[b,p]=qap(y,X,2000,-1)

Output:
ny = 178

X Variable	b	p
Constant	-0.0567	1.0000
Age	0.0292	0
Citizenship	0.2607	0
Leadership Preferences	0.2164	0.0010

APPENDIX G.

Sample of Data Used in Logit Regressions in Chapter II.

EGO	ALTER	IF_NEG	E_GDR	A_GDR	AGE_DIF	·
1043	1496	0	0	1	12	·
1043	1642	1	0	0	12	·
1496	1043	0	1	0	-12	·
1496	1642	0	1	0	0	·
1642	1043	1	0	0	-12	·
·	·	·	·	·	·	·

APPENDIX H.

Description of Steps for Choice of Leadership Analyses in Chapter III Using Stata

1. Make an Excel file with columns for the number of times chosen for group task leader, group relational leader, and overall group leader. In the other columns, include the number of positive ties, the number of undirected negative ties, the number of directed negative ties, gender, age, and grade point average. For any missing values, replace with –1. Save this file as a comma delimited file.

2. Write a command in Stata to load the above file. The following is the command that was used: "infile TSK_LEAD REL_LEAD OVR_LEAD BOTH_POS UND_NEG DIR_NEG GDR AGE GPA using d:\[filename.csv]"

3. Next, all missing values must be re-coded as missing. The command to do this is: "mvdecode _all, mv(-1)".

4. Next, interaction terms must be generated. The command to do this is: "gen [new variable name]=GDR*BOTH_POS". This command would make an interaction variable for gender by the number of positive ties.

5. A Poisson regression model (using the command "poisson" followed by the dependent variable name and the independent variable names) was run first. After the output is shown, a goodness-of-fit chi-square test was run by the command "poisgof". Next, the observed and predicted scores based on the poisson model were needed. The command "prcounts pois, max(5) plot" was entered and then the observed probabilities for each count of times chosen on a leadership dimension were listed ("poisobeq") and the predicted probabilities were also listed ("poispreq").

6. If the chi-square from Step 5 was significant, the negative binomial model was run. The command for the negative binomial regression model is "nbreg" followed by the dependent variable and a list of the independent variables. The predicted probabilities from the negative binomial model were listed by "prcounts nbr, max(5) plot" and then "list nbrpreq".

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