ATHABASCA UNIVERSITY

MULTIPLE TEAM MEMBERSHIP AND CONFLICT SPILLOVER

BY

CHRISTINE ELIZABETH NEWTON

A DISSERTATION

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

DOCTORATE OF BUSINESS ADMINISTRATION

FACULTY OF GRADUATE STUDIES

ATHABASCA, ALBERTA

APRIL, 2023

Athabasca University
Faculty of Graduate Studies

Approval of Dissertation

The undersigned certify that they have read the dissertation entitled

MULTIPLE TEAM MEMBERSHIP AND CONFLICT SPILLOVER

Submitted by:

Christine Newton

In partial fulfillment of the requirements for the degree of

Doctor of Business Administration

The examination committee certifies that the dissertation
and the oral examination is approved

Supervisor:
Dr. Janice Thomas
Athabasca University

Committee Members:
Dr. Kay Devine
Athabasca University (Prof. Emeritus)

Dr. Maiga Chang
Athabasca University

External Examiner:
Dr. Giuseppe Labianca
University of Massachusetts Amherst

April 19, 2023

Acknowledgements

First and foremost, I would like to express my gratitude to my thesis supervisor, Dr. Janice Thomas (Faculty of Business, Athabasca University). Her unwavering enthusiasm and guidance helped sustain my motivation and focus my thoughts. I'm also exceedingly grateful to my supervisory committee members: Dr. Maiga Chang (Faculty of Science and Technology, Athabasca University) and Dr. Kay Devine (retired DBA Program Director, Athabasca University). Their ongoing commitment and substantive feedback gave me confidence as my ideas evolved into this final form.

Dr. Tammy Rapp (Ohio University) acted as the external examiner during my proposal defense. Dr. Giuseppe (Joe) Labianca (University of Massachusetts, Amherst) acted as the external examiner during my final dissertation defense. Their generous and insightful feedback will continue to inspire me as I explore and expand my dissertation topic into future research.

Although confidentiality precludes me from disclosing specific identities, I'm grateful to the post-secondary institution that provided the archival data upon which my dissertation was based. A handful of individuals there guided me through the Research Ethics Board approval process, helped me make sense of administrative records, and gave me direct access to raw data for my analysis. I'm thrilled to have had the opportunity to learn more about multiple team membership and conflict spillover by exploring this particular data set.

My final expressions of appreciation are for my mother (Pat, my most vocal cheerleader), my father (Eric, less vocal but just as proud of me), my son (John, who still can't believe that a grown adult would willingly be a student for this long), my partner (Tony, who never complained about having to make compromises for my research time), and my DBA classmates (especially Peggy, a one-person support group whose journey paralleled mine).

Abstract

This research focuses on interpersonal conflict that occurs in project-based environments where an individual is a member of more than one project team simultaneously (i.e., multiple team membership, or MTM). Although the body of existing conflict research is substantial, scholarly studies of multiple team membership are comparatively recent and conflict in MTM settings has been largely unexplored. Our understanding of conflict in MTM settings can be improved by asking the following question: *What are the effects of conflict spillover in MTM contexts?* In other words, when team members experience interpersonal conflict in one of their project teams, how (if at all) do the effects of this conflict affect other teams that they are members of? Using archival peer evaluation data from students who participated on multiple project teams while completing coursework in a Canadian college graduate program, the extent of conflict spillover was measured and the risk of decreased performance was assessed. The moderating role of high conflict intensity, conflict type and team member attributes were also examined. Social network analysis and other statistical procedures were used to assess peer evaluations from online and colocated student cohorts. Research findings suggested that conflict spillover was not uncommon among MTM team members, although spillover decreased for MTM team members in the second half of the program. Conflict intensity was typically low/moderate and conflict spillover was generally not associated with a higher risk of negative performance outcomes. Conflict intensity appears to have had a moderating effect, as both conflict spillover and negative performance outcomes increased among MTM team members who perceived high-intensity conflict towards other team members. Relationship conflict was common but evidence of higher spillover or decreased performance for MTM team members who experienced relationship conflict was mixed. Findings suggested that conflict, spillover, and negative performance

outcomes were potentially magnified for virtual relative to colocated team members. Finally, there was evidence to suggest that some rater and/or ratee attributes (such as age difference and difference in student grade point average between the rater and the ratee) were associated with higher levels of conflict spillover, high intensity conflict, and relationship conflict.

Keywords: multiple team membership, team conflict, group conflict, conflict spillover

Table of Contents

List of Tables

List of Figures

Chapter 1. Introduction

Statement of the Problem

Teamwork has been a popular area of organizational research since the mid-twentieth century (Forsyth, 2014). It is a rich field, spanning topics such as structures, processes, development, and outcomes (Forsyth, 2014; Guzzo & Dickson, 1996). This research focused on a particular type of team process - namely, team conflict - that occurs in environments where an individual is a member of more than one team simultaneously (i.e., multiple team membership, or MTM; Mortensen et al., 2007). There is abundant research on the topic of team or group conflict, including types of conflict (e.g., Jehn, 1997) and the effects of conflict on team outcomes (e.g., De Dreu & Weingart, 2003; De Wit et al., 2011; O'Neill et al., 2013). However, research on MTM is sparse (Margolis, 2019; O'Leary et al., 2011) and research on conflict in the context of MTM is virtually non-existent. This paper sought to address these gaps.

Evolution of Teams and Team Research

The use of organizational work teams became increasingly prevalent throughout the second half of the twentieth century, as organizational design began to shift away from hierarchical, bureaucratic structures commonly associated with scientific management principles (Cohen & Bailey, 1997; Forsyth, 2014; Guzzo & Dickson, 1996; Levine & Moreland, 1990; Randsley De Moura et al., 2008). Increasingly, humanistic perspectives have influenced organizational design, with greater emphasis on interactivity and collaboration of workers as they engage in work-related tasks (Forsyth, 2014).

In recent decades, the ecology of teams has become more diverse, particularly for teams comprised of knowledge workers (Cummings & Haas, 2012; Maynard et al., 2012). It is not uncommon for organizations to employ permanent work teams, virtual teams, semi-virtual teams

(that are collocated at different times during the span of a project), ad hoc (spontaneous, short-duration) teams, global teams, self-organized teams, and/or cross-functional teams (Tannenbaum et al., 2012). In some organizations, such as consulting firms, software development firms or health care facilities, all of the core production/service work may be project- or team-based, with employees assigned to work on more than one project or team simultaneously (i.e., multiple team membership). The increasing diversity of teams means that our traditional understanding of a team as a stable entity with a fixed number of people has become less characteristic of today's workplace (Wageman et al., 2012). This underlines the importance for theorists and empirical researchers to carefully define their meaning of "team," and describe their team-based study samples in detail, given the diversity of teams in today's workplace.

Despite a proliferation of research on teams (Cohen & Bailey, 1997; Mathieu et al., 2008; Rapp & Mathieu, 2019; Salas et al., 2008), it has been observed that research has not kept up with the evolving landscape of workplace teams. According to Tannenbaum et al. (2012), "A rich and valuable history of team research and experience exists as a launching point. However, times have changed, and the science and practice of team effectiveness must continue to evolve to remain relevant and meaningful" (p. 22). In a study to determine drivers of effectiveness in global virtual teams, Maynard et al. (2012) echoed this sentiment, contending that "it is important not to disregard what we know about traditional teams but rather to leverage the lessons learned from prior research while simultaneously incorporating the complexity of modern-day arrangements into models of team effectiveness" (p. 342).

In a review of significant changes affecting modern teams, Tannenbaum et al. (2012, p. 8) identified three key areas of change: technology and distance (such as the increasing prevalence of geographically dispersed work teams), empowerment and delayering (self-

organized and self-managed work teams), and composition (where team membership boundaries have become more fluid). They commented specifically about the presence of multiple team membership in today's organizations, adding that "[w]hen individuals are simultaneously members of multiple teams, how they allocate their time, attention, priorities, identity, and so forth all become salient issues - but are little understood at present" (p. 8). In other words, multiple team membership is a phenomenon that appears to be relatively more understood by practitioners than scholarly researchers.

Purpose of the Study

The purpose of this research is to explore a specific variation of work team design - multiple team membership. Multiple team membership (MTM) refers to organizational designs where individuals are deployed in more than one work team simultaneously (Mortensen et al., 2007). Pluut et al. (2014) define MTM as "a situation in which working time is fragmented over multiple teams" (p. 333). According to O'Leary et al. (2010), "MTM appears to be the norm for at least 65 percent of knowledge workers across a wide range of industries and occupations in the United States and Europe; some even put it closer to 95 percent in some industries" (p. 51).

Work teams are at the core of MTM research and practice, so it would be helpful to clarify what teams are. According to Katzenbach and Smith (1993), a team is "a small number of people with complementary skills who are committed to a common purpose, performance goals and approach for which they hold themselves mutually accountable" (p. 21). Similarly, O'Leary et al. (2011) define teams as "bounded sets of individuals who work interdependently toward a shared outcome" (p. 463), and Forsyth (2014) describes a team to be "a unified, structured group that pursues collective goals through coordinated, interdependent interaction" (p. 400). Cohen and Bailey (1997) provide a more comprehensive definition of a team:

> A team is a collection of individuals who are interdependent in their tasks, who share responsibility for outcomes, who see themselves and who are seen by others as an intact social entity embedded in one or more larger social systems (for example, business unit or the corporation) and who manage their relationships across organizational boundaries. (p. 241)

The preceding definitions are similar in many respects - teams include more than one individual, team members are interdependent, and teams are goal-oriented. According to some authors (e.g., Cohen & Bailey, 1997; Guzzo & Dickson, 1996), interdependence and goal orientation are two characteristics that distinguish teams from groups. Group research has traditionally been the domain of social psychology and sociology researchers; however, in recent decades interest has grown among organizational psychologists in their exploration of organizational settings where interdependence and shared outcomes are important characteristics of work groups (Levine & Moreland, 1990; Randsley De Moura et al., 2008).

For consistency, this dissertation used O'Leary et al.'s (2011) definition of teams, as those researchers authored a substantial amount of the seminal literature on MTM. Similarly, this dissertation used the term *team* rather than *group*. It should be acknowledged that some researchers use the terms interchangeably (Cohen & Bailey, 1997; Guzzo & Dickson, 1996), while others do not. Thus, when other research or data are described in this dissertation (e.g., in the review of literature), efforts were made to respect the terminology adopted by those authors.

Although MTM has been observed in project- or team-based organizations for some time (e.g., Payne, 1995), intra-team and inter-team MTM dynamics have not been studied in depth. Where research on multi-project organizations exists, it has typically focused on resource allocation and scheduling from a project management perspective (e.g., Platje et al., 1994) or leadership issues from a project manager's perspective (e.g., Luciano et al., 2014). In a conceptual research article modelling the relationship between the number of MTM teams, knowledge transfer, and productivity, the authors observed: "To the best of our knowledge, this

article is the first attempt to model the mechanisms driving [MTM's] effects on individuals and teams" (O'Leary et al., 2011, p. 471). Thus, it has only been in the past 20 years or so that empirical research articles on this topic have started to appear, albeit slowly. More than 5 years after Zika-Viktorsson et al.'s (2006) seminal empirical study of simultaneous work teams, Pluut et al. (2014) observed that "relatively little is known about the implications of multiple team membership (MTM) for teams and their individual members" (p. 333), and there is "scant conceptual and empirical work in this area" (p. 334). In other words, MTM has received limited attention by researchers, even though evidence suggests that it is not uncommon to find this type of work arrangement in organizations.

This dissertation focused on interpersonal conflict dynamics in the context of MTM. Conflict can be defined as "an interactive process manifested in incompatibility, disagreement, or dissonance within or between social entities (i.e., individual, group, organization, etc.)" (Rahim, 2002, p. 207). Conflict is a socio-emotional process that has a potentially negative impact on MTM dynamics (Pluut et al., 2014; Rapp, 2009). Conflict in MTM teams was explored by Pluut et al. (2014) and Rapp (2009), with these studies focusing on overall levels of conflict associated with time fragmentation and role strain, respectively. The studies did not address the extent to which conflict experienced by individuals in one team has an impact on other teams to which they belong. Rapp (2009) and Pluut et al. (2014) also did not explore conflict in MTM teams using the conflict typology (i.e., task, process, and relationship conflict) that is prevalent in current conflict research (e.g., Jehn, 1995). As described in the literature review, team conflict can assume different forms. Conflict can be related to the quality of work or effort produced by group members, processes by which team members execute tasks, interpersonal differences relating to team member personalities, or combinations thereof (Jehn, 1995). Different types of

conflict have different impacts on team satisfaction and team outcomes (e.g., De Dreu & Weingart, 2003; De Wit et al., 2011; O'Neill et al., 2013), so it is possible that spillover patterns are different as well. Thus, this dissertation distinguished among task, process, and relationship conflicts.

Researchers such as Bodtker and Jameson (2001) contended that conflict and emotion cannot be unbundled and that despite evidence of the positive effects of conflict (e.g., Jehn, 1997), a perception persists that both conflict and emotion are to be avoided: "[T]o be in conflict is to be emotionally charged, and that part of the reason conflict is uncomfortable is due to its accompanying emotion" (p. 260). The authors argued:

> The fact that cognitive interpretation of a situation (e.g., appraisal) is central to what emotion a person will experience is monumental to understanding organizational conflict. Among other things, it suggests that one's attributional tendencies or biases will influence the nature of conflict and one's emotional orientation to it. (Bodtker & Jameson, 2001, p. 261)

Furthermore, unresolved conflict episodes have a tendency to intensify in one's memories, impacting future relationships in the organization (Gayle & Preiss, 1998). In MTM environments, team members work together on different projects simultaneously; thus, the impact of unresolved (or ineffectively resolved) conflict may not be contained within specific team boundaries.

Taken together, these conceptual streams suggest a research area that may be of particular importance for organizations that incorporate MTM: understanding the circumstances in which different types of conflicts cross team boundaries and affect other teams in MTM settings.

Research Question

This dissertation addressed the following question: *What are the effects of conflict spillover in MTM contexts?* In other words, when team members experience interpersonal

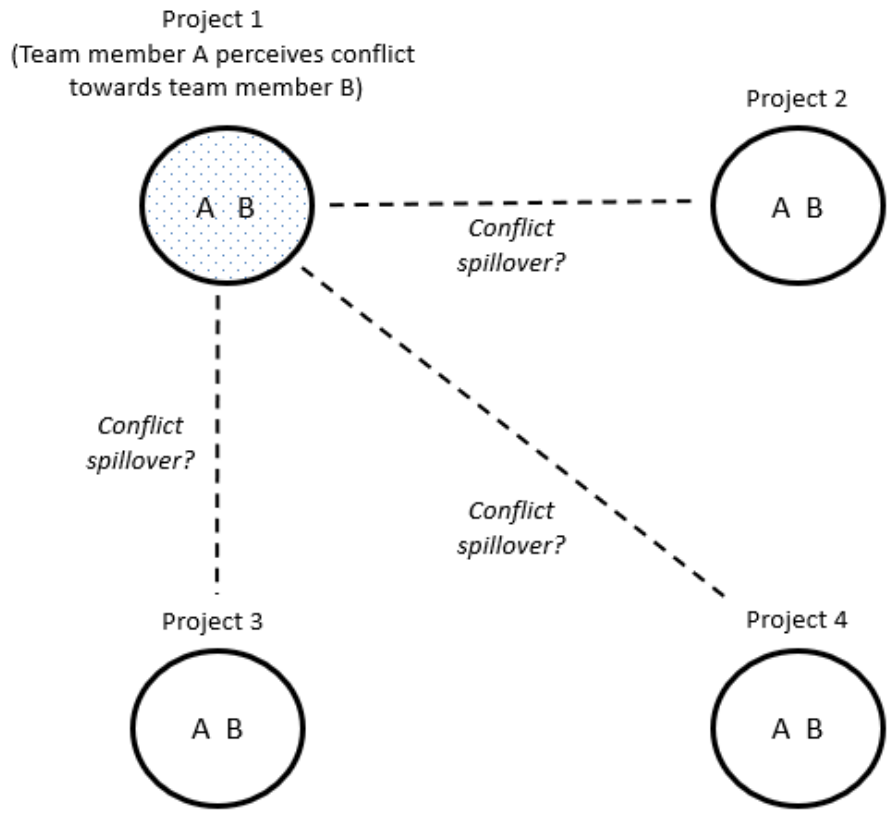
conflict in one of their work teams, how (if at all) do the effects of this conflict affect other teams to which they belong?

Spillover effects include the persistent spread of conflict across different team projects with the same team members (i.e., conflict involving the same members spreads beyond team boundaries) as well as possible negative performance outcomes when spillover occurs.

Figure 1 illustrates conflict spillover in a simplified MTM environment with four simultaneous two-person teams at a given point in time (t=0). In this example, there are four project teams consisting of two members each, working on different projects concurrently. Let us say that team member A perceives conflict towards team member B in Project 1. The purpose of this dissertation was to examine how (if at all) conflict spilled over to other projects which contain team members who were involved in the conflict from Project 1, and whether there was a greater risk of decreased performance when conflict spillover occurred. For example, the conflict in Project 1 may have occurred because team member A is an argumentative person who is unable to get along well with others. It is possible that this person is also argumentative with team member B in Project 2, Project 3, and/or Project 4. The conflict dynamics between team members A and B might be the same across multiple projects, even though the task environment is different. The effects of the conflict spillover across these concurrent projects might include decreased performance because the conflict may fester and grow if it is not resolved.

Figure 1

Possible Concurrent Spillover in MTM Environments at Time t = 0



Note. MTM = multiple team membership.

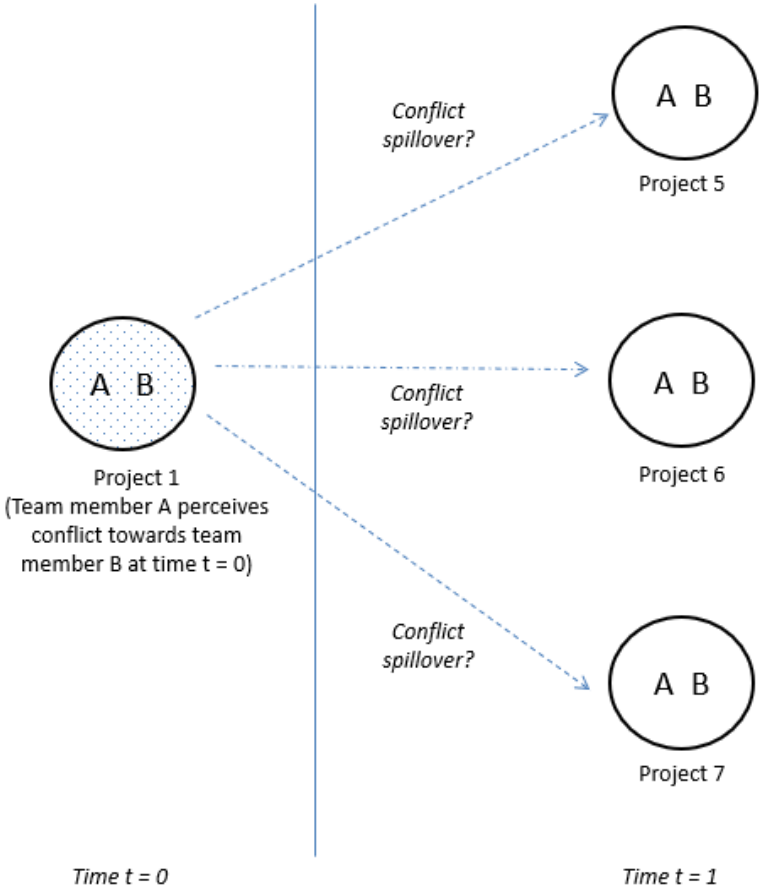
As time passes in MTM environments, existing projects wind down and new projects are initiated; thus, teams dissolve and new teams are constituted. Some of these future teams may comprise individuals who have worked together before, and these individuals may have experienced conflict while working together on previous project teams. Multiple team membership is concerned with simultaneous work teams; however, an *indirect* effect of conflict may be that it persists and spills over to subsequent projects. When conflict spills over to future projects, negative performance outcomes may occur.

Figure 2 illustrates this concept. Figure 2 describes a simplified MTM project environment at some point in the future (t=1), when projects 1 through 4 from Figure 1 have been completed and new projects are underway. Team member A perceived conflict towards team member B while completing project 1 at time t=0 (Figure 1). If they are assigned to work together on projects 5, 6, and 7 at time t=1 (Figure 2), this previous conflict may persist in the subsequent projects.

Although not examined in the present research, other indirect effects may also occur. In the case of self-selected teams, members may choose whether or not they wish to participate on a future project. If team member A experiences conflict with team member B during Project 1 at time t=0, then team member A may opt not to join projects 5, 6, or 7 because team member B is on that team. This may deprive those projects of a potentially valuable member. In environments where teams are not self-selected, team member A might make a request to the project manager that he/she not to be assigned to the same project as team member B because of a past history of conflict. In this scenario, the project manager's decision about team composition becomes more complicated; he or she must decide how to formulate the team, knowing that team members have a past history of conflict and may be prone to future conflict. Furthermore, although Figure 1 and Figure 2 depict a simplified two-person team, interpersonal conflict between two team members may have a further indirect effect of drawing additional team members into the conflict and potentially causing factions to form (Jehn et al., 2013).

Figure 2

Possible Subsequent Conflict Spillover in MTM Environments From Time t = 0 to t = 1



Note. MTM = multiple team membership.

Significance of the Study

Conflict is a normal feature of team processes; in a field study conducted by Jehn (1997), a conflict episode was observed every eight hours, on average. On one hand, conflict that is resolved effectively and without residual negative emotions can facilitate improved decisions and overall team performance (De Dreu & Weingart, 2003; Roloff, 2009). However, when conflict is unresolved or negative feelings linger, its effects can be detrimental to team performance and it may lead to subsequent conflicts (DeChurch et al., 2007; Jehn et al., 2014).

Conflict can distract team members from their tasks as they engage in various conflict management strategies, reduce team performance if task motivation and effort levels decrease, erode trust and communication (Gayle & Preiss, 1998), and contribute to burnout at work (Ilies et al., 2011).

The negative consequences of conflict in a MTM environment may be particularly damaging. If team members become distracted from their tasks due to conflicts, that team's overall performance may suffer, but performance in other projects may also be negatively affected if team members shift their time and energy away from those projects to deal with these conflicts. Conversely, team members engaged in conflict in one team context may shift more energy and effort to other team projects if they wish to avoid conflict, so performance in the project with conflict may decrease while performance in other projects may increase (Liu & Roloff, 2015).

As team members work on other teams, negative attitudes may spread to other teams in a contagion-like manner. If conflict results in decreased trust and communication, it may conceivably stunt the flow of information and learning between teams and, consequently, throughout the organization. Stress experienced by members in one team may have a negative performance impact in another team if they are not able to "leave their emotions behind" as they work on other projects. If the consequences of conflict are severe, it may prompt team members to shirk or abandon their tasks on that project entirely, instead re-focusing their time on conflict-free projects. For managers or team members of other projects, they might be blindsided when effects from conflict in another team impacts their team, making it challenging for the indirectly impacted team to directly resolve the original conflict. For team members who are exposed to ongoing second-hand conflict, their overall satisfaction and disposition towards teamwork might

suffer. In other words, conflict within one team may have an impact at the individual level, the team level, and the organization level.

Limitations of the Study

This research explored the complexities of conflict in MTM environments. Team conflict is a challenging construct to investigate because, for participants and observers alike, conflict is something that is subjectively perceived and defined (Avgar & Neuman, 2015; Solansky et al., 2014). Even though survey instruments are available to measure different types of conflict (e.g., Jehn, 1995, 1997; Jehn & Shah, 1997), people perceive conflict episodes differently. Indeed, researchers have found that perceptions of conflict can be more critical than the facts pertaining to the conflict (Sitkin & Bies, 1993). Differing perceptions of conflict have given rise to the study of conflict asymmetry or conflict skewness (e.g., Jehn et al., 2010; Sinha et al., 2016). Furthermore, different types of conflict may co-occur (e.g., task and personality conflict in the same conflict event; Behfar et al., 2016; De Wit et al., 2013; Marineau et al., 2018; Methot & Rosado-Solomon, 2020; Rispens, 2012) or conflicts may transform to a different type (Greer et al., 2008; Xie & Luan, 2014). At any point in time, perceptions of a past conflict may change, which may influence a team member's likelihood of engaging in future conflict (Carr et al., 2012; Jehn et al., 2014).

A related challenge associated with this type of research comes from acknowledging that "few studies have examined the separate impact of team members' reactions to conflict" (Ayoko & Callan, 2010, p. 221). Authors such as Sinha et al. (2016) suggest that previous research which measures conflict at a group level may sometimes produce "divergent findings that have emerged from the reliance on traditional mean-based [group level] operationalizations of. . . conflict" (p. 1051). In recent years, the call for individual level analysis of team conflict has been

growing louder (Jehn et al., 2010; Solansky et al. 2014). This dissertation addressed this call, because in MTM settings individual team members may participate on multiple teams and it is individual members whose reactions to conflict spill over to other teams.

Variations in context can explain why replicated research studies can yield different results (Johns, 2006). Johns identified different dimensions of context, or situational factors that may affect human behaviour and behavioural research. He described omnibus context as the broad 'who-what-where-when-why' associated with research design and data collection. Discrete context incorporates task, social, and physical contexts. Characteristics and interrelationships among these contexts produce distinct types of organizational behaviour and research outcomes. This makes it challenging to produce findings that are generalizable to settings characterized by different contexts. Different contexts can explain causal direction of results, different directionality of relationships, curvilinear effects, and differences in the strength of relationships (Johns, 2006).

A further challenge of the present study is that by its very nature, both the omnibus and discrete context change with every project. If, for example, a researcher studies the behaviours of one team member who participates on five different concurrent project teams and five subsequent project teams, this would require the researcher to describe ten different contexts. Although some contextual characteristics may be similar across projects, many other characteristics would be different. Thus, it may be difficult to replicate the present research given the contextual complexity of MTM environments. Johns (2006) recommends, sensibly, that researchers describe their research context as comprehensively as possible so that the audience can better understand and interpret the research findings. This includes the omnibus context as

well as the discrete context. Efforts were made to do that in this dissertation, in the form of an in-depth description of the data set.

Finally, this dissertation investigated effects of conflict in MTM environments. By focusing on this, other variables that affect team effectiveness (such as leadership, efficacy, composition, conflict management, or personality) were underemphasized (Mathieu et al., 2008). Theories and models about group processes and behaviours may not be generalizable to multiple team settings, and inferences or conclusions about the direction and causality of observed relationships may be less stable.

Limitations specifically relating to the methodology and research design are described in the Methodology chapter (Chapter 3).

Chapter 2. Review of the Literature

This chapter contains an overview of existing research on MTM. Also summarized are concepts that have received little attention by MTM researchers but are central to the research question: conflict and emotional contagion.

Overview of MTM Research

The body of research focusing on MTM spans less than 20 years and the pace of publication has been slow until recently. A search of academic databases yielded fewer than two dozen published articles and unpublished graduate/doctoral theses on the topic of MTM from 2006 to 2016. The first integrated literature review of MTM was published in 2020, based on an evaluation of only 44 articles (Margolis, 2020). While a pattern of increasing scholarly attention is apparent, it is clear that this area of team research is generally unexplored.

The body of published MTM research is distinctly international in coverage. For example, MTM teams from Sweden (Zika-Viktorsson et al., 2006), Russia (Rapp, 2009), United States (Mortensen et al., 2007), Italy (Bertolotti et al., 2015), South Africa (Chan, 2014), Romania (Pluut et al., 2014), the Netherlands (Van de Loo, 2014; Van Gompel, 2011), and Colombia (Alfaro, 2015) are represented, and at least three studies feature global teams in multi-national organizations (Cummings & Haas, 2012; Matthews et al., 2012; Maynard et al., 2012).

There are very few purely conceptual papers on the subject of MTM. The paper by O'Leary et al. (2011) is an example that will be summarized in more detail in this chapter because it is often cited by other MTM researchers as a seminal publication. Empirical studies can be categorized into two general types. Some examine how team and individual variables (such as productivity) change as a function of the number of teams to which an individual belongs. Others explore topics such as commitment (Van Gompel, 2011), time allocation

(Cummings & Haas, 2012), and performance (Chan, 2014) in MTM environments, illustrating how team processes and outputs are unique to this setting.

Early MTM Research

Zika-Viktorsson et al. (2006) were among the first researchers to empirically study multiple team membership dynamics, surveying nearly 400 individuals from a variety of Swedish industries. The authors found that slightly more than 30 percent of respondents reported feeling a sense of overload from being engaged on multiple teams. Their feelings were related to the inability to recuperate effectively, lack of work routines, lack of time resources, and a perception that the respondents were assigned to too many projects. Respondents also reported that their ability to develop competence and professional skills was inversely related to project overload. The authors found a positive relationship between stress and project overload, and concluded that work fragmentation and loss of focus due to multiple team work decreased their individual efficiency (expressed as an ability to adhere to time schedules).

In the first empirical research study to introduce the term MTM, Mortensen et al. (2007) interviewed 13 project leaders (who also had experience as project members) in an American research and development organization. Findings revealed challenges such as individual time management and team scheduling. On the other hand, interviewees reported benefits from MTM such as opportunities for career development, cross-project learning, access to scarce and specialized expertise, and enriched organizational social capital. The authors found that MTM teams are more effective when team members have good social and time management skills, when task and team structures are suitable for MTM work, when team members have high levels of trust and familiarity with each other, when adequate information and communication systems

are in place, and when the organization has the capability to balance tasks and schedules of resources across projects.

Rapp (2009) conducted a multi-method study consisting of e-mail and telephone interviews of eight IT managers, followed by a three-stage survey of 101 IT workers in a medium-sized Russian enterprise. Rapp found that role strain (inter-role conflict and role overload associated with increased meetings, increased deadlines, deadlines that were close together, increased reporting relationships) increased with the number of simultaneous team memberships, and that role strain decreased job satisfaction and job performance. Rapp also explored relationships between cohesion, team identification, and team satisfaction, and how these variables favourably predisposed team members to work together on future teams.

O'Leary et al. (2010, 2011) developed a conceptual model of MTM dynamics that addressed benefits and costs of MTM as a function of the number of MTM teams an individual was a member of. According to the authors, there is strong potential for increased productivity and learning in MTM environments at the individual, team, and organizational levels when individuals are allocated to multiple project teams. At a certain point, however, the number of multiple teams becomes ineffective and benefits start to decrease to the point where costs start to exceed benefits.

At the individual level, membership on too many simultaneous teams means that the individual member must shift focus more and more between projects (known as context-switching). This implies switching between managers, objectives, tasks, technologies, roles, routines, procedures, and intra-team relationships. As MTM increases, load-balancing and effective context-switching becomes more challenging. If a person is working on only one project team, he/she may not use his/her time efficiently or slack time may emerge as that

individual waits on other team members to complete predecessor tasks. Working on multiple teams compels individuals to use their time wisely and become more focused on multi-tasking. Research has shown that when there are time pressures involved, workers can effectively engage in context-switching, particularly if they complete the task they were engaged in prior to switching tasks (Leroy, 2009). However, if the contexts are too dissimilar or if there starts to be too many contexts, this can be problematic in terms of time, mental energy, and productivity. For example, extensive context-switching requires additional transition time, particularly when switching from an unfinished task to a new task, and performance on the subsequent task may deteriorate (Leroy, 2009). With respect to learning, MTM brings exposure to new learning from others. However, too much MTM makes it difficult for individuals to assimilate new learning effectively (O'Leary et al., 2010).

At the team level, participating on too many simultaneous teams can cause temporal misalignment challenges. When successful work practices are imported from other team experiences, this results in productivity improvements. However, if there is too much MTM, scheduling inefficiencies can occur (e.g., delays as individuals are unavailable mean that a project is delayed). Further, as proposed by Bedwell et al. (2014), team workload capacity is reduced because of the cumulative reduction of time availability by members who must also allocate work time to other team initiatives. When team members work on other teams, they have an opportunity to learn new things that they can cross-pollinate to other teams they work on. However, when there is too much MTM, there is no time to effectively cross-pollinate ideas (O'Leary et al., 2010).

At the organization level, intra-organizational connectivity benefits start to erode with greater MTM. High interconnectedness means that "the organization becomes better able to shift

staff fluidly and quickly from team to team without incurring the costs typically brought about by restructuring or reassigning resources" (O'Leary et al., 2010, p. 54). The organization benefits when individual resources are deployed seamlessly and efficiently because there is less slack or wasted time. When there is more MTM, productivity is increased because there is less risk of redundancy; members understand what is happening in other teams (because they are members of those teams), so risk of inefficient or redundant task behaviour is reduced. When MTM increases too much, it becomes costly and unwieldy to coordinate tasks and resources among so many teams. As mentioned, delays will have a ripple effect on other teams, leading to overall decreases in productivity. Similarly, at the organization level, learning is increased when more paths for knowledge transfer are established. With excessive MTM, knowledge transfer hits a saturation point and teams become homogenous (O'Leary et al., 2010).

O'Leary et al. (2012) identified six primary reasons why managers may experience challenges in "keeping MTM at healthy, moderate levels" (p. 160). These include: lack of managerial understanding of what takes place at the individual and team levels, inability to recognize instances when MTM is a root cause of team problems, the desire for some employees to participate on several teams simultaneously even though fewer teams may be better, managers perceiving that some problems associated with MTM are inherent and not resolvable, organizational pressure to increase MTM to increase utilization of employees (this may be particularly the case in organizations where employee time is billed to customers), and the desire for managers to allocate key talent to as many projects as possible because of performance gains from using these resources. The authors proposed that these challenges can be addressed by careful allocation of team members so that context-switching is minimized through efficient scheduling (e.g., "creating larger contiguous blocks of work per member" [p. 162]) and

complementary task assignments. The authors also recommended that teams develop norms that enable MTM. For example, teams could relax rules around consensus decision making so that all team members do not need to provide input in less critical decisions. Finally, they suggested that team members use asynchronous communication where possible (such as virtual meetings), so that scheduling pressures arising from face-to-face time are minimized.

Planning is important when individuals are deployed on multiple project teams, particularly global virtual teams. This includes planning tasks, establishing schedules, and allocating tasks to team members. Maynard et al. (2012) studied this in a survey of 60 virtual global supply chain teams who were also members of other teams in a multi-national organization. The authors sought to understand how planning activities, internal dynamics, and effectiveness were different when team members "are only able to allocate a portion of their workweek to a given team (because of MTMs)" (p. 344). The authors found that individuals who spent a proportionately higher percentage of their work time on one project engaged in more planning and preparation for that project. Conversely, for projects where the individual spent proportionately less of his/her work time, planning and preparation in those projects would be correspondingly decreased. The authors found that this relationship was moderated by task interdependence; where task interdependence was lower, less time was spent on planning and preparation activities. They found that team effectiveness was significantly and positively related to the amount of time spent planning and preparing for project tasks, so effectiveness would be greater for projects in which the individual allocated most of his/her time. The authors also explored how technology could be used to moderate the importance of this relationship. Specifically, participation on a high number of teams might normally be detrimental to team

performance, but the use of information and communication technologies might enable team members to engage in planning and preparation activities more efficiently.

Continuing the theme of technology and effective MTM performance, Bertolotti et al. (2015) explored the moderating effects of instant messaging technologies and social networks on MTM levels and team performance. The authors surveyed 83 R&D employees at an Italian energy company and collected diary data from each respondent. They also conducted pre-and post-survey interviews with a small number of executives to add context to survey and diary data. The authors found that the relationship between the number of MTM teams and performance was curvilinear (inverted-U shaped), with peak performance occurring when an individual participated on nine simultaneous teams. In other words, team member performance increased positively with the number of teams to which he/she belonged, but performance started to decline once the average number of teams reached nine. They also found that intensive use of instant messaging moderated this relationship, increasing performance for low-MTM and decreasing performance for high-MTM. Finally, the authors found that accessing external social networks (for advice receiving) increased performance when MTM was low or high, but increased performance wasn't observed at moderate levels of MTM.

In a study of 2055 members of 285 teams in a large multi-national food organization, Cummings and Haas (2012) found that none of the respondents participated on only one team. In exploring the allocation of time across focal teams (the teams in which members allocate most of their time) and non-focal teams, the authors found that team members who had greater company experience, rank, and education tended to spend a lower proportion of time with their focal teams. In other words, due to their expertise and value as a resource for teams, their time tended to be spread more evenly across teams. For team members who held the role of team leader, they

tended to spend disproportionately more of their time with their focal team. The authors found that team performance was higher when team members spent proportionately more of their time with a focal team, and that global dispersion of teams moderated this relationship (globally dispersed teams with members spending more time on the focal team increased performance further). The authors found that focal team performance increased with the number of teams a member belonged to, but this effect was diminished for geographically dispersed teams. These findings support O'Leary et al.'s (2011) contention that participation on multiple teams can increase knowledge transfer and effective work-balancing. Further, achieving an optimal mix of greater time spent on a team, balanced with time spent on multiple other teams, can have a beneficial impact on performance. Factors influencing the precise mix might include interdependency or similarity of tasks, workflow, deadlines, and priorities of different teams.

Like Bertolotti et al. (2015), Chan (2014) also tested the curvilinear relationship between MTM and performance that was modelled by O'Leary et al. (2011). Chan studied 435 team members in 85 South African engineering project teams and confirmed that the number of MTMs and individual innovative performance followed the inverted-U shaped relationship proposed by O'Leary et al. (2011). However, Chan found that the relationship between the number of MTMs and team performance was positive and linear rather than curvilinear in an inverted U-shape. The author speculated that effective project managers use scheduling tools and techniques to avoid scheduling lags.

Using questionnaire data from 151 Romanian IT workers, Pluut et al. (2014) explored the positive and negative aspects of MTM for individuals. Positive aspects of MTM include the benefits of role accumulation, where individuals thrive and feel positively challenged by taking on more challenging work and increasing their efficiency. Negative aspects of MTM include

cognitive overloading from context switching, and stress derived from time pressure demands. The authors hypothesized that increased MTM increased conflict because of a lack of time on each team to effectively resolve conflicts. Pluut et al. (2014) also speculated that fragmented time schedules meant that team members were not able to engage synchronously with other team members to resolve conflicts properly. Further, because time was fragmented in MTM environments, individuals were less likely to have complete information, so were more likely to be confused or to misunderstand the situation, thus increasing conflict.

Pluut et al. (2014) found that participants perceived their experience with MTM to be represented negatively by increased role demands and greater task loads. They found that increased MTM did not result in increased social support from group members, and that increased fragmentation of time increased job demands, which increased job strain. The authors found that when participants were assigned to multiple teams, their task workload did not become more complex and stressful (the authors speculated that effective load-balancing and efficiencies from load-balancing accounted for this); instead, their team workload increased (which included team processes such as coordination and communication). In addition, the authors found that time fragmentation was positively related to interpersonal conflict. The authors speculated that cognitive demands and inconsistent mental models across different team contexts made team members less able to manage conflict effectively.

In summary, early MTM research (summarized in Table 1) consistently demonstrates that participation on multiple simultaneous work teams adds complexity to the work environment at the individual, team, and/or organization levels.

Table 1

Summary of Early Multiple Team Membership (MTM) Literature

Study	Sample	Topic
Zika-Viktorsson et al. (2006)	400 team members, various industries, Sweden	Work overload associated with MTM
Mortensen et al. (2007)	13 project leaders, United States	Benefits and challenges of MTM team members
Rapp (2009)	101 IT workers, Russia	Role strain - presence of, and effects of role strain on job satisfaction and job performance (relative to number of MTM teams)
O'Leary et al. (2010, 2011)	N/A	Conceptual model - productivity and learning (relative to number of MTM teams) at individual, team, and organizational levels
Maynard et al. (2012)	60 virtual global supply chain teams in multi-national enterprises	Time spent planning and preparation (on focal team versus other teams) and impact on team effectiveness
Bertolotti et al. (2015)	83 R&D team members, energy organization, Italy	Performance (relative to number of MTM teams), use of instant messaging and accessing external social networks for advice receiving
Cummings & Haas (2012)	285 teams (co-located and virtual), multi-national food organization	Time allocation (focal team versus other teams) and team performance
Chan (2014)	85 engineering project teams (435 team members), South Africa	Individual innovative performance of team members (relative to number of MTM teams), team performance (relative to number of MTM teams)
Pluut et al. (2014)	151 IT workers, Romania	Benefits and challenges of MTM - task workload, team workload, level of social support, job strain, positive relationship between time fragmentation and conflict
Matthews et al. (2012)	198 team members, global software services organization	Interrelationships between different types of collaborative groups
Alfaro (2015)	180 software engineers, software consulting organization, Colombia	Information transfer and problem-solving creativity (relative to number of MTM teams)

Note. IT = information technology; R&D = research and development.

Recent Research on Spillover in MTM Environments

Wageman et al. (2012) speculated that interdependencies within and between MTM teams are nuanced and there is ample opportunity to extend our understanding. In recent years,

MTM research has accelerated as scholars continue to explore and extend upon the themes identified in Table 1. Earlier research (O'Leary et al., 2010) identified the transmission of knowledge or learning as a productivity benefit of MTM. However, affective spillover across MTM teams has not been a focus of recent research. A search of recent academic literature yielded only one published article, a 2019 study of leadership spillover (Chen et al., 2019).

Chen et al. (2019, p. 322) speculated that "social influences affecting employees in one team impact psychological reactions and behaviors of those same employees beyond the realm of that team". Similar to efficiencies gained in the transfer of knowledge in MTM environments, the authors hypothesized that effects of positive leadership experienced by team members in one team might be realized by team members on other teams in which they participated. They described literature on emotional contagion across work-family boundaries as analogous, applying that concept to their study of positive spillover effects of effective team leadership. Employing a scenario-based experiment and observational field studies in the United States and China, the authors found that "empowering leadership effects can generalize (or spill-over) "horizontally" across teams to affect employee motivation and behavior" (p. 335) and that "one team leader's higher levels of empowering leadership can substitute for another leader's lower levels of empowering leadership" (p. 335). They speculated that negative affective states might also spill over across MTM teams and produce negative effects, particularly where there is team member overlap across multiple teams. This dissertation explored those particular speculations.

Conflict

There is abundant research on conflict in teams. The state of research has evolved so that meta-analytic literature is available that incorporates many dozens of empirical studies and confirms relationships between conflict and team performance, and conflict and team member

satisfaction (e.g., De Dreu & Weingart, 2003). From the 1950s to the 1980s, the general consensus was that conflict was negative and to be avoided because it decreased satisfaction and team effectiveness (Jehn, 1997). However, this consensus started to shift in the 1980s as research on conflict became more nuanced and the benefits of constructive conflict were recognized (Jehn, 1997). Research since the 1990s has contributed to our current understanding of team conflict by demonstrating that conflict is not universally negative as had been previously believed and that certain types of conflict may improve team performance.

In a seminal research study by Jehn (1995), four production teams and two management teams were studied extensively over a period of 20 months. These task-interdependent teams were part of a household-goods-moving organization and data were collected using semi-structured interviews, unobtrusive observation, and review of workplace documents (such as procedure manuals). Conflict behaviour was identified through researcher observation as well as team-member self-reporting. Jehn (1995) developed a model of conflict that was derived from her research findings. Jehn explored three types of conflict that can occur within teams: process, task, and relationship. Process conflict relates to disagreements about how work is done. Jehn concluded that a small amount of process conflict is not detrimental but higher levels of process conflict have a negative effect on performance and team member satisfaction. Relationship conflict is interpersonal conflict that might stem, for example, from personality incompatibilities. Relationship conflict has a negative effect on performance as well as team satisfaction. Task conflict refers to disagreements about the content of the work itself or the goals of the work. Jehn found that moderate to high levels of task conflict can potentially have a positive impact on group performance.

Jehn (1997) identified four moderators of conflict that influenced its impact on group performance: negative emotionality, norms around the acceptability of certain types of conflict, perceptions around the potential for a conflict to be resolvable, and perceptions around the importance of the conflict. Jehn concluded that if a conflict is associated with strong negative emotions (such as shouting), group performance deteriorates and team member satisfaction decreases. If there are group norms around the acceptability of task or process conflict but relationship conflict is to be kept private, then conflict tends to be constructive and group performance improves. Group performance and satisfaction also improve if a conflict has a higher potential to be resolved. Finally, if the conflict is perceived to be important to team members, the effects of the conflict (positive or negative) are enhanced. These moderators help explain why the relationship between conflict and group performance and group satisfaction may be mixed. For example, moderate task conflict may hypothetically improve group performance, but if the conflict is shrouded in emotionality, group performance may in fact deteriorate. This nuanced model of conflict has implications for both team members and managers, suggesting that a one-size-fits-all approach to conflict management may have detrimental outcomes.

Since Jehn's seminal research in the 1990s, many empirical studies have been conducted that incorporate the specific constructs of task, relationship, and/or process conflict (e.g., Choi & Cho, 2011; De Wit et al., 2013; Martinez-Moreno et al., 2012; Solansky et al., 2014). Current research has conventionalized the distinction between task and relationship conflict. On the other hand, studies of process conflict are relatively less abundant, possibly because of challenges in distinguishing process conflict from task or relationship conflict (Park, Mathieu, & Grosser, 2020) . Team conflict has been correlated with independent variables such as performance, satisfaction, innovation, trust, cohesion, commitment, identification, positive affect,

counterproductive workplace behaviour, potency, cooperative behaviour, competitive behaviour, and avoidance behaviour (O'Neill et al., 2013).

In a meta-analysis that included 28 research studies, De Dreu and Weingart (2003) confirmed a strong, negative relationship between relationship conflict and team performance, as well as relationship conflict and team member satisfaction. The authors found that a strong, negative relationship existed between task conflict, team performance, and team member satisfaction. The authors cautioned that task complexity had a moderating effect, weakening the findings when task conflict and relationship conflict were weakly related and strengthening the findings when task complexity was high.

De Wit et al. (2011) conducted an updated meta-analysis, incorporating 116 sources, and confirmed the negative relationship between relationship conflict and a range of team outcomes (e.g., performance, cohesion, and commitment). They also considered process conflict and found there to be a negative relationship between that type of conflict and team outcomes. Their findings concerning task conflict and team outcomes were more nuanced; under certain conditions, task conflict was positively linked to some team outcomes, while under other conditions, the relationship was negative or neutral. In other words, the effect of task conflict to outcomes appears to vary, based on context.

Results of a third meta-analysis, conducted by O'Neill et al. (2013), contrasted with De Dreu and Weingart's (2003) findings for task conflict and team performance. In an analysis of 83 studies, O'Neill et al. (2013) found that task conflict was positively related to team performance for decision-making teams but that task conflict had a small or negligible effect on team performance otherwise, particularly as perceived by external assessors such as managers (rather than team members themselves). The authors were unable to confirm relationships between any

conflict type and team innovation. They found that team potency was reduced when teams experienced ongoing team or relationship conflicts, and that task and relationship conflict were positively associated with competitive team behaviours and negatively associated with cooperative team behaviours. Further, they found a positive relationship between avoidance behaviours and relationship conflict, but no relationship between avoidance behaviours and task conflict were found. Like relationship conflict, process conflict was negatively associated with team performance. The authors speculated that "negative effects of conflict become increasingly harmful as they recur over time. Team members may be able to work around conflicts in the short term, but with repeated occurrences these conflicts likely become increasingly personal and impose harm that members have difficulty overcoming" (O'Neill et al., 2013, p. 253).

It is worth emphasizing that the three main conflict types (task, process, and relationship) are not unrelated. A brief summary of a handful of studies illustrates this. De Wit et al. (2013) explored the link between task and relationship conflict and found that the perceived or actual presence of relationship conflict negatively influenced the quality of decision-making during task conflicts (specifically, participants became more recalcitrant in terms of information processing and consideration of alternate points of view).

In a study of 74 student project teams, Choi and Cho (2011) found that relationship conflict contributed to negative group affect, which increased subsequent task conflict. Further, where trust levels were low, task conflict was found to lead to subsequent relationship conflict. Research by Martinez-Moreno et al. (2012) also examined the relationship between task conflict and relationship conflict in an experimental study of Spanish undergraduate psychology students. In that study, the authors used different communication moderators (face to face communication, videoconference communication, and online chat communication) to determine whether

communication mediums affected the likelihood of early task conflicts leading to later relationship conflicts. They found that early task conflict did predict later relationship conflict for face-to-face and videoconferencing groups but not for groups that communicated via online chats. The authors also found that early process conflict was positively related to later relationship conflict. These findings align with Jehn (1997), who speculated that "task conflicts can lead to relationship conflicts if they are not resolved" p. 541).

In a relatively rare research study of process conflict, Behfar et al. (2011) deconstructed process conflict into two sub-types, logistical conflict (conflicts about how to allocate tasks to team members, for example) and contribution conflict (such as disagreements about the quality and quantity of a team member's work). They found that both types of process sub-conflicts were detrimental to team performance, team member satisfaction, and group coordination. They also concluded that process conflict had the potential to be emotionally laden, and that "relationship conflict could potentially be a consequence of process conflict" (p. 165).

As conflict researchers (e.g., Behfar et al., 2011) suggest, it is deceptive to presume an association between conflict and team outcomes without understanding how individuals respond to conflict situations. Conflict episodes may be resolved to everyone's satisfaction, or they may be unresolved (or ineffectively resolved); team member satisfaction as well as performance-related outcomes may be significantly different in either of these contexts (Gayle & Preiss, 1998). Therefore, an investigation of conflict outcomes is enhanced when conflict management behaviour is also examined.

Early models of conflict management that were developed in the 1960s through the 1980s remain in use today. Blake and Mouton's managerial grid, first appearing in 1964, was the first well-known prescriptive conflict management model, with five styles of conflict management

(forcing, confronting, smoothing, avoiding, and compromising) arranged in a two-dimensional matrix according to degree of concern for people and degree of concern for production (Lee & Rogan, 1991; Thamhain & Wilemon, 1975; Van de Vliert & Kabanoff, 1990).

Research on conflict management is diverse and has yet to coalesce around what conflict management styles (if any) are preferable to others. For example, Weider-Hatfield and Hatfield (1995) determined that better outcomes and reduced conflict resulted when integrating and compromising styles were used. Negative interpersonal outcomes resulted when avoiding and dominating styles were employed. Similarly, Alper et al. (2000) found that cooperative approaches to conflict management were more effective than competitive approaches. On the other hand, De Dreu and Van Vianen (2001) concluded that collaborating and contending responses produced less positive outcomes for relationship conflicts and that avoiding responses in relationship conflicts were associated with higher functioning teams engaged in complex tasks. Gobeli et al. (1998) found that confronting and "give and take" conflict management styles had beneficial effects, while smoothing, withdrawal and forcing had negative effects. Song et al. (2006) confirmed positive relationships between constructive conflict and integrating and accommodating conflict management strategies. They also found that forcing and avoiding strategies were associated with destructive conflict. These findings were consistent with a meta-analysis conducted by DeChurch et al. (2013), who analyzed 45 team studies and concluded that collectivistic conflict management approaches (collaborating and openness) were positively associated with team performance while individualistic conflict management approaches (competing and avoiding) were negatively associated with team performance.

Other researchers have explored conflict management from entirely different perspectives, suggesting that variables such as demographics predispose us towards specific

conflict management styles. For example, Holt and Devore (2005) completed a meta-analysis comprising 36 studies of the relationship between culture, gender, and conflict resolution preferences. The authors found that individualistic cultures preferred forcing conflict management styles, collectivistic cultures favoured withdrawing, compromising, and problem-solving relative to their counterparts in individualistic cultures, females preferred compromising more than males, and males were more likely to employ forcing styles in individualistic cultures and in conflicts with superiors compared to females.

One of the interesting aspects of conflict research is that it is multi-disciplinary. Nearly all of the research cited in this literature review so far has been found in the domain of organizational studies. However, conflict research is robust in other domains and may have relevance in organizational contexts. For example, based on years of accumulated research and practice in relationship counselling, Roloff (2009) concluded that pro-social conflict management is the preferred mode of conflict management (relative to anti-social conflict management strategies such as avoidance). His research has shown that avoidance is sometimes misinterpreted by the other party that the conflict has been resolved. He also found that if parties are silent, they may be "mulling" and this can sometimes make ensuing conflict more destructive. Roloff realized that unresolvable conflicts may recur again and again, with both parties maintaining stubbornness, and that "[c]onflicts arising from violated expectations seem especially difficult to resolve in a single episode and individuals become pessimistic that they will ever be resolved" (Roloff, 2009, p. 341).

Roloff (2009) also found that people often fall into the same patterns of behaviour during conflicts, but that the quality of the relationship doesn't necessarily deteriorate as long as both parties perceive that "progress is being made toward resolution and that the problem will

eventually be resolved" (p 342). Further, conflict behaviour sometimes has negative and positive aspects. For example, conflict avoidance is dysfunctional because the problem isn't resolved or when the avoider wishes to avoid negative consequences (such as being punished for a mistake). On the other hand, the avoider may choose to engage in this behaviour because he/she does not want to hurt the other party with an emotional or impulsive response. Finally, relationship conflicts sometimes have external root causes such as stress originating from other domains (such as the loss of a pet) or medical problems. In other words,

> Conflict in the 'real world' is complex, sloppy, and sometimes due to factors beyond personal control. What research suggests is a simple and effective solution can be rendered nearly impossible to implement, ineffective, and perhaps even counter-productive in some situations and among some individuals. (Roloff, 2009, p. 346)

Recent research recognizes the complexity of conflict that Roloff (2009) noted. An example is research on multiplex conflict, such as co-occurring task, process, and/or relationship conflict, and the co-occurrence of negative affect and positive affect that is perceived by one team member towards another team member (Hood et al., 2017; Methot & Rosado-Solomon, 2020). Another example is research on reciprocal/symmetrical conflict (e.g., Jin et al, 2019; Wang et al., 2020), which contends that interpersonal may not be mutually recognized or described. Yet another example is research that examines conflict intensity (e.g., Esbati & Korunka, 2021), which identified a positive relationship between high conflict intensity and emotional exhaustion, and a negative relationship to work engagement. It is no longer sufficient to study conflict without acknowledging these nuances, because they may influence findings in ways that are unknown to the researcher (Shah et al., 2021).

In summary, team conflict is a complex construct and efforts to improve our understanding are ongoing. We know that some types of conflict, particularly when unresolved, have deleterious effects on group affect and group performance. These negative outcomes are

potentially concerning in MTM environments, where time fragmentation, workload strain, role conflicts, and task-switching make it difficult for groups to become cohesive or engage in productive conflict management. Because MTM team members may work together on simultaneous projects, or may work together in the future, negative feelings resulting from unresolved conflict may have residual effects that linger beyond the boundaries of a project.

Emotional Contagion

This section of the literature review explores the concept of emotional contagion, a construct that is important for this research because it can be conceptualized as the mechanism that produces the spillover of conflict in MTM environments (Chen et al., 2019). Researchers contend that emotion is an integral aspect of conflict research. Bodtker and Jameson (2001) suggested that understanding the emotions behind conflict episodes can help individuals resolve conflict more effectively and anticipate the consequences if conflict remains unresolved. For example, if emotions affecting conflict are related to one's sense of identity, the outcomes of the conflict may be more potentially destructive.

Desivilya and Yagil (2005) conducted a study of 69 medical teams in Israel and produced findings consistent with Bodtker and Jameson's emotion-conflict link. Desivilya and Yagil found that emotions were an antecedent to a team member's preference for a particular conflict management style. Specifically, team members having positive emotions towards their teammates tended to use pro-social conflict management styles such as compromising, integrating, and obliging. If team members had negative emotions towards their teammates, they tended to use anti-social conflict management styles such as dominating and avoiding. The authors also found that relationship conflict was positively associated with negative emotions. However, they were unable to confirm a relationship between task conflict and negative

emotions towards fellow team members. The authors also found that "[e]motional experience is shown to be the sole direct link to the integrating and compromising patterns. By contrast, the patterns of dominating and avoiding are directly related both to emotions and to type of conflict" (p. 64).

If conflict is emotionally fraught, the emotional effects of conflict are unlikely to be contained within the parameters of a conflict episode. If a dispute has "winners" and "losers", winners may experience lingering positive emotions such as generosity and grace, while losers may harbor negative emotions such as resentment. These emotions may have a long-lasting effect that influences future interactions between the participants in the original conflict. Furthermore, in a team setting, other team members may be indirectly affected and exhibit emotions and behaviours that have been influenced by someone else's conflict. This is emotional spillover, or emotional contagion, and these hypothesized effects are worthy of further study.

Emotional spillover across members of work teams has been demonstrated in empirical studies. In a seminal study of emotional contagion, Barsade (2002) studied 94 business school undergraduate groups in an experimental setting where emotions were manipulated by a trained confederate in each group. Barsade confirmed that mood was contagious among group members. Contrary to expectations, the author did not find that unpleasant emotions were more likely to lead to mood contagion (the author speculated that this might reflect the study design, where the negative emotion expressed by the confederate was to be socially withdrawn - an emotion that tends to be less "contagious" than other negative emotions). Furthermore, the author did not find that high energy expressions of positive or negative emotions increased contagion (the author speculated that this might have been an artifact of the study design, which included a scenario where participants might have felt it to be socially inappropriate to respond to the confederate's

excessively hostile behaviour). Positive emotional contagion was associated with greater levels of group cooperativeness, reduced group conflict, and higher self-ratings of their own and their groupmates' performance.

Barsade's (2002) research is significant because team research had historically tended to focus on cognitive processes rather than socio-emotional processes. Barsade considered affect to be comprised of emotion, mood, and disposition. Emotion involves intense, short-term feelings. Mood involves weaker feelings than emotion. Disposition tends to be stable and linked to personality. Barsade focused on mood "as everyday moods seem most representative of the commonplace and malleable affective short-term changes that can occur in groups" (p. 646). Barsade described the contagion process as one where a group member exhibited an emotion (verbally and non-verbally) and other group members perceived the emotion and mimicked it subconsciously, including experiencing the emotion itself. Barsade also cited cognitive-based research which suggested that group members might perceive another group member's mood and respond "according to what seems appropriate for the situation" (p. 648). Barsade concluded that "people do not live on emotional islands but, rather, that group members experience moods at work, these moods ripple out and, in the process, influence not only other group members' emotions but their group dynamics and individual cognitions, attitudes, and behaviors as well" (p. 670).

Jehn et al. (2013) proposed a model for team conflict contagion that draws upon the concept of emotional contagion. Where emotional contagion concerns itself with the spread of feelings across members of a group, ultimately affecting its overall affective tone, conflict contagion focuses on the spread of conflict behaviours from the source of the conflict (in Jehn et al.'s model, contagion starts with a dyadic conflict between two team members) throughout the

rest of the team. In the conflict contagion model, the proposed mechanisms for the spread of conflict are coalition formation (where other team members start to "take sides" with one of the members of the original conflict dyad), followed by emotional contagion, followed by a broader concern among previously uninvolved team members that their interests and team interests are at risk. As conflict spreads throughout the team, emotions are manifested into conflict-related behaviours such as threats or refusal to cooperate with others in the group. In MTM environments, one can envision an extension of this concept where conflict contagion is transmitted via the individuals involved in a conflict to other teams (contexts) to which they belong.

Hypotheses

This dissertation investigated the effects of emotional contagion arising from conflict within MTM environments. In MTM environments, it is not unlikely that some or all of the individuals in a team will work together on other concurrent project teams or subsequent teams. Negative emotions from unresolved or ineffectively resolved conflicts have the potential to fester and spread, so that conflict may be renewed or regenerated on other teams to which these individuals belong (Jehn et al., 2013). The overlapping composition of teams is characteristic of MTM, which makes the environment ideal for conflict to spill over to other teams vis à vis emotional contagion. In order to increase our understanding of conflict spillover and its effects in MTM environments, a series of hypotheses was presented.

Hypothesis 1 was concerned with conflict spillover involving team members who experience conflict on concurrent teams. This hypothesis was derived from the concept of the rippling effect of negative emotion (Barsade, 2002) and the tendency for unresolved (or ineffectively resolved) conflicts to fester (Jehn et al., 2013).

Hypothesis 1: When team members experience conflict with each other in their team, they will experience conflict with the same individuals in other *concurrent* teams to which they belong.

Hypothesis 2 was concerned with conflict spillover in subsequent or future project teams containing at least one member who experienced conflict in a past project team. The basis for this hypothesis was that conflicts that are not resolved effectively will typically resurface when the conflicting individuals interact in the future (Bevan et al., 2008). Sequential conflict spillover is technically not related to multiple team membership, which is defined as participation on more than one simultaneous project team (Mortensen et al., 2007), but it is a potential indirect effect that arises from team members who work together on different projects.

Hypothesis 2: Team members who experience conflict in a past team will continue to experience conflict if they participate together on *future* teams.

The third hypothesis explored the effects of spillover on performance. As mentioned in the literature review, an inverse relationship between conflict and performance has been demonstrated (albeit not unequivocally; e.g., De Dreu & Weingart, 2003). This hypothesis was of particular interest because of its practical implications in MTM environments. If it can be demonstrated that conflict spillover leads to negative outcomes on other concurrent or future project teams, this would signal a need for further research and organizational interventions such as conflict management training or increased diligence when making decisions about team composition.

Hypothesis 3: Team members whose conflicts spill over to other team projects will experience lower levels of performance on those teams, compared to team members who work on concurrent or future projects together without experiencing conflict spillover.

The fourth hypothesis addressed the effects of conflict intensity on spillover and performance. Hypothesis 4 recognizes that conflict is emotionally laden (Bodtker & Jameson, 2001) and that unresolved conflicts can intensify in an individual's memories and influence future relationships negatively (Gayle & Preiss, 1998; Miller & Roloff, 2014; Weingart et al., 2015). Furthermore, in high intensity conflicts where feelings are hurt or when individuals 'take it personally', some individuals may ruminate on the conflict issue and experience avoidance or revenge motivations with the other person regarding the future (Miller & Roloff, 2014). Because spillover and performance are different constructs, Hypothesis 4 was separated into two parts. Specifically:

Hypothesis 4a: Team members with high intensity conflict on a project team are more likely to experience conflict spillover, compared to team members with lower conflict intensity.

Hypothesis 4b: High intensity conflict in MTM relations is more likely to be associated with decreased performance, compared to lower intensity conflict in MTM relations.

The final hypothesis acknowledged research that distinguishes among types of conflict (e.g., Choi & Cho, 2011; De Dreu & Weingart, 2003; De Wit et al., 2013; Manata, 2016; Martinez-Moreno et al., 2012). If relationship conflict is driven by affective perceptions of others (i.e., it is not task or context specific), then we would expect that the emotionality of relationship conflict would be experienced by team members across different project contexts; furthermore, this negative emotionality would be associated with decreased performance. As with Hypothesis 4, Hypothesis 5 was divided into two parts. Specifically:

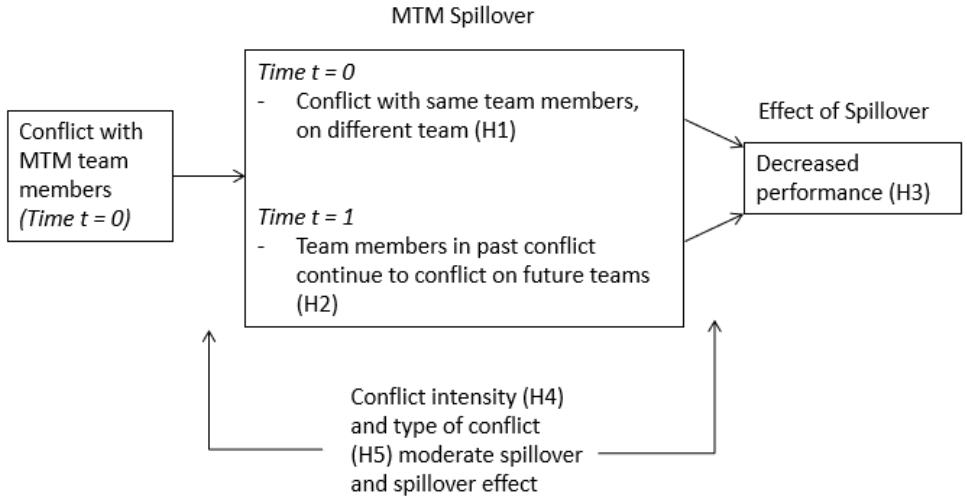
Hypothesis 5a: Team members with relationship conflict on a project team are more likely to experience conflict spillover, compared to team members with task or process conflict.

Hypothesis 5b: Relationship conflict in MTM relations is more likely to be associated with decreased performance, compared to task or process conflict in MTM relations.

The hypotheses are described in Figure 3. The box at the left side of the diagram represents interpersonal conflict within a MTM team at time t=0. The box in the middle of the figure illustrates possible spillover to concurrent teams (Hypothesis 1) and future teams (Hypothesis 2). The box on the right side of the diagram hypothesizes decreased performance as a key spillover effect (Hypothesis 3). It is proposed that conflict spillover and decreased performance will be moderated by conflict intensity (Hypothesis 4a and 4b) and conflict type (Hypothesis 5a and 5b).

Figure 3

Hypotheses of Conflict Spillover at Time t = 0 and t = 1 With a Predicted Outcome of Decreased Performance, Moderated by Conflict Type and Conflict Intensity



Note. MTM = multiple team membership; H = hypothesis.

Given the limited amount of existing MTM research, it is perhaps not surprising that conflict and conflict spillover have not received focused attention by MTM scholars. Recalling the summary of MTM research in the literature review, current MTM research does not explore interpersonal conflict at all, except to identify increased conflict as a negative outcome of participation on multiple simultaneous project teams (Pluut et al., 2014). This dissertation sought to advance our understanding of conflict in MTM environments, following a methodology that is described in the next chapter.

Chapter 3. Methodology

This dissertation employed a mixed methods design. According to Bergman (2011a), throughout most of the 20th century, mixed methods research design was more informal and less sophisticated than it is today. In the past 25 years, efforts have been made to develop a more standardized vocabulary, taxonomy and process description for mixed methods research.

Creswell and Tashakkori (2007) identified four different perspectives adopted by mixed method researchers. First, the methods perspective described mixed methods research as a collection of qualitative and quantitative approaches to data collection and analysis that is not linked to paradigms. A second methodological perspective depicted mixed methods research as being more than mixed data collection and analysis. Rather, mixed methods research should also focus on assumptions, sampling, data collection, analysis, research questions, and interpretations of findings. Third, the paradigm perspective emphasized philosophical assumptions around mixed methods research. For example, the quantitative component may follow a positivist paradigm while the qualitative component may adopt a social constructivist paradigm. The fourth perspective suggested that mixed methods research emerges as a strategy as part of ongoing research to enhance understanding of a phenomenon that also explores other types of methodologies. Thus, mixed methods research becomes a new methodological filter through which the researcher examines a phenomenon. The authors contended that mixed methods research continues to evolve, and therefore researchers might adopt any or all of these perspectives as they explore phenomena of interest to them.

Of the four perspectives described by Creswell and Tashakkori (2007), this dissertation most closely aligned with the second (methodological) perspective. Human behaviour is complex, and conflict spillover behaviour in MTM environments is no exception. It is a

phenomenon that is poorly understood, so qualitative techniques enabled this researcher to discern linkages among conflict spillover, conflict intensity, conflict type, and performance outcomes. Text-based team member reflections were also reviewed to enhance quantitative analysis. As will be described later in this chapter, the data sample was a convenience sample that was identified based on the researcher's personal (subjective) experiences managing graduate student teams in a classroom setting. The analysis included quantifying qualitative data (such as conflict type and conflict intensity) and completing hypothesis testing using a sizable sample of nearly 200 teams. Qualitative data was coded using keywords from valid and reliable conflict scales. Quantitative analysis was interpreted by triangulating back to the text-based team member reflections.

Aside from mixed methods perspectives, the term “mixed” may also be interpreted differently among researchers. For example, some researchers might consider multiple qualitative methods to be a type of mixed method while others believe that mixed methods should include a combination of qualitative and quantitative methods (Bergman, 2011a). As mentioned in the previous paragraph, this dissertation comprised a qualitative component (i.e., archival document analysis of team member reflections) and a quantitative component (i.e., statistical procedures using social network analysis of quantified qualitative data and rating scales that were incorporated into the reflection). Triangulation occurred when findings from the quantitative analysis were compared with qualitative text-based reflections to identify areas of convergence and divergence and to clarify inconsistent or confusing findings (Jick, 1979).

It may seem that mixed method research is a "best of both worlds" approach. According to Johns (2006), qualitative research may be so context-oriented that researchers "fail to recognize universal phenomena" (p. 404), while quantitative research may be so sterilized of

context that validity is compromised. Nevertheless, mixed methods researchers (e.g., Bergman, 2011a, 2011b) warned that examining a phenomenon using multiple approaches does not cancel out the limitations of each. For example, even though large-sample quantitative analysis may appear to be representative, if it is the second stage following qualitative research to explore dimensionality, then results are influenced by subjectivity associated with qualitative research. Slonim-Nevo and Nevo (2009) suggested that it would be unsurprising for a researcher to discover that each strand of mixed method research yielded different findings. What is important is that the discrepancies should be acknowledged and reasons explored. For example, there may be methodological problems such as data collection issues. Different data sources and research subjects may have different contexts and perspectives so it may not be easy to generalize human behaviour from standardized quantitative instruments. The different data sources/strands may in fact be measuring two different aspects of reality. We might have to accept that a phenomenon is complex and we are measuring different aspects of it. Or, we may have to admit the contradiction and suggest further study (Jick, 1979; Slonim-Nevo & Nevo, 2009). As Bryman (2007) noted, "In genuinely integrated studies, the quantitative and the qualitative findings will be mutually informative. They will talk to each other, much like a conversation or debate, and the idea is then to construct a negotiated account of what they mean together" (p. 21).

The present research was approached in a manner that aligns with Bryman's (2007) perspective. Specifically, qualitative reflection data from each team member was coded into categories of conflict type by interpreting text in the context of existing conflict theories. The coded data was analyzed using social network analysis and other statistical techniques. The findings from that analysis were, in turn, interpreted in the context of prevailing conflict and MTM theories, and also in the context of original team member reflection data. This research

addressed a topic (i.e., conflict spillover in MTM settings) that has rarely been explored before in academic literature, so this negotiated interpretation of findings improved and clarified the results of the research.

Site and Sample

In order to study MTM conflict spillover, field research is desirable so that the researcher can study simultaneous work teams in a natural and authentic setting, where conflict is not artificially introduced and measured by the researcher. It can be challenging for researchers to locate and secure permission to study work teams in organizational environments and expect them to behave in a natural and unbiased manner (Jehn, 1995). A comprehensive study of organizational MTM teams would also be time-consuming and expensive. Therefore, an alternate data source was used for this dissertation: graduate students who participate on multiple simultaneous team projects in their two-semester program of study.

Multiple team membership is frequently found in post-secondary educational environments. It is not uncommon for students to participate on team-based course projects throughout their programs, often working with the same classmates on simultaneous course projects in different courses. Ideally, students work together harmoniously to achieve synergies within their teams and resolve conflicts in a productive manner. However, a student team may experience conflict in one course and this conflict can sometimes spread to teamwork in other course projects. When this occurs, satisfaction and grades may be negatively affected, and students may choose not to work together in subsequent courses. In other words, it is possible to observe similar spillover dynamics and outcomes in this quasi-laboratory setting.

This research explored conflict spillover dynamics using a purposive convenience sample of post-secondary students enrolled in a two-semester graduate studies certificate program at a

community college in Ontario, Canada. This two-semester program (eight consecutive months in total) was available to mature students who had previously completed a college diploma or university degree. Students were required to achieve a final grade of 50% or more to pass each course in the program. Most students enrolled in this program to satisfy subject-specific education requirements towards a professional designation. Students who were pursuing a professional designation must achieve a course grade of at least 65% (as specified by the accrediting organization), with an overall average of at least 70% in the accredited courses of the program. Accordingly, most students in the program were typically engaged in their learning and committed to earning good grades.

The program was delivered in both a classroom-based format and a fully on-line format, with students selecting which delivery format they preferred during the application process. In this program, students were often required to complete team projects and complete peer/self-evaluations as part of their normal course work. In the first semester of the program, students were unfamiliar with each other and had no previous experience working together. In the second semester of the program, students had a range of familiarity with their classmates, depending on how extensively (if at all) they worked together during the previous semester and the extent to which they interacted during regular classroom discussions and activities.

Team member peer/self-evaluations were small assignments that were completed at the end of courses that featured major team projects. They typically consisted of ratings and/or written reflections, in which students explained the reasoning behind their ratings of each of their fellow team members; however, some peer/self-evaluations consisted solely of rating scales with a dozen or more items in the scale. These ratings and reflections were used to populate variables representing conflict ratings, conflict intensity, conflict spillover, and conflict type. Information

from reflections provided qualitative insights into conflict experienced by team members. Course data (e.g., team project grades) and administrative data (e.g., student gender and age) were also provided by the college. These data were used to assess performance impacts of conflict and to identify possible conflict patterns involving demographic attributes.

The data set consisted of peer/self-evaluations, course data, and administrative data for students who completed the program during the years 2014 and 2015. Data used for the research were archival data that were collected with written permission from the college and anonymized for confidentiality purposes. All students in the data set had graduated from the program more than 5 years before the data were obtained. All courses in the program which met the following criteria were included in the sample: (a) the course included a team project (worth at least 10% towards the final course grade); (b) the course took place between January 2014 and August 2015; and, (c) the course included an individual reflection assignment, where students evaluated each member of their project team via a detailed rating scale and/or a written reflection explaining each team member's evaluation of each other team member. During the time period covered in the data sample, there were three program intakes and 162 students completed the program.

The data set thus contained 2497 ratings/reflections for 226 student teams that were formed in various courses during the program (self-ratings were excluded from the data set). It was possible to identify team members who did not submit peer evaluations by examining course administrative data. Using a conservative imputation strategy that will be described later in this chapter, an additional 150 ratings were imputed. The remaining 261 non-responses were not adjusted with imputed ratings and were left blank. In summary, the response rate before imputation was 85.9% and 91.0% after imputation.

Measures

This dissertation described conflict spillover in MTM settings as well as effects of conflict spillover. In order to produce findings that supported or rejected the hypotheses (described at the end of the preceding chapter), various measures were used in the analysis. Dependent variables comprised various representations of conflict and were defined differently for each hypothesis; they included conflict, conflict spillover, conflict intensity, and conflict type. Independent, or outcome, variables were conflict spillover and performance outcomes. Moderator variables consisted of variations of four key student demographic attributes: age, gender, grade point average (GPA), and domestic versus international status.

Conflict

This variable formed the foundation of the analysis for all of the hypotheses, as it was used to define related variables such as spillover and intensity. If a team member gave a less-than-perfect numeric peer rating to a fellow team member (i.e., a peer evaluation rating below 10.0 on a normalized scale from 1.0 to 10.0), then it was assumed that the rater experienced feelings of conflict towards and/or engaged in conflict behaviour with the individual receiving the rating. In other words, a rater perceived conflict towards a ratee if a less-than-perfect peer evaluation rating was given.

Conflict spillover was defined in either of the following two forms. First, *concurrent conflict spillover* occurred when a team member perceived conflict towards the same team member on more than one project concurrently in the first semester or on more than one project concurrently in the second semester of the program. In other words, a pair of students worked together on multiple projects in concurrent courses and the rater perceived conflict towards that same team member in multiple concurrent projects. Alternately, *sequential conflict spillover*

occurred when a team member perceived conflict towards the same team member on at least one first-semester project and at least one second-semester project. Conflict spillover was a dichotomous independent variable in the analysis of Hypotheses 1, 2, 4a, and 5a, and a dependent variable in the analysis of Hypotheses 3.

The literature review discussed emotions and emotional contagion, suggesting that higher intensity conflict often have more detrimental effects on team outcomes and future interactions when feelings get hurt or when participants in the conflict dwell on conflict issues before or after the conflict event (e.g., Jehn et al., 2013). Thus, *conflict intensity*, a moderator variable, was used in the analysis of Hypotheses H4a and H4b. If the rater gave the ratee a peer evaluation rating below 7.0 (on a normalized scale from 1.0 to 10.0), then the conflict was deemed to be high-intensity conflict. If the rater gave the ratee a peer evaluation rating between 7.0 and 9.9, then the conflict was deemed to be low/moderate-intensity conflict. (The rationale for using a rating of 7.0 as a threshold to distinguish higher and lower conflict intensity is described later in this chapter.)

For peer evaluation ratings that indicated conflict (i.e., where a rater gave a numeric rating below 10.0 in the peer evaluation of a team member), peer evaluation rating scales and/or open-ended evaluation comments by raters were examined to determine the reason(s) for the conflict. The literature review discussed conflict research that emphasizes the importance of distinguishing among task, process, and relationship conflict separately (e.g., Jehn, 1995). These conflict categories were represented as a moderator variable in the analysis of Hypotheses H5a and H5b.

Performance Outcomes

There is abundant previous research that examines the relationship between conflict and performance (e.g., DeChurch et al., 2007; De Dreu & Weingart, 2003). In the present research, performance outcomes were measured in two ways, both from the perspective or viewpoint of the team member providing the peer evaluation rating. The first measure of performance was the rater's project grade relative to his or her grade point average (GPA). The second measure of performance was the rater's project grade relative to the class average project grade. All team members typically received the same grade on their projects. However, there were instances when a team member received a lower grade relative to the rest of the team; the implication is that some course Professors may have reduced project grades for team members who received low peer evaluation ratings. Performance outcomes were independent variables in the analysis of Hypotheses 3, 4b, and 5b.

Team Member Attributes

Although individual characteristics of team members were not included in the formulation of the hypotheses, their role as moderators was examined in Hypotheses 1, 2, 4a, and 5a. Attributes included age, gender, grade point average (GPA) and domestic versus international student status. Research suggests that external validity increases when student samples composed of older students are studied, potentially increasing generalizability to the business environment (James & Sonner, 2001). Therefore, it was desirable to understand the age profile of teams and the ages of students who have conflict experiences with fellow team members, to see if age-related patterns emerge. Similarly, literature shows that gender and culture may influence one's preferred conflict management strategies, which in turn influences how effectively conflicts are resolved (e.g., Ammons and Brooks, 2011; Bodtker & Jameson, 2001; Holt & Devore, 2005;

Takeda & Homberg, 2014). Student grade point averages were also used as a moderator variable, as conflict may be influenced by achievement expectations (Sellitto, 2009). Specifically, students who were high achievers in other courses were assumed to also have high performance expectations for their team projects and might have become dissatisfied with team members who were 'free riders' or were otherwise behaving in ways that might have jeopardized the overall team outcomes. These four attributes were specified in various ways (described later in this chapter) to identify different patterns of association.

The independent, dependent, and moderator variables are summarized in Table 2.

Table 2

Summary of Measures

Variable	How Measured	Hypothesis
Independent variables:		
Conflict spillover	Presence of conflict on multiple concurrent or sequential projects	1, 2, 4a, 5a
Performance	Rater's project grade relative to the rater's grade point average (GPA)	3, 4b, 5b
	Rater's project grade relative to the class average project grade	
Dependent variables:		
Conflict	Peer evaluation rating score below 10.0	1, 2
Conflict spillover	Presence of conflict on multiple concurrent or sequential projects	3
Moderator variables:		
Conflict intensity	High intensity conflict: peer evaluation rating score below 7.0	4a, 4b
	Low/moderate intensity conflict: peer evaluation rating score between 7.0 and 9.9	
Conflict type	Peer evaluation rating scales Open-ended comments from raters	5a, 5b
Age Gender Grade point average (GPA) Domestic vs. international status	Administrative records	1, 2, 4a, 5a

Data Preparation

The following data were collected for analysis: the names of students in each team, for each course and cohort; numerical ratings and descriptive team member peer evaluations prepared by each team member in each course; project grades for each student in each course; and, attribute data for each student (program-wide grade point average, age, gender, domestic vs. international status). Data preparation for each of these elements of the data set is described below.

Student, Course, and Cohort Identifiers

To maintain confidentiality, each student was assigned a three-digit ID number (not his or her college student number). That number was used to identify his or her affiliation with specific courses, project teams, and cohort. As data from peer evaluation forms were coded and entered into a database, rater and ratee names were replaced with ID numbers. Project grade and student attribute data were also mapped to respective student ID numbers rather than student names.

For similar reasons of confidentiality, specific course names were also assigned unique numeric course codes. Course codes were used in the analysis of hypotheses to distinguish first-semester and second-semester courses. Course codes were also used to organize and connect each student's project grades to the appropriate courses.

Cohort identifiers were relevant for the analysis because each of the three cohorts in the data set was unique. In Cohort A (the online cohort), students interacted virtually throughout both semesters of the two-semester program. Students in Cohort B and Cohort C completed all courses via traditional classroom delivery. Cohort C differed from Cohort B in one key respect. Cohort C was larger and thus split into two sections of students. During the first semester of the program, each section of students in Cohort C attended classes with members of their section

only. Halfway through the program, enrollment in the two sections was shuffled. As a result, during the second semester of the program, students in each section of Cohort C encountered a blend of familiar classmates (who were in their section from the previous term) and new classmates (who were in the other section in the previous term). In the analysis of the hypotheses, separate results were produced for each cohort. Differences in findings across cohorts justified the decision to keep them separate in the analysis.

Ratings and Reflections

Preparation of rating and evaluation data involved compiling and organizing data from the peer evaluation forms in various courses. For each course in the data set, each student completed and submitted a confidential peer evaluation rating and/or reflection for each member of his or her project team.

Team Member Ratings. Peer evaluation rating scales differed for each course, with some scales containing one item while others contained more than a dozen items. Some scale items spanned two points while others spanned five points. Some scale items specifically addressed conflict while others asked respondents to provide a global rating and elaborate with a written explanation for the rating given. The diversity of rating and reflection formats in the data set is an unfortunate but unavoidable limitation, considering that these data were not originally collected for research purposes (Bowen, 2009).

To address the issue of different rating scales, each type of scale was examined and adjusted to ensure that all shared the same directionality (i.e., high-value points reflected positive evaluations of team member performance and low-value points reflected negative evaluations). A linear transformation of raw peer evaluation scores from each student rater was applied to the rating data using the POMP (percent of maximum possible score) technique (Cohen et al., 1999).

Transformed results were then converted to a score out of 10 for each rating in the data set. If a student completed a peer evaluation form that contained multiple scale items, then an average of the transformed scores of the items was calculated to determine a single rating score.

For the quantitative analysis, there were only two threshold values in the numeric peer evaluations ratings that were important. First, if a rater gave a rating of 10.0 in the evaluation of a team member, the interpretation was that no conflict was perceived by the rater towards the person being rated (the ratee). Second, if a rater gave a rating below 7.0 in the evaluation of a team member, the interpretation was that conflict intensity was high. The decision to set a threshold value of 7.0 to delineate high-intensity conflict from lower-intensity conflict (defined as a peer evaluation rating between 7.0 and 9.9) was made by examining open-ended comments provided by each rater. Wherever raters commented that they never wanted to work with the ratee again, the numeric rating in that particular peer evaluation was noted. It was found that this comment was never associated with a numeric peer evaluation rating above 7.0, so this rating value was set as the upper threshold rating for high-intensity conflict. This threshold was double-checked by reviewing comments to identify cases where the raters commented that they would be willing to work with the ratee again; the numeric ratings in these peer evaluations did not fall below 7.0. In other words, there were no raters who gave a peer evaluation rating below 7.0 and commented that they would like to work with that partner again, and there were no raters who gave a peer evaluation rating above 7.0 and commented that they would never want to work with that partner again.

As mentioned earlier in this chapter, there were 2497 numeric peer evaluation ratings submitted by students in the data set. A conservative approach was used to impute ratings for 150 missing responses. The remaining 261 non-responses were not imputed and were left blank.

The decision to attempt imputation was guided by literature on the topic of missing data in social network analysis (e.g., Huisman, 2009). It can be beneficial to impute missing data so that certain statistical analysis can be completed. For example, in the present research, much of the quantitative analysis focuses on conflict spillover. If a rater worked with a team member on two projects and submitted a peer evaluation for one project but not the other, then it is impossible to determine whether conflict spilled over. The missing rating for one project renders the existing rating on the other project meaningless (because we cannot conclude whether or not conflict spilled over to both projects) and the entire relationship must be excluded from the analysis of conflict spillover. On the other hand, if a value for the missing rating can be reasonably imputed, then both project ratings can be used in the analysis of conflict spillover. Because each student was part of a team and each team member supplied peer evaluation ratings of other team members, ratings of other team members in the team could be considered in making the determination of whether to impute a value for a missing rating, and what that value should be. Imputation is nevertheless challenging, particularly for subjective peer evaluation ratings. An incorrect imputation might skew results, leading to inaccurate conclusions.

The imputation approach that was used for this data set focused on evaluating the *incoming* ratings that were provided by other members of the team. For example, let's say that a four-person team consisted of students A, B, C, and D. Student D did not submit any peer evaluation ratings of other team members, but Students A, B, and C did. Student D was rated by Students A, B, and C. Student A was rated by Students B and C but not Student D. Student B was rated by Students A and C but not Student D. Student C was rated by Students A and B but not Student D. We may be able to impute a rating that Student D may have given (figuratively, not literally) to Student A, based on the ratings that Students B and C gave to Student A. As

noted by Huisman (2009), "the ties from other actors to the incompletely observed actors are observed" (p. 3).

Three conditions were applied when making imputation decisions for missing ratings within teams. First, if less than 50% of the total possible number of ratings for the team were submitted, then missing values would not be imputed for any team member. For example, in a four-person team, the total number of possible ratings contributed by team members is 12 ratings. If less than six ratings in total were completed by members of that team, then all missing ratings for that team would remain blank. Second, if some team members gave a peer rating below 7.0 to a team member and other team members gave a peer rating above 7.0 to that team member, then missing values for that team member would not be imputed. The presence of a wide range of peer ratings for a team member suggests that perhaps the team was divided into factions, making any imputed value less reliable. Third, if the other conditions permitted imputation, then the imputed value would equal the mean incoming rating given to the ratee by the other members of the team.

Coding Conflict Types. Text-based reflections were coded into a categorical variable with values corresponding to types of conflict (i.e., task, process, relationship, and combinations thereof). These categories align with Jehn's typology of conflict types (1995).

A coding guide was developed using keywords and measurement scales used by Jehn and her colleagues (e.g., Jehn, 1995, 1997; Jehn & Shah, 1997). For example, Figure 4 illustrates Jehn's nine-item Intragroup Conflict Scale (ICS) that measures relationship and task conflict.

Figure 4

Jehn's Intragroup Conflict Scale

Relationship Conflict 1. How much emotional conflict was there among the members of your group? 2. How much anger was there among the members of your group? 3. How much personal friction was there in the group during decisions? 4. How much were personality clashes between members of the group evident? 5. How much tension was there in the group during decisions?
Task Conflict 1. How much disagreement was there among the members of your group over their opinions? 2. How many disagreements over different ideas were there? 3. How many differences about the content of decisions did the group have to work through? 4. How many differences of opinion were there within the group?

Note. Adapted from "An Assessment and Refinement of Jehn's Intragroup Conflict Scale," by A. W. Pearson, M. D. Ensley, and A. C. Amason, 2002, *International Journal of Conflict Management*, *13*(2), pp. 110–126 (https://doi.org/10.1108/eb022870). Copyright 2002 by Emerald Publishing.

Jehn and Shaw (1997) created three additional scale items to measure process conflict: "To what extent did you disagree about the way to do things in your work group?", "How much disagreement was there about procedures in your work group?", and "How frequently were there disagreements about who should do what in your work group?".

Behfar et al. (2011) created and tested scale items associated with two different dimensions of process conflict (logistical conflict and contribution conflict). These items are shown in Figure 5.

Figure 5

Scale Items Measuring Process Conflict

Logistical Conflict 1. How frequently do your team members disagree about the optimal amount of time to spend on different parts of teamwork? 2. How frequently do your team members disagree about the optimal amount of time to spend in meetings? 3. How often do members of your team disagree about who should do what?
Contribution Conflict 1. How often is there tension in your team caused by member(s) not performing as well as expected? 2. To what extent is there tension in your team caused by member(s) not completing their assignment(s) on time? 3. How much tension is there in your team caused by member(s) arriving late to team meetings?

Note. Adapted from "Conflict in Small Groups: The Meaning and Consequence of Process Conflict", by K. J. Behfar, E. A. Mannix, R. S. Peterson, and W. M. Trochim, 2011, *Small Group Research*, *42*(2), pp. 127–176 (https://doi.org/10.1177%2F1046496410389194). Copyright 2011 by Sage Journals.

Additional insights came from qualitative research, where researchers provided keyword dictionaries (e.g., Jehn, 1997) and sample excerpts from open-ended questions about conflict (e.g., Behfar et al., 2011). Examples of keywords associated with relationship conflict used by Jehn (1997) included: "backstabbing", "bicker", "complain", "disrupt", and "enemy" (p. 557). Task conflict keywords included: "differ", "ideas", "opinion", and "viewpoint" (Jehn, 1997, p. 557). Process conflict keywords included: "assign", "process", "schedule", "allocate", "procedures" (Jehn, 1997, p. 557). Conflict phrases identified by Behfar et al. (2011) are not inconsistent with Jehn's (1997). For example, Behfar et al. associated phrases such as "disagreement over solutions to cases", "difference in opinions concerning the analysis of the case" with task conflict (2011, p. 138). Behfar et al. considered phrases such as "not listening to

others" and "youngest member of the team did not have enough maturity to discuss ideas" to be examples of personality conflict (2011, p. 137). Statements such as "some of the members are too busy to have enough meetings" were determined to be associated with process conflict (Behfar et al., 2011, p. 137). These resources provided important source material during development of the codebook of conflict types. Accordingly, the coding process followed a deductive technique based on existing research and *a priori* theories distinguishing types of conflict (Creswell, 1998; D. R. Thomas, 2006).

Each peer evaluation was reviewed by this researcher and a list of thematic codes was generated (see Appendix A) using a bottom-up approach. This list of conflict codes was then reviewed by this researcher, by two members of this researcher's advisory committee, and by an individual with over 20 years of practical work experience in a project-based organization. All four individuals independently classified each of the conflict codes as task, process, and/or relationship conflict using a guide containing examples of each type of conflict taken from academic conflict literature (including examples described in the previous paragraphs and in Figures 4 and 5).

Descriptive Evaluation Comments. In addition to numeric ratings, text-based comments were extracted from peer evaluation documents. Thematic comment codes were generated so that conflict types could be identified. Original comments were also organized into a separate database along with rater, ratee, rating, and course code fields. Each entry in the database was

identified by a unique case number for referencing purposes. This allowed the researcher to locate and extract comments to add further insights to the discussion of quantitative findings.

Project Grades

Team project grades were an outcome variable that was used to determine individual performance outcomes for the analyses of Hypothesis 4a and 4b. These grades were reported as continuous numeric variables and were not recoded into categorical variables.

Student Attribute Data

Student attribute data were extracted from college administrative records and incorporated into the analysis of selected hypotheses as moderator variables. Once random identifiers were assigned to students, the original attribute data were archived and analysis proceeded using the assigned identifiers. All original data remained in the sole possession of this researcher and third parties did not have access to original or coded raw data.

Age. Student age was coded as a continuous numeric variable. Rater and ratee ages were analyzed using social network analysis software (UCINET) to identify possible age-related conflict patterns. Specifications of this variable are summarized in Table 3.

Table 3

Age Variables for Attribute Analysis

Variable name	Description
rrage	Continuous variable: Rater's age
reage	Continuous variable: Ratee's age (i.e., the age of the team member receiving the rating)
diffage	Continuous variable: Mathematical difference in age between the rater and the ratee. If the rater was older than the ratee, this number was positive. If the rater was younger than the ratee, this number was negative.

GPA. Student cumulative (overall program) grade point averages were provided by the college using a scale that ranged from 0 to 4.200 (actual student grade point averages were rounded to three decimal places in the administrative records). Grade–level categories corresponding to the GPA are not of equal size and therefore could not be treated as continuous variables until they were transformed. As Table 4 shows, a student's grade point average increases by 1.0 as the grade range increases in 10 percent increments for most of the grade ranges, but the upper and lower ends of the grade range scale do not follow this pattern. Therefore, student grade point averages were transformed into a numeric grade out of 100 by scaling the transformation separately for each grade range according to information in Table 4.

Table 4

Grade Point Average (GPA) Categories Used by the College in the Data Set

Grade category	Grade range (%)	GPA
A+	90–100	4.2
A	80–89	4.0
B+	75–79	3.5
B	70–74	3.0
C+	65–69	2.5
C	60–64	2.0
D+	55–59	1.5
D	50–54	1.0
F	0–49	0

The GPA attribute variable was analyzed as a continuous variable that could be correlated with conflict from the perspective of the rater's GPA or the ratee's GPA, as well as the

difference between the rater's and the ratee's GPA. These GPA variables are summarized in Table 5.

Table 5

Grade Point Average (GPA) Variables for Attribute Analysis

Variable Name	Description
rrgpa	Continuous variable: Rater's GPA
regpa	Continuous variable: Ratee's GPA
diffgpa	Continuous variable: Mathematical difference in GPA between the rater and the ratee. If the rater's GPA was higher than the ratee's, this number was positive. If the rater's GPA was less than the ratee's, this number was negative.

Gender. Gender attribute data for raters and ratees were coded into dichotomous variables that reflected social network analysis theories of homophily and heterophily (Borgatti et al., 2013). These data were available from college administrative records. Although it is possible that current administrative records permit more than two categories for gender, the administrative records from the years that the raw data was collected classified gender as either male or female. Gender-related variables used in the attribute analysis are summarized in Table 6.

Table 6

Gender Variables for Attribute Analysis

Variable Name	Description
rrmale-remale	Dichotomous variable: A value of 1 if the rater was male AND the person being rated was male, 0 otherwise
rrfemale-refemale	Dichotomous variable: A value of 1 if the rater was female AND the person being rated was female, 0 otherwise
rrmale-refemale	Dichotomous variable: A value of 1 if the rater was male AND the person being rated was female, 0 otherwise
rrfemale-remale	Dichotomous variable: A value of 1 if the rater was female AND the person being rated was male, 0 otherwise

Domestic Versus International Status. Like gender, domestic versus international status variables data were coded into dichotomous variables that reflected theories of homophily and heterophily. Administrative records recorded whether a student was a domestic student (who was not studying at the college on a temporary visa) or an international student (who was in possession of a student visa which allowed him or her to study in Canada). Administrative data did not indicate which countries international students hailed from. Attribute variables relating to domestic versus international status are shown in Table 7.

Table 7

Domestic Versus International Status Variables for Attribute Analysis

Variable name	Description
rrdom-redom	Dichotomous variable: A value of 1 if the rater was a domestic student AND the person being rated was a domestic student, 0 otherwise
rrint-reint	Dichotomous variable: A value of 1 if the rater was an international student AND the person being rated was an international student, 0 otherwise
rrdom-reint	Dichotomous variable: A value of 1 if the rater was a domestic student AND the person being rated was an international student, 0 otherwise
rrint-redom	Dichotomous variable: A value of 1 if the rater was an international student AND the person being rated was a domestic student, 0 otherwise

Qualitative Analysis

As mentioned earlier in this chapter, information relating to reasons for conflict and other open-ended comments was extracted and assigned thematic codes. Thematic coding categories were created so that conflict could be identified and classified into conflict types which were then used in the quantitative analysis of Hypothesis 5a and 5b. In other words, conflict type is a quantitized variable, qualitative in its original format and converted to numeric variables so that additional statistical testing could be undertaken (Vaismoradi et al., 2013). Details of the coding approach were presented earlier in this section.

It was desirable to code other comments in the reflections, such as declarations that the team member would not like to work with his or her teammates again in the future, precise details of the conflict, and so on. The content of team member reflections was valuable in the discussion of results, when triangulating text reflection themes with findings from the quantitative analysis. The three main conflict types are broad categories, thematic coding allowed the researcher to identify specific reasons for conflict that were cited most often by raters. For researchers and practitioners, it is useful to pinpoint specific reasons for conflict so that conflict can be reduced. In MTM environments, this is particularly desirable because reasons for conflict might persist across multiple project boundaries if they are not resolved effectively.

Quantitative Analysis

Much of the quantitative analysis was completed using social network analysis (SNA) techniques and software (e.g., UCINET). Each cohort of students was conceptualized and analyzed as a closed network. Students were actors (or nodes) in the network and they had relationship ties with other students in their teams.

There are various reasons why SNA is an ideal method to explore the research question (Wolfer & Hewstone, 2017). SNA permits researchers to analyze social groups at various levels of focus - individuals, dyads, subgroups, and groups. A challenge of group research is disentangling group-level processes and effects from sub-group or individual-level processes and effects (Forsyth, 2014). SNA software is able to recognize these distinctions, allowing researchers to easily specify the types of analytical procedures and level of analysis. This was important for this dissertation research, because conflict spillover patterns may occur at multiple levels within the group (Hanneman & Riddle, 2005).

A key advantage of SNA is that, "SNA can reveal aspects of a group's sociometric structure that often go unnoticed even by members of the group themselves" (Forsyth, 2014, p. 191). For example, upon examination of all conflict ratings for each student in a cohort, the researcher might find that some team members are 'toxic' and that they consistently receive negative ratings from fellow team members regardless of the team they are in. Similarly, it may be possible to identify team members who always receive positive ratings from fellow team members. These individuals may have a gift for neutralizing or dispersing conflict in whatever team they are in. Researchers have examined interpersonal conflict using a variety of social network analysis techniques (e.g., Grosser et al., 2020; Harrigan et al., 2020; Labianca & Brass, 2006; Rovira-Asenjo et al., 2013). Although no published research was identified in social network literature that specifically addresses conflict spillover among MTM teams, there is great potential to expand our understanding by adopting perspectives and analytical approaches (e.g., ego network analysis, network structure analysis) employed by those scholars.

Another important advantage of SNA is that it allows researchers to generate both descriptive and inferential statistics using data that is non-normal and highly interdependent. Conflict is a social behaviour and conflict relationships among group members are not normally distributed. Social network analysis is specifically designed to accommodate this type of data (Hanneman & Riddle, 2005; Wasserman & Faust, 1994).

In the terminology of social network analysis, dyads, relations, and directed relations each have specific meanings even though they all involve interpersonal relationships in a network. For the purpose of this dissertation, a pair of students in a project team was called a dyad. The relationship between them was called a relation. Conflict perceptions were unidirectional; one member of a dyad may have perceived conflict towards the other member of

the dyad, but the reverse might not be true. Or, one member of the dyad might have perceived high conflict intensity towards the other, but the other might only perceive low conflict in return. Or, one member of the dyad might have perceived relationship-type conflict with the other person but the other person might not perceive any conflict in return. Although the focus here was interpersonal conflict, the unit of analysis was the directed relation. If both members of a dyad perceived conflict towards each other, then this was counted as two directed relations with conflict in the data set. If one member of the dyad perceived conflict towards the other member of the dyad, then only one directed relation with conflict was counted in the data set. All of the findings in this dissertation were analyzed and summarized from the perspective of the *directed relation*. In other words, conflict perceptions are *from* the perspective of each team member and are directed *to* a fellow team member. Henceforth, the term dyad refers to a pair of students on a project team. A relation refers to the relationship between the students. A directed relation refers to the directional relationship from one team member towards one other team member.

Furthermore, a *directed MTM relation* refers to a unidirectional relationship from one team member towards another team member, where the pair of team members worked together on project teams in more than one course in the program. Non-MTM relations refers to the relationship between two students who worked together in only one course project in the program. (The term *non-MTM directed relation* was not used in this research, but if it were used, it would refer to unidirectional relationship from one student towards another student who work together in only one course project.).

Using a social network analysis approach, relationships between students were modelled using data matrices. Like the data screens in popular spreadsheet software programs such as Microsoft Excel, matrices comprise rows and columns, with data located within cells at the

intersections of rows and columns. If we visualize a long list of team members down the left side of the spreadsheet, and the same long list of team members along the top row of the spreadsheet, then we have a basic relational matrix structure (called an adjacency matrix). Figure 6 illustrates this concept.

Figure 6

Data Representation - Vector (Column) Versus Matrix Format

Vector (Columnar) Format

Rater	Ratee	Number of conflicts	Number of MTM projects	Spillover - yes / no
121	435	*1*	2	0
271	124	*2*	3	1
271	432	*1*	3	0
425	271	*2*	3	1
426	433	*1*	3	0
434	431	*1*	2	0
435	121	*2*	2	1
436	124	*2*	3	1

Matrix Format - Number Of Conflicts

	121	124	271	431	432	433	435
121							*1*
271		*2*			*1*		
425			*2*				
426						*1*	
434				*1*			
435	*2*						
436		*2*					

Note. MTM = multiple team membership.

The first table in Figure 6 displays data in vector format, in columns. Examining the first row of data, we can see that student #121 worked with student #435 and provided peer evaluations that reflected his/her perceptions and experiences while working with student #435. We can determine that student #121 collaborated on two projects with student #435. The rater (student #121) experienced conflict towards student #435 on only one of those projects, thus conflict spillover did not occur. Information for other directed relations appear in rows below the first row of data.

The second table in Figure 6 takes the information from the first three columns of the first table and organizes it into a matrix format. The row headings and column headings contain rater

and ratee ID numbers. The intersection of rows and columns contain information about the relationship ties between the rater (listed in the first column) and the ratee (listed along the top row). Thus, each pair of students in this network is a dyad. The specific type of relationship between students in a dyad that is being represented in the matrix is called a relation. In the matrix shown in Figure 6, the relation is *number of conflicts*. Student #271 perceived conflict towards student #432 on one project; this is a directed relation, the conflict is perceived by one team member towards another team member.

Referring again to Figure 6, additional matrices could be constructed for *Number of MTM Projects* and *Spillover -Yes/No*, and the matrices could be analyzed using procedures such as matrix correlations. Matrix representation of network data is useful because interrelationships are easily apparent. For example, we can see that student #271 (along the left side of the matrix) given peer evaluations to student #124 as well as student #432. We also see that student #121 has perceived conflict towards student #435 on one project, while student #435 has perceived conflict towards student #121 on two projects. If we analyzed this data using traditional statistical procedures, we may be at risk of violating assumptions regarding independence of observations. Social network analysis software allows researchers to perform statistical procedures that take these interrelationships into consideration (e.g., through permutation testing).

Description of Procedures

Multiple procedures were used in the analysis of each hypothesis. As they are applied slightly differently for each hypothesis, descriptions are provided in subsequent chapters to explain how specific results were produced. A summary of procedures is provided in Table 8.

Table 8

Summary of Analytical Procedures

Type of analysis	Purpose, hypothesis, and software
Quadratic assignment procedure (QAP) correlation	To examine depth of [concurrent spillover (H1)/ subsequent conflict spillover (H2)/ conflict spillover for directed relations with high conflict intensity (H4a)/ conflict spillover for directed relations with relationship conflict (H5a)] across projects completed by MTM team members To examine the association between the presence of specific rater and/or ratee attributes (continuous attribute variables) and [concurrent conflict spillover (H1)/ subsequent conflict spillover (H2)/relationship conflict (H5a)] Software: UCINET
Jaccard similarity	To examine breadth of [concurrent conflict spillover (H1)/ subsequent conflict spillover (H2)/ conflict spillover for directed relations with high conflict intensity (H4a)/ conflict spillover for directed relations with relationship conflict (H5a)] across teams in each cohort To examine the association between the presence of specific rater and/or ratee attributes (binary attribute variables) and [concurrent conflict spillover (H1)/ subsequent conflict spillover (H2)/ relationship conflict (H5a)] Software: UCINET
Heat map	To enable a visual examination of depth of concurrent conflict spillover (H1) and subsequent conflict spillover (H2), by number of MTM projects that each dyad completed Software: Microsoft Excel
Conditional probability and binomial test	To examine rater and/or ratee attributes and assess whether possessing an attribute is associated with a significantly higher probability of [concurrent conflict spillover (H1)/ subsequent conflict spillover (H2)/ high conflict intensity (H4a)/ relationship conflict (H5a)], compared to the overall probability observed in each cohort Software: UCINET and R
Relative risk ratio	To determine the comparative risk of decreased project performance for directed relations with [conflict spillover (H3)/ high conflict intensity (H4b)/ relationship conflict (H5b)], relative to directed relations with [no conflict spillover (H3)/ lower conflict intensity (H4b)/ non-relationship conflict (H5b)] to determine the comparative risk of conflict spillover for directed relations with [high intensity conflict (H4a)/ relationship conflict (H5a)], relative to directed relations with [lower intensity conflict (H4a)/ non-relationship conflict (H5a)] Software: MedCalc

Note. H = hypothesis.

Disaggregation of Research Findings

The results of the quantitative analysis were disaggregated across forms of multiple team membership (e.g., concurrent Term 1 MTM directed relations) and across cohorts (e.g., Cohort A). The decision to present disaggregated results arose because preliminary aggregated results failed to reveal unique significant results that occurred within specific forms of multiple team membership and within specific cohorts. For example, significant findings in Cohort A (the online cohort) were neutralized or washed out when the full data set was aggregated. Similarly, significant findings for concurrent Term 1 directed relations disappeared when the full data set was analyzed.

In summary, disaggregation of results for MTM team members occurred across two dimensions: form of multiple team membership (i.e., concurrent Term 1 directed MTM relations, concurrent Term 2 directed MTM relations, and Term 1–Term 2 sequential directed MTM realtions) and cohort (i.e., Cohort A, Cohort B, and Cohort C). There were fundamental differences between each of these groupings, based on characteristics such as program delivery format (e.g., online versus colocated), whether team members were entirely new to each other, whether team members had worked together in the past semester, and so on. As the results of the quantitative analysis will demonstrate, it was wise to present disaggregated results because findings of each analysis were sometimes significant for some groupings but not significant for others.

Triangulating Results

There are different ways to describe triangulation, including data triangulation (where data from different sources are integrated or compared), researcher triangulation (where results are improved when multiple researchers produce consistent findings during a research study),

theoretical triangulation (where different theoretical frameworks are used to interpret a data set), and methodological triangulation (where multiple techniques are used to investigate a particular phenomenon; Denzin, 1978). For the present research, the fourth type of triangulation - methodological triangulation - was employed to integrate findings, with a view to reconciling competing interpretations from the qualitative and quantitative analysis. Methodological triangulation, conducted effectively, can improve the rigour and authenticity of the results (Konecki, 2008).

In a different sense, data triangulation was also employed. The data set contained ratings and reflections from each member of the project teams. Although conflict may be asymmetrical (i.e., parties to a conflict may have different perceptions of the conflict), it was possible to compare the reflections of each member of a conflicting team, to construct a more nuanced understanding of group conflict dynamics (Konecki, 2008).

Ethics Considerations

Although the research utilized secondary historical data, potential ethical issues concerning confidentiality, informed consent, and researcher bias existed. These will be discussed in turn.

Borgatti et al. (2013) observed that "the design of a network study generally requires more attention to ethical issues than other studies" (p. 42). A key reason for this is that social network analysis often involves data visualization of relationships among specific individuals; accordingly, the identities of these individuals may be deduced by members of the social network (Borgatti et al., 2013). Anonymizing respondent identities ameliorated this risk and care was also taken to ensure that audiences were unable to deduce the identities of individuals by

scrutinizing the overall network structure, attributes of network members, and/or the characteristics of relationship ties within the network.

Informed consent is an important issue when conducting research involving human subjects and Institutional/Ethical Review Boards often require researchers to clearly identify protocols for securing permission of human research subjects (Borgatti & Molina, 2005). When researchers study social networks whose members have possibly unflattering perceptions of each other, the potential for non-participation increases. In social network analysis, non-response by a member of a network may distort the analysis and lead to unusable results. This creates pressure for the researcher to encourage full participation at all costs, potentially abrogating the rights of the research subjects (Borgatti et al., 2013). It is not helpful that non-respondents may be indirectly included in data sets despite their objections, when other members of the social network report on the nature of their relationships with the non-respondent. Borgatti et al. (2013) observed that "[a]s a matter of general principle, this does not seem unethical as the respondent owns his or her own perceptions" (p. 40). On the other hand, "neither person owns the relationship exclusively; it is a joint creation, and so it is at least plausible to argue that neither party can ethically report on it without the consent of the other" (p. 40). Thus, the issue of informed consent can become complex in social network analysis, as the interests of the researcher and each member of the network potentially clash.

The data set contains historical data that was not originally created for research purposes. It is a compilation of student reflections that were submitted as part of the normal course work as well as administrative records containing student attribute data (such as student gender) and team project outcomes. The students in the data set have since graduated and are now out of contact with the post-secondary institution, making it impossible to obtain informed consent. However,

inability to obtain informed consent does not eliminate the responsibility of the researcher to ensure the privacy of the individuals in the data set. Accordingly, an application to the college's Research Ethics Board to conduct the research using archival data was prepared. A Notification of Approval was obtained, with a provision that protocols around de-identification of data were strictly followed.

To preserve confidentiality of the individuals in the archival data set, various measures were taken to anonymize the data. Prior to analysis, each individual named in the data set was assigned a randomly generated numeric identifier and all names were removed from the data set (including references to specific team members by their names in open-ended reflection comments) once the relationship ties were identified and coded. Furthermore, the names of the post-secondary institution and the post-secondary program were suppressed, and multiple cohorts of students were studied.

A further ethical consideration is the relationship between the researcher and some of the subjects in the data set. The researcher is a faculty member who taught many of the students in the sample. The post-secondary institution's Research Ethics Board was informed that the proposed research was conceived after the students had graduated from the program and that current students would not be included in the sample. The Research Ethics Board request and Notification of Approval can be provided upon request (but are not included in this report for confidentiality reasons).

Methodological Limitations

Actual and potential methodological limitations from the use of this secondary data set were identified and are discussed here. An important potential limitation is the use of student samples. The data set comprised multiple courses and even though all incorporated peer/self-

ratings, actual rating scales were different from course to course. Some evaluation and reflection forms were not fully completed by every student (there were 261 non-responses, representing a 9.0% non-response rate). Furthermore, because they were used exclusively for student self-reflection rather than research purposes, rating scales were not tested for validity or reliability.

Use of Student Samples

The sample comprised graduate-level post-secondary students. The use of students as research subjects in organizational research is a contentious issue, even though it has been common practice for decades. Wintre et al.(2001) reviewed published articles from prestigious psychological journals in 1975, 1985, and 1995. They found that between 65 and 70% of published articles used undergraduate research participants and this proportion had not significantly decreased over time. The authors found that convenience sampling is the most common form of non-probabilistic sampling, and that students enrolled in introductory psychology courses were favoured subjects for many researchers who published in psychology journals. Nevertheless, the use of student samples continues to be debated in the research community and, to some researchers, it might represent a critical methodological limitation for the present research. In this section, arguments in support of, and against, the use of student samples will be discussed at length.

According to critics such as Sears (1986), students may not be ideal research subjects because they typically have a stronger need for peer approval and a weaker sense of self (compared to non-student research samples). Students have relatively higher cognitive skills and are more likely to be compliant to authority, so they will be more likely to 'give the researcher what he/she wants' rather than providing unbiased responses. Basil (1996) rebutted each of Sears's assertions. Basil suggested that the researcher could compare findings from student-

based research with literature using other types of subjects and compare results to determine whether significant differences existed. Basil argued that students' higher cognitive skills would be beneficial for researchers, because students are more likely to complete questionnaires and report mental activity more accurately. If students are more likely to comply with authority, again, this could be beneficial because students would comply with study requirements. Students might be more predisposed to give the researchers the answers that the researchers wanted, but this risk could be minimized if the researcher hid the hypotheses from the student subjects, and if the researcher used objective measures to help reduce the possibility that students could guess the researchers' hypotheses.

Sears (1986) also speculated about the maturity and emotional stability of adolescent research subjects. He suggested that adolescent undergraduates might have more unstable peer group relationships. Wintre et al. (2001) concurred, arguing that adolescent undergraduates are more egocentric and their interpersonal relationships are different from adults. Because they are isolated in an academic environment, students do not have the same kinds of adult experiences that shape their reasoning skills. Wintre et al. (2001) recommended that researchers fully describe the samples, including age of the subjects, the incentives or rewards provided to students, and statements related to (limited) generalizability. Reporting of demographic and socio-economic variables are useful in allowing the audience to evaluate generalizability of research findings.

Bello et al. (2009) commented on the editorial policy of the *Journal of International Business Studies*, which indicates that the use of student samples is usually discouraged. The authors provided clarification to the editorial policy: If the research question implies that students have real-world knowledge of business practices, then a student sample consisting of

Executive MBA students would be appropriate but an undergraduate sample would not be useful. However, if the research question focused on more fundamental human behaviours (such as those found in the field of neuroeconomics), then undergraduate samples might be considered as the results might be generalizable and achieve external validity (although the authors recommended that studies using adult samples also be used to corroborate these results). The authors suggested that studies using well-defined theories with specific predictions were more likely to be generalizable. Internal validity represented a threat for student samples, because "students may not possess the requisite knowledge to respond adequately to the experimental treatments or survey questions," and thus the onus should be on the researcher to demonstrate validity and generalizability (Bello et al., 2009, p. 363). These recommendations are consistent with those presented by Stevens (2011), who argued that student samples could be used for universalistic research topics (versus particularistic topics), and for research that focused on internal versus external validity.

Peterson and Merunka (2014) conducted a study of business ethics using multiple undergraduate convenience samples of business students, and found that there were significant differences in results across the samples. In other words, findings from undergraduate samples were not generalizable even to business students. The authors recommended that researchers using student samples include statements theoretically justifying the use of students. They added that this should be included in the Methodology section of the document, rather than the Limitations section.

Belot et al. (2015) completed a comparative study of student and non-student samples in a series of experimental games. The authors found differences between student and non-student samples in the areas of social preferences and strategic reasoning. The authors found that

students tended to act more selfishly and be less kind and less trusting than non-students. They also acknowledged that there are large sub-group differences relative to the entire population when it came to experimental games involving other-regarding preferences, and that socio-demographic differences (such as IQ, cognitive ability, and age) drove these differences.

Hooghe et al. (2010) believed that student samples could be useful starting points for further research, but "student samples can tell us only part of the story" (p. 94). Students have different socio-economic characteristics, they may have higher levels of knowledge, and "being used to getting clues from textbooks and lectures, students might utilize more cognitive effort to get the "right answer" and thus respond to stimuli and related survey questions very differently than other young people would" (p. 88).

Peterson (2001) conducted a second-order meta-analysis that incorporated four meta-analyses of college student response homogeneity and 30 meta-analyses of effect sizes for 65 behavioural/psychological relationships (e.g., relationship between gender and risk-taking behaviour). He found that responses of college students tended to be more homogenous than responses of non-college students (i.e., that there is less "noise" when using student samples). He also found that effect sizes and direction of effects tended to differ for student versus non-student samples. The author detected no pattern to these results, however, and suggested that non-student samples could be used in conjunction with non-student samples, and that non-student samples be used to replicate research that used student samples. As with many of the other authors cited here, it is critical for researchers to fully describe their samples and control for socio-economic factors where possible.

Basil (1996) believed that researchers should explain how the sample is appropriate in the context of the research question. Samples can be non-representative even when drawn from the

overall population, because of choices relating to how the sample was drawn and recruited, and because of sampling attrition. Sampling may also be non-representative based on age, gender, ethnicity, culture, and mental/physical ability – even if the sample was drawn from the population. In other words, it is unlikely that any sample drawn from the population will truly be generalizable to the entire population. Non-representative/non-probabilistic samples are used in all sciences; it is accepted practice. Researchers should explain why a student sample would differ from a sample drawn from the population. Research would not get done if student samples weren't permitted; if student-based samples are used and published, then other researchers can challenge or attempt to replicate the findings – which advances theory. A well-designed study using student subjects is better than a weakly designed study using representative samples.

James and Sonner (2001) conducted an advertising study using traditional undergraduate college students (all under 35 years of age), adults (35% under 35 years old, 53% were 35-49 years old, and 12% were 50 years of age or older), and adult undergraduates (67% were under 35 years of age, 29% were 35-49 years of age, and 4% were older than 50 years of age). Their findings suggest that traditional undergraduate college students differ from random adult samples, but that mature undergraduate samples are similar to random adult samples. According to the authors, "It should be obvious from these results, however, that to universally condemn the use of "college students" is wrong" (Wintre et al., 2001, p. 69). In other words, disadvantages of using younger undergraduate samples are offset when the students are older.

Leentjens and Levenson (2013) recommended that students should not be required to participate in research studies (even for compensation such as credit), unless there was an educational benefit. The authors contended that requiring students to participate denied students the right of self-determination. Student privacy should be protected and course credit should not

be offered as a reward because it could be perceived by some students to be coercive. The authors added that faculty should not recruit their own students, for ethical reasons. However, the authors cited research showing that the majority of students do not feel as if they are being coerced when their professor asks them to voluntarily participate in research studies.

In summary, it appears that the debate surrounding the use of student samples has yet to be decisively resolved. A summary of arguments in favour of and against the use of student samples from the preceding discussion is provided in Table 9.

Table 9

Summary of Arguments in Favour and Against the Use of Student Research Samples

Arguments in favour of student samples	Arguments against student samples
Researcher can compare findings from student-based research to findings from similar studies and can discuss differences (Basil, 1996)	Students seek peer approval and have a weaker sense of self, thus they are more likely to provide responses that they think are acceptable or desired by the researcher (Sears, 1986)
Students have high cognitive skills, so they will complete research instruments accurately (Basil, 1996)	Students tend to be immature and lack life or business experiences; they lack the knowledge to answer effectively to survey questions (Bello et al., 2009; Sears, 1986, Wintre et al., 2001)
Students will comply with instructions because they are likely to be more compliant towards authority (the researcher; Basil, 1996)	Student groups tend to be unstable or volatile (Sears, 1986)
Maturity or business experience may not be required to study universal constructs (Bello et al., 2009; Stevens, 2011)	Students are ego-centric and their responses will be biased towards selfishness (Belot et al., 2015; Wintre et al., 2001)
Often, adult samples are non-generalizable or non-representative (non-probabilistic sampling is used in all sciences; Basil, 1996)	Students may feel compelled to participate, even though they might not want to (Leentjens & Levenson, 2013)
Little research would get done if student sampling were restricted (Basil, 1996)	

Arguments in favour of student samples	Arguments against student samples
Replicating student-based sampling in other research studies can advance theory (Basil, 1996; Hooghe et al., 2010)	
A good research design using student samples can be superior to a weak research design using adult samples (Basil, 1996)	
Student samples may be more homogenous than adult samples, so there is less "noise" in the results (Belot et al., 2015; Peterson, 2001)	
Sampling older (post-adolescent) students can offset the disadvantages of sampling younger students (James & Sonner, 2001)	

For this dissertation, efforts were made to address the concerns described by opponents of student research subjects. The sample consisted entirely of mature students who had previously earned a post-secondary diploma or degree. Many had families and careers, and all had been members of student and/or workplace teams in the past. There were no adolescents in the sample. The data set included variables such as age, gender, domestic vs. international status, and GPA because research suggests that conflict behaviour is influenced by socio-demographic factors. Also, care was taken to thoroughly describe the sample characteristics and generalizability concerns of the findings, as recommended by both critics and advocates of student-based research (Basil, 1996; Belot et al., 2015; Peterson, 2001; Wintre et al., 2001).

The propensity of research subjects to 'tell the researcher what he/she wants to hear' is a form of response bias. It is a common limitation in research involving self-reporting by participants as it may impact the validity of research findings (Furnham, 1986). This dissertation minimized response bias because the analysis used secondary data (Bowen, 2009). Student peer/self-ratings and reflections were collected from previously completed courses and were part of normal course work. By using historical data for this research, the integrity of the student-

teacher relationship was not compromised because the students already received their course grades prior to the data collection for the research. Students were not compelled or pressured to complete the rating/reflection assignment for research purposes (or to please their Professor). They completed the assignment for self-benefit - to increase their course grade, to gain experience completing performance assessments (useful in their chosen profession), and to hopefully influence their behaviours and expectations about future group work by reflecting on their team experiences during their courses.

Loss of Data Granularity

Some social network analysis techniques require binary data and conflict ratings were represented on a continuous scale. Therefore, ratings were recoded into binary dichotomous format for some procedures. This is less desirable because nuances were lost in the process. A rating of 9.9 was coded as having conflict. A rating of 7.2 was also coded as having conflict. They were both treated equally for the analysis even though it is likely that the level of conflict was minimal in the first instance and much more pronounced in the second instance. Loss of granularity in analysis is a possibility for some social network analysis procedures (Hanneman & Riddle, 2005) so conducting additional or separate qualitative research is important.

Inconsistent Peer Evaluation Formats

Another methodological limitation was inconsistent peer rating formats, an unavoidable problem that stemmed from working with secondary data. Some peer evaluation questionnaires comprised several items, while others contained a single global-rating question. Some peer evaluation forms did not have space for students to enter open-ended comments, instead using a variety of questions to assess various reasons for the rating. With more items, raters were compelled to reflect on specific reasons or criteria underlying their evaluations. Rating scales

were normalized, even though the use of consistent rating instruments is preferable when doing comparative analysis.

Incomplete Contextual Information

Although the data source contained abundant data, some contextual information was absent and this may have influenced the interpersonal dynamics of team members. For example, some rater comments referred to team members taking leadership roles but it is unclear whether team leaders emerged organically, if some teams were entirely self-managed without a team member taking a leadership role, if the teams were formally instructed to appoint a leader, or if the leadership role (where it existed) was shared or rotated among team members. If teams had recognized leaders, then leaders may have played a role in establishing conflict management procedures or mediating conflict among team members.

Similarly, it was not clear whether teams were self-selected or assigned by the Professor. If team members were able to self-select their teammates, then it is reasonable to assume that conflict spillover might be lower. A possible reason for this is that students might opt not to work with incompatible students or students with whom they had previous conflict.

The role of the Professor was unknown. For example, it was not always clear if the Professor assigned students to groups, let students self-select their team members, or used a combination of both methods. A project grade might have be unusually low due to grading preferences of the Professor or the objective quality of the deliverable. Some Professors may have provided good clarity around project task requirements, while others may have deliberately created a more challenging project assignment. It was also unknown whether students received their project grade before or after submitting their peer evaluations; if students received a high grade on the project, they might have been more gracious in evaluating the performance of their

teammates. In other words, there was considerable variability regarding the role and activities of the Professor; his or her decisions and behaviours may have had an indirect influence on team member conflict. All of these contextual factors may have influenced the students' experiences with their team members and, in turn, affected the evaluating ratings that students provided towards their peers.

Rater Bias

The construct under examination was conflict and data was in the form of peer evaluations. Peer evaluation data might have been deliberately or subconsciously biased (rating bias). Some students might have been generally more generous when it comes to evaluating peers, while others might have been generally more negative. Some students dislike working in groups under any circumstances, and this might also have influenced their peer ratings. Although it is beyond the scope of this present research, it might be possible to use social network analysis in conjunction with qualitative analysis of rater comments to discern this type of rater bias in future research.

Chapter 4. Description of Data Set

A starting point for understanding conflict spillover in MTM environments is to examine general characteristics of the data set. The following descriptive analysis of the data set highlights key methodological decisions that were made, most notably the decision to conduct the analysis by cohort. This descriptive overview also provides signposts to the deeper analysis provided for each hypothesis in future chapters.

Cohort Characteristics

The overall data set consisted of three separate student cohorts who completed the two-semester graduate program. Cohort A comprised 44 online students who had no face-to-face interaction during the program. Cohort B included 35 students who were collocated while receiving instruction and interacting with each other in their classrooms. These students had many opportunities to conduct group meetings on campus before, after, and in between classes. Cohort C was a double-sized cohort of 83 students split into two sections of students. Students were randomly allocated into either of the two sections by administrative personnel at the start of the program. Halfway through the program (between Term 1 and Term 2), roughly half of the students were randomly switched into the opposite section. Program delivery was on-campus and in-person like Cohort B, but the introduction of new classmates and loss of other classmates in Cohort C at the mid point made this cohort different from either Cohort A or Cohort B. These fundamental differences between the cohorts warranted disaggregating the results by cohort.

Student Attributes by Cohort

Similarities or differences in attributes of raters and ratees may influence their interpersonal relationships. Consistent with the concept of homophily in social network analysis (Borgatti et al., 2013), students may have more positive feelings towards team members who

have characteristics similar to themselves. Data from college administrative records were made available and are summarized by cohort in Table 10.

Table 10

Comparison of Attribute Characteristics by Cohort

Attribute	Cohort A (n = 44 students)		Cohort B (n = 35 students)		Cohort C (n = 83 students)	
Gender	Male	Female	Male	Female	Male	Female
	8	36	9	26	26	57
	(18.2%)	(81.8%)	(25.7%)	(74.3%)	(31.3%)	(68.7%)
Domestic/	Domestic	Int'l	Domestic	Int'l	Domestic	Int'l
international	44	0	23	12	68	15
(int'l) status	(100.0%)	(0.0%)	(65.7%)	(34.3%)	(81.9%)	(18.1%)
Age	Min	21.0	Min	19.3	Min	19.3
	Max	53.3	Max	42.3	Max	56.5
	Median	26.7	Median	25.6	Median	24.8
	Average	29.1	Average	27.4	Average	26.7
Grade point	Min	51.0	Min	50.0	Min	50.0
average	Max	90.0	Max	85.0	Max	90.0
(GPA)	Median	76.0	Median	74.0	Median	76.0
	Average	74.2	Average	71.9	Average	74.9

Note. Min = minimum; Max = maximum.

The gender breakdown for students in this particular college program skewed heavily female and heavily towards domestic students (who were living in Canada prior to starting the program, as opposed to international students who were studying at the college under international student visas). Cohort A contained no international students, due to federal government visa requirements that international students register for on-campus programs only. The median and average age of students was mid to late 20s (with slightly older students in Cohort A), where student age was determined as the difference between their date of birth and the mid-point of the two semester program. The oldest students were in their 40s and 50s. The

range of student ages within each cohort was between 23 years (Cohort B) and 37 years (Cohort C). Aside from demographic attributes, each student's grade point average (GPA) upon graduation was also available from administrative records. The profile of grade point averages was similar across cohorts, with Cohort B students having slightly lower average and median grade point averages than their counterparts in Cohort A and Cohort C.

Distribution of MTM Collaborations by Cohort

Seven courses that included major group projects were offered in the two-semester program. Thus, the upper limit on the number of possible MTM collaborations was seven. By definition, the lower threshold of possible MTM collaborations was two projects (if students worked together on only one project, it would not meet the definition of multiple team membership). Table 11 presents a distribution of MTM projects in which student dyads participated. The labels along the left side of the table represent the number of MTM projects, ranging from two to seven collaborations during the two-semester program. The bottom row indicates the average number of projects per MTM dyad in each cohort.

Table 11

Distribution of Multiple Team Membership (MTM) Collaborations by Cohort

Number of MTM projects	Number (and percentage) of MTM dyads		
	Cohort A	Cohort B	Cohort C
2	23 (63.9%)	23 (38.3%)	98 (55.1%)
3	10 (27.8%)	16 (26.7%)	41 (23.0%)
4	0 (0.0%)	7 (11.7%)	17 (9.6%)
5	2 (5.5%)	4 (6.7%)	12 (6.7%)
6	1 (2.8%)	8 (13.3%)	9 (5.0%)
7	0 (0.0%)	2 (3.3%)	1 (0.6%)
Total	36 (100.0%)	60 (100.0%)	178 (100.0%)
Average number of projects per MTM dyad	2.6	3.4	2.9

Each cohort had a unique distribution of MTM collaborations. Nearly 92% of MTM dyads in Cohort A worked together on two or three projects. Only three dyads (8.3%) in this cohort worked together more than three times. Conversely, 65% of MTM dyads in Cohort B worked together on two or three projects and 35% of MTM dyads worked together on more than three projects. Cohort A was somewhat larger than Cohort B (44 students and 35 students, respectively), so there was a relatively bigger pool of potential team members in Cohort A. This may explain the lower number of MTM projects per dyad in Cohort A.

Another reason for the lower number of MTM projects per dyad is that Cohort A was an online cohort with no opportunity to interact regularly in person which may indicate there was less cohesion among team members and relationship bonds were weaker. Cohort B was an in-class cohort of students who interacted frequently and consistently throughout the program. Perhaps this colocated environment created stronger relationship bonds among Cohort B students, resulting in a greater willingness to work together on multiple course projects.

It is also possible that students in Cohort A were less likely to self-select their team members (and allow the professor to place students into random groups) and students in the colocated Cohort B were more likely to identify specific team members to work with. Due to the size and section switching evident in Cohort C during the second half of the program, roughly half of the students no longer had an opportunity to work with peers whom they worked with during the first half of the program.

During the second semester, both sections consisted of a mixture of new faces and familiar faces, which could explain why the average number of MTM projects (2.9 projects per MTM dyad) was lower than the average number of MTM projects in the other colocated cohort (Cohort B, with 3.4 projects per MTM dyad). Specific reasons for these differences cannot be

determined from an examination of this archival data set but this topic is worth investigating in future research on multiple team membership.

Peer Evaluation Rating Characteristics by Cohort

For each course, each student worked in teams to complete assignments. At the end of each course, each team member evaluated every other member of his or her team. Table 12 summarizes the distribution of ratings, response rate, average rating, and median peer evaluation rating by cohort.

Table 12

Comparison of Ratings for Multiple Team Membership (MTM) and Non-MTM Students, by Cohort

Variable	Cohort A (n = 44 students)		Cohort B (n = 35 students)		Cohort C (n = 83 students)	
	MTM relations	Non-MTM relations	MTM relations	Non-MTM relations	MTM relations	Non-MTM relations
Distribution of ratings						
No conflict (rating = 10.0)	84	74	244	92	486	201
Low/moderate conflict (rating = 7.0–9.9)	106	153	134	52	480	346
High conflict (rating ≤ 6.9)	8	45	18	23	47	54
Nonresponse	24	42	14	13	49	119
Response rate	89.19%	86.60%	96.60%	92.80%	95.40%	83.50%
Average rating	9.2	8.6	9.4	8.9	9.3	8.9
Median rating	9.6	9.6	10.0	10.0	9.8	9.8

If a rater and ratee worked together on projects in more than one course, those ratings were assigned to the 'MTM' category. If a rater and ratee worked together in only one course, that rating was assigned to the 'non-MTM' category. For example, a four-person team contributed 12 ratings to the data set. Two members of a team who worked together in three different courses contributed six ratings to the data set. Thus, a rating was a numeric evaluation

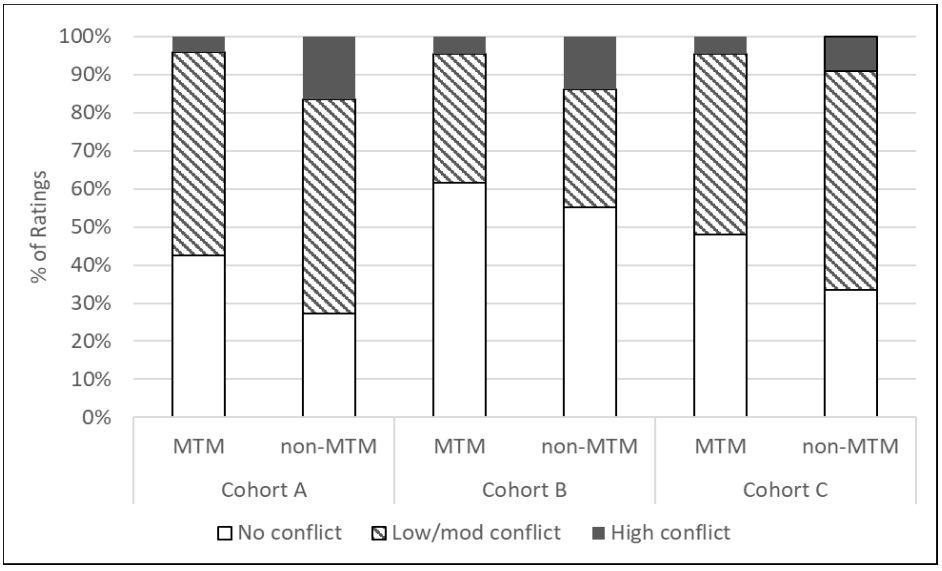
(normalized on a scale from 0 to 10) by a rater towards a ratee. A team member evaluated all teammates (whether or not they worked together on multiple projects), thus contributing ratings to *both* MTM and non-MTM categories.

Distribution of Ratings

Ratings were grouped into four categories (no conflict, low/moderate conflict, high conflict, and no response). If a rater gave a peer review rating of 10 to his or her team member, this rating was included in the 'no conflict' category. If a rater gave a rating between 7.0 and 9.9 to his or her team member, this rating was included in the 'low/moderate conflict' category. If a rater gave a team member a rating below 7.0, this rating was included in the 'high conflict' category. Separate distributions were prepared for MTM and non-MTM ratings in each cohort. Figure 7 presents the rating distribution data from Table 12 as a stacked bar chart enabling a visual comparison of the relative proportions of rating types.

Figure 7

Distribution of Conflict Ratings by Cohort and MTM/Non-MTM Category



Note. MTM = multiple team membership; mod = moderate.

We can see that the proportion of 'no conflict' ratings was higher for MTM relations in each cohort compared to non-MTM relations in the cohort. This is consistent with the higher average and median ratings for MTM relations that was observed in Table 12. There are also relatively low proportions of high conflict ratings for MTM relations compared to non-MTM relations. A comparison of MTM to non-MTM relations is not the focus of the present research. However, scholars who study group research might be encouraged to explore multiple team membership as an independent variable influencing team processes and outcomes.

Focusing on MTM students in each cohort (see the first, third, and fifth columns of Figure 7), it appears that MTM raters in Cohort A (the online cohort) experienced a relatively higher proportion of low/moderate conflict and a relatively lower proportion of no conflict. This supports research that online teams experience higher levels of conflict compared to colocated teams (e.g., Ayoko et al., 2012; Gilson et al., 2015; Martinez-Moreno et al., 2012). The low proportion of high conflict perceived by MTM raters, regardless of the cohort, is an interesting finding, complementing the previous observation that overall conflict is more common in virtual teams; this suggests the possibility that being a MTM team member (and having worked on multiple projects together) reduces incidences of high conflict in virtual teams.

The distribution of ratings in Table 12 (and Figure 7) were compared to determine if the proportions were significantly different between cohorts, and between MTM and non-MTM relations. A chi-square analysis confirmed that the ratings distribution of MTM team members differed from the distribution of the non-MTM team members for all three cohorts, suggesting that it is worthwhile to investigate MTM conflict in this data set on a cohort-by-cohort basis. Specifically, the distribution of ratings was significantly different for MTM team members in Cohort A and Cohort B (chi-square statistic = 21.557, $p < .001$), and between Cohort B and

Cohort C (chi-square statistic of 22.247, $p < .001$). However, a chi-square analysis showed no statistical difference in the distribution of ratings of MTM students in Cohort A versus Cohort C (chi-square statistic = 2.511, $p = .285$). It is possible that teams in Cohort A (whose students were in virtual teams) and Cohort C (whose students were shuffled in and out of the section mid-way through the program) were less cohesive than teams in Cohort B (where students were colocated and class enrollment was stable for the duration of the program).

Response Rate. The response rate was calculated by dividing the number of non-responses by the total number of potential ratings. The response rate was between 83.5% and 96.6% for each cohort and MTM/non-MTM category. Non-response can be a concern for social network researchers because each person potentially contributes multiple data points to the data set. Non-responses may produce measurement errors when analyzing networks, including networks that are constructed with survey response data or networks that describe affective relations (Borgatti et al., 2013; Huisman, 2009; Kossinets, 2006; Smith & Moody, 2013). Analysis of the hypotheses in this dissertation used data points from MTM students only (with response rates of 89.2% for MTM students in Cohort A, 96.6% for Cohort B, and 95.4% for Cohort C), so the response rates here were not expected to produce biased results due to missing data (Alhajj & Rockne, 2014; Sparrowe et al., 2001).

Average and Median Peer Evaluation Rankings. The third and fourth types of information in Table 12 are the average and median ratings for each cohort and MTM/non-MTM category. The average and median ratings were high for each cohort and category, suggesting that raters were, on the whole, quite satisfied with their partners regardless of cohort and MTM/non-MTM category. It is worth noting that the median and average ratings were equal to or higher for MTM students compared to non-MTM students. While it is outside the scope of

this research to compare MTM and non-MTM team peer evaluations (the focus here is on MTM conflict only), it is an intriguing topic for future research nevertheless.

Project Performance Among Students in the Data Set

In Hypothesis 3, Hypothesis 4b and Hypothesis 5b, performance outcomes for MTM students were explored. In Table 13, a summary of project performance outcomes is presented by cohort and MTM/non-MTM category. The top half of the table contains the average project grade of raters, by conflict level. The bottom half of the table contains the average project grade of ratees, by conflict level.

Table 13

Project Grades by Level of Conflict for Multiple Team Membership (MTM) and Non-MTM Relations, by Cohort

Conflict level	Cohort A (n = 44 students)		Cohort B (n = 35 students)		Cohort C (n = 83 students)	
	MTM relations	Non-MTM relations	MTM relations	Non-MTM relations	MTM relations	Non-MTM relations
Average project grade of raters, by conflict level						
No conflict	88.3	83.2	84.6	80.9	85.1	80.2
Low/moderate conflict	87.8	82.8	82.8	82.7	82.3	78.5
High conflict	82.6	82.1	83.6	78.7	82.8	77.5
Average project grade of ratees, by conflict level						
No conflict	88.4	81.8	84.5	83.7	84.6	81.3
Low/moderate conflict	85.9	82.0	82.4	78.5	82.5	78.6
High conflict	69.8	62.1	80.9	66.9	78.1	78.8

Recall that a peer evaluation is a directed assessment *from* one team member *to* a fellow team member, it is a directed relation. The rater possesses specific attributes and feelings about the relationship. The ratee (the person being rated) also has specific characteristics and perceptions towards the rater about the same relationship, which influence his or her evaluation of the rater. Conflict may be perceived by the rater towards the ratee but the rater may not have

perceived any conflict at all. For this reason, it is useful to examine conflict from the perspective of the rater and also the perspective of the person being rated.

An examination of Table 13 shows why this approach was helpful. At all levels of conflict (or lack of conflict), MTM relations performed better (on average) than non-MTM relations in the same cohort. As will be discussed later, it seems that MTM students recognized and appreciated synergies related to trust, cohesion, and efficient team processes. Looking at MTM relations only, the average project grade was highest for MTM raters who perceived no conflict with the MTM team member being evaluated. In directed relations where the rater gave a peer rating below 7.0 (indicating high conflict), the average project grade of the rater was lower than for no conflict or low/moderate conflict ratings.

For MTM raters in Cohort B and Cohort C (both colocated cohorts), a decrease in average project grade for low/moderate versus high conflict was not observed. Average rater project grades were within one percentage point for low/moderate versus high conflict among MTM raters in Cohort B and Cohort C. Again, reasons for conflict will be explored for each Cohort in the Discussion chapter and this may yield further insight to this observation.

A third observation is that project grades were higher for Cohort A (virtual) team members compared to Cohort B and Cohort C team members. This is a curious finding, because Figure 7 shows that a higher proportion of students in Cohort A perceived conflict towards their team members than Cohort B or Cohort C. Perhaps virtual teams have more productive conflict, or they have to work harder to plan and execute projects due to technological/communication barriers, or there is something unique about the characteristics of Cohort A students. An exploration of reasons for conflict (in the Discussion chapter) may be insightful here.

The second part of Table 13 contains the average project grade for the ratees. For example, considering the MTM raters in Cohort A who gave a 'perfect' peer evaluation rating of 10.0 to a MTM ratee (indicating no conflict), the average project grade for the raters was 88.3 (normalized to a score out of 100). The average project grade for all ratees who received a perfect peer evaluation was similar at 88.4. The average project grades of ratees (who received ratings of 10 for no conflict, 7.0-9.9 for low/moderate conflict, or 0-6.9 for high conflict) declined in a stepwise fashion as the evaluation score decreased. For MTM team members who received low peer evaluation ratings (indicating high conflict) from MTM raters, the average project grade for the ratees in each cohort was substantially lower. Why the large decrease in average project grades for students who received low peer evaluation ratings? One answer may be that course Professors adjusted project grades downwards and applied a performance penalty for team members who received low peer evaluation scores. Another possibility is that some team members may have started a project but withdrew from the team and received a grade of zero on the project.

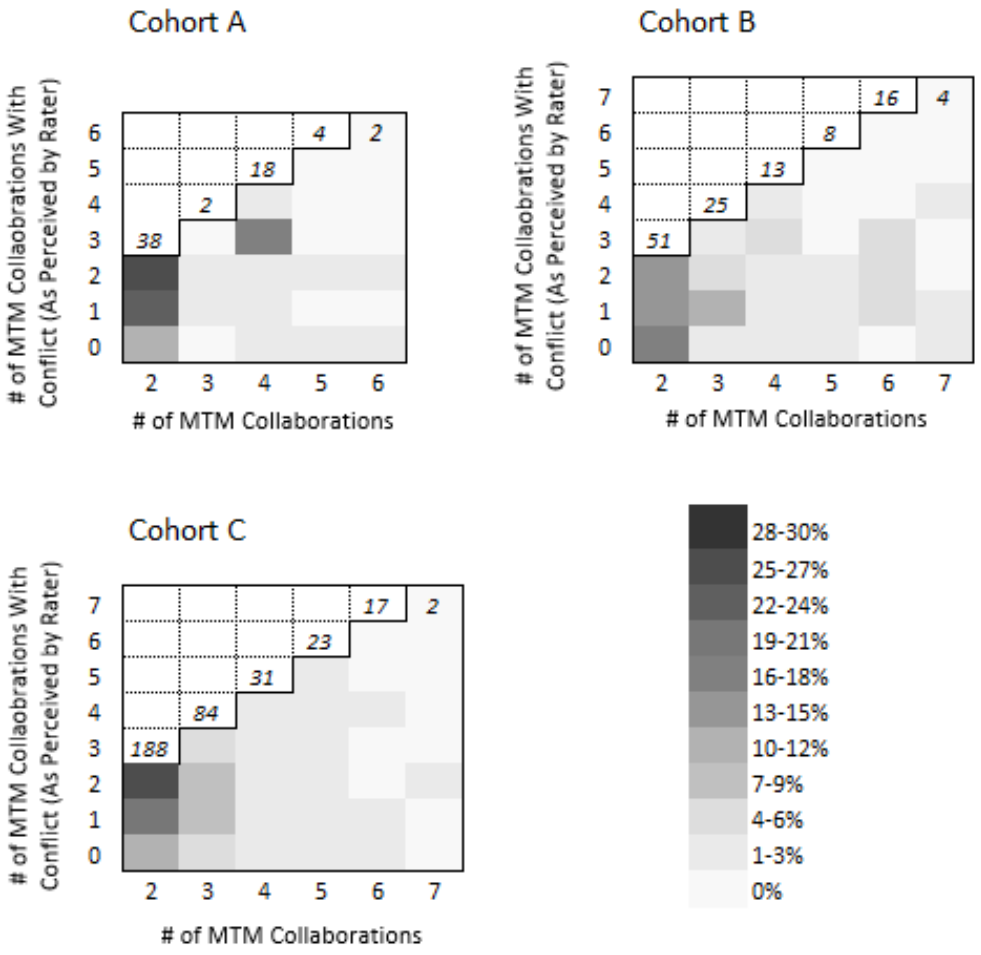
Dyad Conflict Profile by Number of MTM Collaborations

Figure 8 is a heat map visualization of the distribution of conflict across MTM projects (as reported by a MTM rater towards a MTM ratee), by cohort. The horizontal axis of each heat map divides each cohort according to the number of ratings that each MTM respondent contributed to the data set. For example, if we examine the right side of the heat map for Cohort A, we can see that there were two MTM raters in Cohort A (i.e., the number at the top of the furthest right column), each of whom contributed six ratings to the data set regarding a specific MTM ratee. An examination of the data set shows that those two MTM raters were student #161 and student #409, and each of these students provided a peer evaluation of the other person for

each of the six projects (as indicated on the horizontal axis) that they completed together. Each directed relational tie between these two students consists of six ratings in this example. However, by examining the horizontal axis we can see that the other dyads in Cohort A have relational ties that are represented with five ratings, four ratings, three ratings, or two ratings contributed by each member of the dyad. If there is an odd number at the top of any column in Figure 8, this is because of non-response by one or more directed relations on one or more MTM projects.

Figure 8

Conflict Profile of MTM Collaborations, as Perceived by MTM Raters (by Cohort)



Note. MTM = multiple team membership.

The colour shading on each heat map gives an indication of the overall proportion and clustering of MTM conflict (conflict as perceived by a MTM rater towards a ratee) within each cohort. Areas of darker shading represent higher proportions of responses in those cells of the heat map. For example, examining Cohort A, we can see that nearly 30% of all MTM peer evaluations in the data subset for Cohort A were contributed by MTM raters who completed only two projects (horizontal axis) with the MTM ratee and the rater experienced conflict towards the ratee on both of those projects (vertical axis). The grayscale legend includes several levels of shading because fewer levels of shading would fail to distinguish the nuances within each column of the heatmap. As each hypothesis is explored in subsequent chapters, specific n-sizes will be included in all data tables.

The heat maps in Figure 8 are useful for obtaining an overall understanding that most of the ratings in the data set come from MTM raters who collaborate on a small number of projects with a MTM ratee. Furthermore, we can get a sense of the depth of conflict spillover for students involved in two–project collaborations, three-project collaborations, and so on. An examination of the heat map for Cohort C shows that the darkest cell (or concentration of ratings) of the heat map occurs for MTM raters who work on two projects with a MTM team member and experienced conflict with that partner on both of those projects. If the darkest cells of any column in the heat map for a cohort are towards the top of the column, this indicates that there was more extensive depth of conflict spillover within the rater-to-ratee directed relation. If the darkest shading in a column is in a cell at the bottom of the column (i.e., abutting the horizontal axis), this means that the MTM rater did not perceive conflict at all with the ratee on any of the multiple projects in which they collaborated together. If we interpret conflict to be negative or dysfunctional, then we would hope to see the darkest shading occur at the bottom of each

column, indicating lack of spillover (thus, negative conflict effects might be contained within the boundary of one project). On the other hand, if some types of conflict are considered beneficial (e.g., team members feel comfortable debating ideas with each other without damaging their relationship), then darker shading further up the columns might not indicate a dysfunctional relationship between the rater and the ratee.

Summary

The decision to divide the data set into three cohorts was significant. The analytical effort and output increased threefold because results for each hypothesis were generated for each cohort. The data summaries presented here confirm that there were both similarities and differences across cohorts, validating the decision to explore the hypotheses for each cohort. If the cohorts were aggregated and a single set of results produced for each hypothesis, the conclusions might have been misguided; potentially significant data points in one cohort might have been buried under non-significant data points in another cohort, for example. On the other hand, if only one cohort were selected and analyzed (omitting the other two cohorts from the analysis), an opportunity to understand and compare conflict spillover in different MTM contexts would have been missed.

Chapter 5. Hypothesis 1 - Concurrent Conflict Spillover

Hypothesis 1 explored whether concurrent conflict spillover was experienced by MTM team members. Specifically, this hypothesis proposed that a team member who perceives conflict towards a fellow team member will also experience conflict towards the same team member in other concurrent project teams to which they belong. Concurrent conflict spillover was deemed to have occurred if a student perceived conflict towards the same teammate on projects in two or more different courses during the same semester.

The analysis of this hypothesis consisted of four components. The first two components evaluated the breadth and depth of conflict spillover within each cohort. In the first component, Jaccard similarity coefficients were produced using UCINET social network analysis software to measure the prevalence of concurrent conflict spillover *across* all directed relations in each cohort was measured. In other words, if a cohort contained 10 directed relations, what proportion of these 10 directed relations experienced conflict spillover? The second component of the analysis assessed the extent of spillover among MTM projects *within* each directed relation by producing QAP correlations using UCINET software. In other words, was there a linear relationship between the number of MTM projects and the number of conflict ratings? If a student worked with a team member on four projects and perceived conflict towards that team member on two of those projects, this implies that conflict spillover was limited and the working relationship wasn't impaired by conflict. On the other hand, if a student worked with a team member on four projects and perceived conflict towards that team member on all four of those projects, this implies that conflict spillover was substantial; the working relationship might be highly dysfunctional and some sort of intervention might be warranted.

The third and fourth components of the analysis explored student attribute characteristics to determine if conflict spillover was associated with specific student attributes. The third component assessed whether there was a linear relationship between conflict spillover and various attributes (such as absolute age difference) of the rater and/or the ratee. If the student attributes were expressed as binary variables, Jaccard similarity coefficients were produced using UCINET software. If the student attributes were expressed as continuous variables, then QAP correlation coefficients were produced using UCINET software. The fourth component looked at each type of attribute and examined the probability of spillover given the presence of each attribute. Probabilities were generated using UCINET software, while binomial tests of expected versus observed probabilities were completed using R statistical software program. In the attribute analysis, each attribute was considered separately; a multi-variate analysis of combinations of attributes is outside the scope of this investigation but is noted as an area for future research.

Breadth of Concurrent Conflict Spillover in Each Cohort

The presence of concurrent conflict spillover among directed relations in each cohort was measured by calculating Jaccard similarity coefficients for pairs of binary (dichotomous) directed adjacency matrices for MTM dyads in each cohort and each semester. The first binary adjacency matrix (*mtmconyn*) contained values of 1 if a rater worked with a team member on multiple course projects during a semester and the rater perceived conflict towards the ratee in at least one of those projects. Raters who perceived no conflict towards their team members were assigned a value of 0 in the matrix. Thus, the *mtmconyn* matrix mapped the presence or absence of conflict for specific relations in each cohort. The second binary adjacency matrix (*spillyn*) contained values of 1 where a rater perceived conflict towards a ratee in more than one

concurrent course project. Otherwise, a value of 0 was assigned to that tie. Thus, the *spillyn* matrix was a representation of the presence of interpersonal conflict in multiple concurrent projects (i.e., conflict spillover).

The Jaccard similarity coefficient (also known as Jaccard index), is recommended when examining the relationship between two binary matrices (Hanneman & Riddle, 2005; Mainali et al., 2017). The Jaccard similarity coefficient calculates the proportion of elements in the two matrices whose values overlap. If the *mtmconyn* and *spillyn* matrices for a cohort and semester were identical (i.e., if every rater experienced conflict towards a ratee on multiple projects), the Jaccard similarity coefficient would be 1.0. Conversely, if the Jaccard similarity coefficient is 0.0, this would suggest that interpersonal conflict did not spill over to concurrent projects for any raters. Table 14 contains the Jaccard Index coefficients for each cohort in each semester. All matrices were analyzed using UCINET software (Borgatti et al., 2002).

It should be noted that in the first semester, the dyads who worked together on concurrent project teams were all strangers to each other. However, the concurrent dyads in the second semester comprised students who had previously worked together in the first semester without any conflict, who had previously worked together in the first semester with conflict, who knew each other from the first semester but did not work together, or who were complete strangers until the start of the second semester. Referring to the Tuckman model of team development (Tuckman & Jensen, 1977), Term 2 concurrent dyads would be at various stages of forming, storming, norming and/or performing stages together. Term 1 concurrent dyads all started at the same stage in team development (i.e., forming) and would be learning about each other's personalities, styles, process preferences, behaviours, and competencies. Because Term 1 students and Term 2 students differed in this regard, the Jaccard coefficient was computed

separately for each cohort. It should also be recalled that even though the focus of this analysis is on dyads, project teams consisted of more than two students; thus, some teams might comprise MTM triads or MTM quads, while other teams might comprise a mixture of MTM and non-MTM dyads. These various team configurations are worth exploring, but this is outside the scope of the present analysis and is suggested for future research.

Table 14

Jaccard Similarity Coefficients by Semester and Cohort (Concurrent Conflict Spillover)

Cohort and term	Jaccard coefficient	*n* of directed relations	*n* of ratings
Cohort A			
Term 1	.636	11	23
Term 2	.618	34	89
Cohort B			
Term 1	.575	47	121
Term 2	.225	40	109
Cohort C			
Term 1	.761	117	277
Term 2	.402	137	328

Table 14 confirms that in all cohorts and semesters, there were team members who perceived conflict towards the same partner on multiple concurrent projects. However, the proportion of raters who perceived concurrent conflict varied by semester and by cohort. In four of the six data subsets, well over half (between 57% and 77%) of the raters in each of those subsets experienced concurrent conflict with a specific teammate on multiple projects. In two of the six data subsets, concurrent conflict spillover was described by a minority (between 22% and 40%) of raters.

The results in Table 14 also demonstrate that concurrent project spillover was less prevalent in the second semester of the program. This was true for both online-only and collocated project teams, but the decline was stronger for teams in collocated sections (Cohort B

and Cohort C). In the online cohort (Cohort A), a majority of raters (61.8%) perceived concurrent conflict spillover in the both semesters of the program.

These findings provide some support for Hypothesis 1, specifically, that team members who perceive conflict with another member of their team will experience conflict with the same individual on concurrent teams to which they belong. However, this pattern was not consistent across cohorts and semesters. Furthermore, these results did not consider intensity of conflict, type of conflict, or implications on performance - these themes will be explored in other hypotheses.

Depth of Concurrent Conflict Spillover Within MTM Relations Across Multiple Projects

A second dimension of concurrent conflict spillover considers the extent that conflict is perceived throughout some or all of the projects in which the rater and ratee worked together. For example, it is problematic if a team member works with a partner on four concurrent projects and experiences conflict with that person on all four of those projects. On the other hand, if that team member experiences conflict with his or her partner on only two of the four concurrent projects but has excellent relations on the other two projects, this suggests that interpersonal conflict has not soured the overall relationship.

Quadratic Assignment Procedure (QAP) correlation coefficients and *p* values for each cohort and semester are shown in Table 15.

The high *p* values in Table 15 mean that we could not make any inferences about the linear association between the number of projects with conflict and the total number of projects for each directed relation. Thus, there was insufficient evidence to determine that Hypothesis 1 is supported.

Table 15

QAP Correlations by Semester and Cohort (Concurrent Conflict Spillover)

Cohort and term	QAP correlation coefficient (*p* value)	*n* of directed (rater-to-ratee) relations	*n* of ratings
Cohort A			
Term 1	−.418 (*p* = .007*)	11	23
Term 2	.310 (*p* = .721)	34	89
Cohort B			
Term 1	.178 (*p* = .780)	47	121
Term 2	.291 (*p* = .840)	40	109
Cohort C			
Term 1	.414 (*p* = .736)	117	277
Term 2	.103 (*p* = .692)	137	328

Note. QAP = quadratic assignment procedure.

*$p < .05$

The exception to this overall assessment would be for directed relations in Term 1 of Cohort A. Table 15 shows a significant moderate negative correlation for raters in Cohort A during the first semester of the program (QAP correlation coefficient of −.418, $p = .007$). The number of raters and projects in this subset, comprising online students in virtual teams with no previous experience working together, was quite low and so it would be inadvisable to make firm conclusions regarding depth of spillover. Still, it is an intriguing result that warrants further study. The total number of students in Cohort A and Cohort B were similar (44 and 31 students, respectively), but the number of directed (rater-to-ratee) relations in Cohort A was substantially lower than the number of directed relations in Cohort B (64 and 117 directed relations, respectively). Perhaps virtual teams are less likely to work on concurrent projects with team members when they are unfamiliar and are virtual (whereas students in classroom-based courses were able to interact, learn about each other, and more clearly identify potential partners). It

might also be possible that Term 1 students in Cohort A were not permitted to self-select into project teams; this was impossible to determine from the available source data.

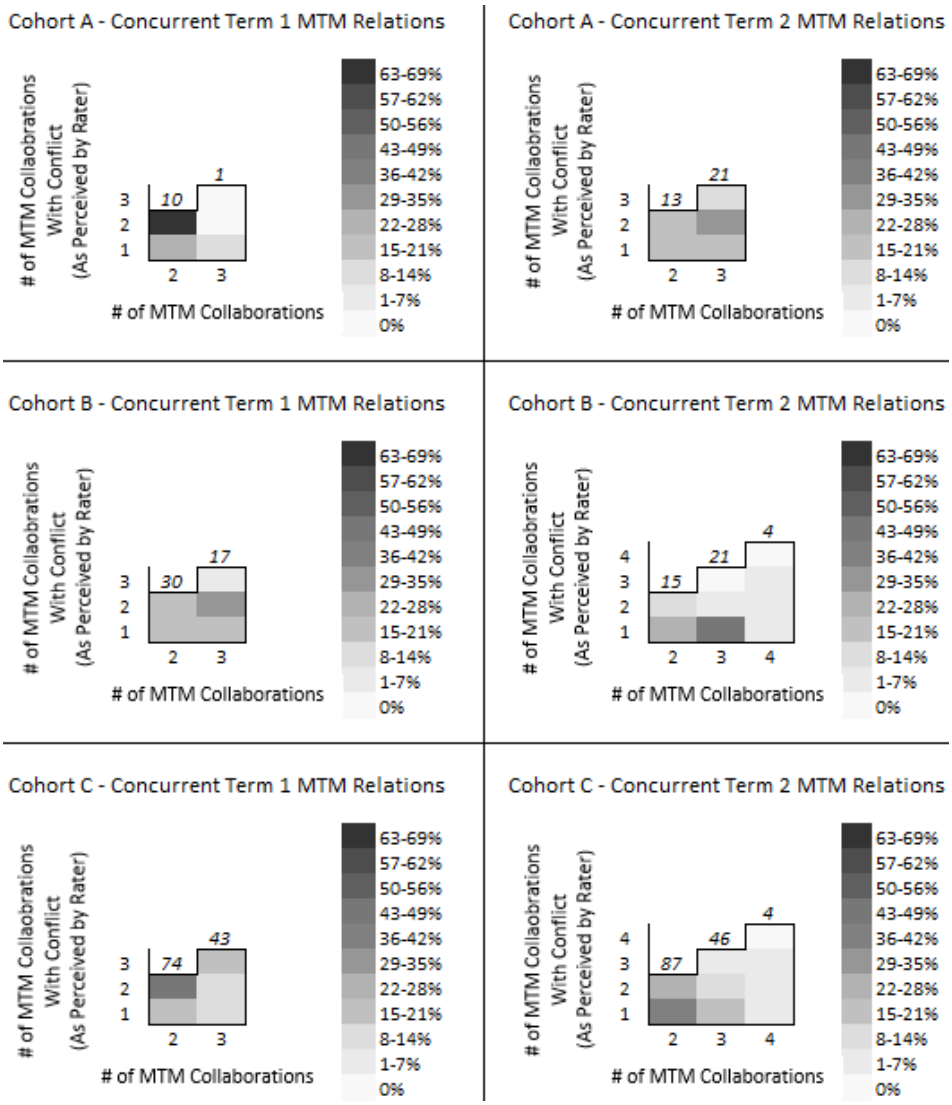
Figure 9 illustrates the distribution of concurrent conflict spillover using heat maps. Each horizontal axis represents the number of concurrent MTM projects that each directed relation participated in. Each vertical axis represents the number of MTM projects with conflict (as perceived by the rater in each directed relation). The numbers at the top of each column represent the total number of relations who collaborated on the number of projects identified along each segment of the horizontal axes. The shading of the cells indicates the relative proportion of observations in each cell. If full conflict spillover was experienced by every directed relation (i.e., if each rater gave a peer rating below 10.0 to his or her ratee), then the darkest cells of the heat maps would appear in the top of each column. If each rater experienced conflict in only one project with the ratee but not in the other projects with that ratee, then we would expect the darkest cells to lie along the horizontal axis.

The heat maps in Figure 9 reveal interesting features. First, there were more concurrent directed relations in the second semester compared to the first semester. This suggests that as the program progressed, students were becoming more familiar with others in their class and more willing to work with the same partners. Perhaps these dyads worked together only once in the first semester but enjoyed their partnership sufficiently enough to be willing to work together on more projects in the second semester of the program. Second, depth of conflict spillover appears to be higher for concurrent directed relations in Term 1 rather than in Term 2. This is based on the location of the darkest shading on the heat maps in Term 1 (darker shading appears towards the top of the columns) compared to Term 2 (darker shading appears towards the bottom of the columns). An exception to this occurs in Cohort A, where darker shading in upper portions of the

columns suggest that conflict spillover was relatively deeper for directed relations in online teams compared to colocated teams.

Figure 9

Concurrent MTM Conflict Profile (Depth of Conflict Spillover), by Cohort and Semester



Note. MTM = multiple team membership.

Analysis of Attributes

The third component of the analysis investigated the direct relationship between concurrent conflict spillover and attributes of the raters and the ratees in directed relations for

each cohort and semester (see Appendix B for detailed tables). Where attribute data was valued (continuous), QAP correlations were produced. Jaccard similarity coefficients were prepared for binary (dichotomous) attributes.

The analysis revealed no general patterns regarding the linear relationship between student attributes and spillover, but four specific findings were significant for directed relations in Term 1 of Cohort A. For that subset of directed relations with conflict, there was a weak negative correlation between concurrent conflict spillover and the rater's age (QAP correlation coefficient of −.168, $p = .034$), a weak negative correlation between concurrent conflict spillover and the difference in age between the rater and ratee (QAP correlation coefficient of −.208, $p = .040$), a moderately weak negative correlation between concurrent spillover and the rater's grade point average (QAP correlation coefficient of −.302, $p = .033$), and a moderately strong negative correlation between concurrent conflict spillover and the ratee's grade point average (QAP correlation coefficient of −.590, $p = .039$). Significant correlations were not observed for concurrent Term 2 MTM students in Cohort A.

The fourth component of the analysis focused on directed relations who experienced conflict, examining whether the presence of each attribute (alone, not in combination with other attributes) was associated with a higher, similar, or lower probability of conflict spillover compared to the overall cohort and semester (see Appendix B for detailed tables). No general patterns were detected, but several statistically significant findings were discerned. Most of the significant findings pertained to directed relations in Cohort C, as follows:

1. if the rater was male and the ratee was male, those directed relations experienced lower than expected conflict spillover in Term 2 (observed conditional probability of .200 versus expected probability of .402, $p = .042$);

2. if the rater was male and the ratee was female, there was higher than expected conflict spillover for those directed relations in Term 2 (observed conditional probability of .619 versus expected probability of .402, $p = .047$); and
3. if the rater was a domestic student and the ratee was an international student, there was higher than expected conflict spillover for those directed relations in Term 2 (observed conditional probability of .857 versus expected probability of .402, $p = .019$).

Additionally, in Term 2 of Cohort B, raters and ratees who were both male experienced higher than expected conflict spillover (observed conditional probability of .571 versus expected probability of .225, $p = .050$).

Summary for Hypothesis 1

Hypothesis 1 posited that students who experience conflict with a team member on one project will also experience conflict with the same team member on other concurrent projects.

The first component of the analysis measured the breadth of conflict spillover across the directed relations in each semester and cohort. Results indicated that concurrent conflict spillover was experienced by a majority of directed relations in the first semester for all cohorts. The proportion of directed relations with conflict spillover decreased from Term 1 to Term 2 in Cohort B and Cohort C; less than half of the directed relations in those cohorts experienced concurrent conflict spillover in Term 2. In Term 2 of Cohort A, the overall proportion of directed relations with concurrent conflict spillover decreased from the first semester, but there was still a majority of directed relations whose conflict spilled over. This suggests that characteristics of the online context might have had something to do with the depth and spread of conflict spillover.

The second component of the analysis examined the depth of concurrent spillover within directed relations by examining the total number of MTM projects correlated with the number of projects with conflict for each semester and cohort. There was insufficient evidence to demonstrate a direct linear relationship between number of projects and number of conflicts for most of the semesters and cohorts. The exception to this general finding was for directed relations in Term 1 of Cohort A, where a moderately negative but significant correlation was observed.

The analysis of attributes yielded potentially interesting findings, particularly for heterophilic attributes (e.g., female raters-to-male ratees, raters whose age was lower than the ratees by 10 or more years, and domestic raters to international ratees). However, findings were not consistent across cohorts or between semesters within a cohort. Also, some of the heterophilic attributes were associated with more spillover and other heterophilic attributes were associated with less spillover.

A key conclusion from these findings is that concurrent conflict spillover is not uncommon in concurrent multi-project environments. This is particularly true for team members who are working together for the first time, at the beginning of the relationship. Research has shown that early stages of team development are more volatile as teams learn about each other, and processes and expectations are established (Tuckman & Jensen, 1977). Perhaps this early-relationship volatility spanned multiple concurrent projects but by the time the second semester arrived, this stage had largely passed. For team members who did not work together during the first semester but did work together during the second semester, perhaps they would have worked on projects with other students in the first semester and were developing effective conflict management and team processes in those groups that benefitted them as they worked

with others in the second semester of the course. In this sense, effective teamwork was a transferable skill that they developed during the first part of the program. This might explain why concurrent conflict spillover decreased in the second semester of the program.

This explanation would not fully explain the results for Cohort A, however. In Cohort A, even though concurrent spillover decreased in Term 2, a majority of directed relations nevertheless experienced conflict spillover. Further research is required before formulating implications with confidence. The analysis of Hypothesis 1 did not distinguish whether Term 2 relations previously worked together in Term 1. For colocated teams (i.e., Cohort B and Cohort C), students likely became more familiar with each other as the program progressed. They would see each other several times per week in classes, observe how their classmates participated in discussions, and note which students consistently attended all classes and were engaged and attentive. They might have also communicated informally with members of their teams and other students in the course during classes and before/after classes, gradually learning each other's personalities and compatibilities. Perhaps they also gathered to work on assignments together, where they would collaborate and debate with each other about tasks outside of the scope of their course projects. Many of these types of interactions might also occur outside of educational settings, in workplace environments. Colocated team members might have opportunities to build relationships and learn about their coworkers while not completing project tasks, and these ancillary interactions might contribute to the effectiveness of these individuals during project work.

The number and nature of interactions (external to project activities) may be different for virtual teams. In the absence of organic opportunities to interact, it might be beneficial for team

leaders or project managers (or Professors, in educational environments) to create additional opportunities for team members to interact.

There was insufficient evidence to confirm a linear relationship between the total number of projects and the number of projects with conflict. For the semester and cohort that did produce significant results (Cohort A, Term 1), the correlation was moderate and negative. If there were a significant positive correlation, there would be reason to be potentially concerned about the depth of conflict spillover within directed relations. In the absence of additional significant results (including significant results for Term 2 of Cohort A), further speculation is not wise.

Thus Hypothesis 1 was largely rejected but these findings do raise interesting future research questions for further study with respect to the impact of contextual factors (such as online environment and uncertainty). The next hypothesis focused specifically on relations who worked together in both semesters of the program and experienced conflict in the first semester.

Chapter 6. Hypothesis 2 - Term 1–Term 2 Conflict Spillover

Hypothesis 2 was conceptually similar to Hypothesis 1, with a focus on subsequent rather than concurrent multiple team membership. Specifically, this hypothesis investigated Term 1–Term 2 relations who worked together on at least one project during both semesters where the rater perceived conflict towards the ratee for at least one project during the first term. The purpose of Hypothesis 2 was to explore whether team members experiencing conflict on a past (i.e., first semester) project team continued to experience conflict on subsequent (i.e., second semester) projects. The variables and four analytical components for Hypothesis 2 were the same as for Hypothesis 1.

Breadth of Term 1–Term 2 Conflict Spillover in Each Cohort

The presence of subsequent conflict spillover across directed relations in each cohort was measured by calculating Jaccard similarity coefficients. Similar to Hypothesis 1, the binary matrix titled *mtmconyn* indicated whether conflict was present for any project in which the team members worked together. Unlike Hypothesis 1 but consistent with the objectives of Hypothesis 2, the *mtmyn* matrix for each cohort contained values of 1 for students who perceived conflict with a partner during a first-semester project and worked with the same partner again during the second semester. If raters perceived no conflict towards their partner during the first semester and also worked together during the second semester, a value of 0 was inserted into that element in the matrix. The second binary matrix (*spillyn*) indicated whether or not the raters perceived conflict towards their team members during the subsequent semester. A Jaccard similarity coefficient comparing these two matrices for each cohort was calculated using UCINET social network analysis software. Results are shown in Table 16.

Table 16

Jaccard Similarity Coefficients by Semester and Cohort (Term 1–Term 2 Conflict Spillover)

Cohort	Jaccard coefficient	*n* of directed relations	*n* of ratings
A	.895	19	69
B	.649	37	161
C	.652	92	310

In all cohorts from Table 16, the majority of directed relations experienced Term1–Term2 conflict spillover. The proportion of directed relations with Term 1–Term 2 conflict spillover in each cohort was higher than the proportion of relations with concurrent spillover. As with Hypothesis 1, the proportion of relations with spillover was notably higher for directed relations in Cohort A, the online cohort, compared to directed relations in Cohort B or Cohort C (both classroom-based cohorts). The findings from this table offer moderately strong to very strong support for Hypothesis 2.

Prevalence of Conflict Within MTM Relations Across Multiple Projects From Term 1 to Term 2

Referring to Table 16, the average number of ratings (projects) per directed relation was between three and five projects, depending on the cohort (this estimate was obtained by dividing the number of ratings by the number of directed relations). QAP correlation coefficients measured the depth of Term 1–Term 2 spillover across these multiple projects. Two continuous adjacency matrices were correlated to measure this type of association. The first adjacency matrix (*nummtm*) indicated the total number of projects in which the Term 1–Term 2 directed relations participated. The minimum value in this matrix was 2 for logical reasons; the team member must have worked at least once in the first term and at least once in the second term to be considered for this analysis. Elements in this matrix were left blank for pairs of students that were not part of a Term 1–Term 2 relation, or if a rater did not perceive conflict with a ratee

during Term 1 (thus, there was no conflict to potentially spill over). The second adjacency matrix (*numcon*) included the number of projects from the *nummtm* matrix that involved conflict (as perceived by the rater towards the ratee). The minimum value in the *numcon* matrix was 1, if a rater perceived conflict towards a partner during the first term but did not perceive conflict when working with that partner during the second term. Because both the *numcon* and *nummtm* matrices were valued adjacency matrices, correlation coefficients and *p* values were produced using UCINET's QAP correlation procedure.

Table 17

QAP Correlations by Semester and Cohort (Term 1–Term 2 Conflict Spillover)

Cohort	QAP correlation coefficient	*n* of directed relations	*n* of ratings
A	.436 (p = .876)	19	69
B	.201 (p = .766)	37	161
C	.556 (p = .725)	92	310

Note. QAP = quadratic assignment procedure.

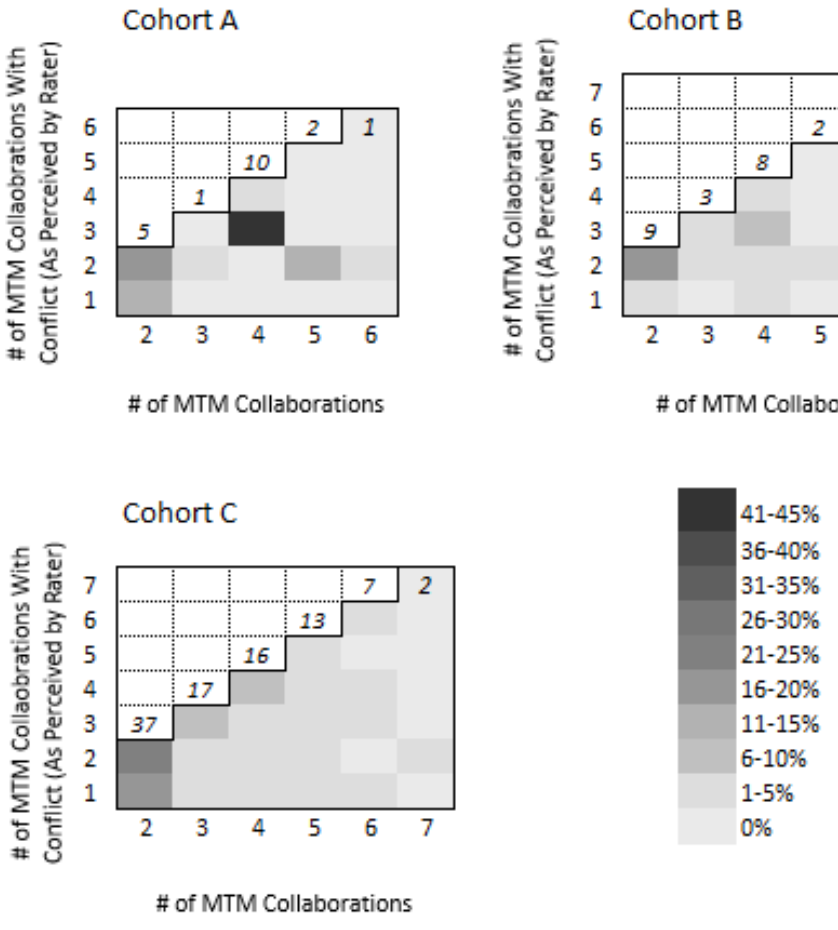
The findings in Table 17 were somewhat similar to Hypothesis 1. There was low to moderate correlation between the number of projects and number of conflicts, but none of the *p* values indicated significance. Thus, there was insufficient evidence to make any inferences about the associations between the number of Term 1–Term 2 projects and the number of conflicts.

Heat maps (see Figure 10) were created to visualise the depth of conflict spillover from the first semester to the second in each cohort. The number of projects is listed across each horizontal axis. The number of projects with conflict (as perceived by a rater towards a ratee) are listed along each vertical axis. Because directed relations with no conflict in Term 1 could not, by definition, experience conflict spillover, there are no zeros on the vertical axes of the heat maps. Similarly, MTM relations, by definition, participated in two or more projects so there are no ones on the horizontal axes of the heat maps. The shading of the heat maps represent the

relative proportion of Term 1–Term 2 directed relations in each cohort that populated each cell. Darker cells represent higher proportions of the cohort whose conflict experiences correspond to the value on the vertical axes. If there was a full depth of conflict spillover by each directed relation, we would expect the darker shading to appear at the top of each column. If there was no conflict spillover, the darker shading would appear along the bottom of each column. The numbers at the top of each column are the total number of directed relations represented by the shading in each column.

Figure 10

Term 1–Term 2 MTM Conflict Profile (Depth of Conflict Spillover), by Cohort



Note. MTM = multiple team membership.

Figure 10 illustrates some interesting findings. If we examine the number of directed Term 1–Term 2 directed relations in Cohort A and Cohort B, we can see that more students participated in a greater number of collaborations.

For example, in Cohort A there were 10 directed relations with four collaborations, compared to five directed relations with two collaborations. In Cohort B, there were 13 directed relations, each of whom provided ratings for six collaborations. In Cohort C, most relations consisted of only two or three collaborations. This might be explained by the key difference between Cohort C and the other two cohorts; Cohort C was a large cohort that was divided into two separate sections of students, and enrollment in the sections was shuffled after Term 1 ended. Thus, in Term 2, Cohort C students were in classes with a mixture of familiar faces and strangers. Students in Term 2 were more likely to work with team members who were previously unknown to them. It is also possible that the introduction of new faces to the Term 2 groups led to more instability around team processes.

Referring to Tuckman's model of team development (Tuckman & Jensen, 1977), a student on a Term 2 team in Cohort C might have already moved through the stages of team development model with some of his or her team partners because they worked together in the previous semester. However, with the introduction of some familiar faces on the team in Term 2, the norms that had been developed in the previous semester might have become destabilized and the Term 2 team members might have reverted back to the storming stage of development. This could be an explanation for the darker shading appearing in the top portions of the columns for Cohort C.

For relations in Cohort A and Cohort B, the class enrollment was stable and team members would have greater familiarity with each other so the darker shading did not appear at

the tops of the columns in the heat maps for those cohorts. On the other hand, the darkest shading did not appear at the bottom of the columns of the heat maps for Cohort A or Cohort B. This suggests that there was some conflict spillover from Term 1 to Term 2 within these relations. An examination of other hypotheses will explore whether conflict spillover was beneficial or detrimental to the team members.

Attribute Analysis

The analysis revealed no significant patterns of association between attributes and spillover across cohorts. There were also no significant differences in probabilities of spillover given the presence of each attribute.

Summary for Hypothesis 2

In summary, there was support for the hypothesis insofar as a majority of directed MTM relations experienced conflict spillover from the first semester to the second semester of the program. The proportion of directed Term 1–Term 2 relations with conflict spillover was higher than the proportion of directed relations with conflict spillover. Even though the majority of directed Term 1–Term 2 relations experienced conflict spillover (indicating breadth of spillover), there was insufficient evidence of a linear association between the number of projects and the number of projects with conflict (indicating depth of conflict spillover). The analysis of attributes showed no patterns of association with Term 1–Term 2 conflict spillover.

In other words, there was support for Hypothesis 2 regarding the breadth of Term 1–Term 2 conflict spillover but the other components of the analysis yielded no findings of note. Indeed, the lack of significant findings is perhaps noteworthy in itself, particularly with respect to the attribute analysis. Term 1–Term 2 conflict spillover is moderately (in Cohort B and Cohort C) to strongly prevalent (in Cohort A) for relations who experienced conflict in Term 1 and also

worked together in Term 2. Given the high prevalence of Term 1–Term 2 conflict spillover, this suggests that merely getting to know each other better over time may be insufficient to ameliorate conflict among MTM team members.

This hypothesis did not explore reasons for conflict or intensity of conflict, and we cannot state with certainty that the prevalence of conflict spillover is detrimental. As described in the Literature Review chapter, some conflict can be beneficial - particularly task conflict, if team members feel comfortable debating different perspectives. If this were the case among the relations in the data set, then the prevalence of conflict spillover might be positive and indeed should be encouraged. On the other hand, if the intensity of conflict was high, if the reasons indicated dysfunctional relationships between team members, or if the conflict was associated with decreased project performance, then the moderate to high prevalence of conflict spillover would be concerning. Hypothesis 3, 4, and 5 explored each of these potentialities, so that a more complete picture of conflict spillover could be formulated. The next chapter will explore Hypothesis 3, focusing on the relationship between conflict spillover and performance outcomes.

Chapter 7. Hypothesis 3 - Conflict Spillover and Performance Outcomes

In the previous two hypotheses, analysis of the data set confirmed that conflict spillover was common among both colocated and virtual MTM dyads. Hypothesis 3 focused on performance outcomes for MTM team members who experience conflict. Specifically, Hypothesis 3 stated that MTM relations with conflict spillover are more likely to be associated with lower performance compared to MTM relations who experience conflict that does not spill over.

Two different indicators of individual performance were used in the investigation of Hypothesis 3. The first indicator of performance was the grade that the rater on each project received, relative to the rater's grade point average (GPA). Each student's GPA encapsulated his or her academic performance for all courses in the program. It was an average of all final course grades and was included in the student administrative records that were obtained for this research. This indicator provided a proxy reference point of each student's expected academic performance in each course. If a student's project grade in a course was higher than his or her GPA, it could be assumed that the student's project performance exceeded his or her personal expectations - a positive outcome. On the other hand, if a student received a project grade below his or her GPA, this suggests that the student's performance might have been disappointing and below his or her personal expectations.

Hypothesis 3 posited that conflict spillover is associated with lower project performance. It is possible that conflict led to inefficient team processes such as poor communication, or task-related disagreements did not result in optimal content in the project deliverables. Regardless of the cause of conflict (which is examined in a later chapter), the presence of conflict was proposed to have a negative impact on the team member's personal academic performance.

Extending this concept, conflict on multiple projects would exacerbate the negative impact on student performance.

A second indicator of performance was calculated from the administrative records on project grades for each student in each course. This was a more externally-oriented measure of performance. Let us say that a team member earned a grade of 75 percent on a group project and that student's GPA was 80 percent. We could assume that the team member would be disappointed or dissatisfied with his or her project performance. However, if the class average grade for that project was only 60 percent, then the student might not consider the project outcome to be quite as negative after all; the student might be inclined to externalize reasons for the poor team project grade instead (e.g., if everyone performed poorly on the project, it must be the Professor's fault for creating an unfair assessment, for grading it too strictly, or for improperly teaching students the concepts needed to complete the project correctly). Thus, it was helpful to explore performance outcomes from multiple perspectives where possible.

This second performance indicator - rater's project grade relative to class average grade on the project - may link to conflict spillover because if a team member received multiple project grades that were below the class average when working with the same partner on these projects, it may suggest that there were underlying issues with the dyad that persisted across the projects in which the team members worked.

Hypothesis 3 was tested by calculating relative risk of decreased performance, given the presence or absence of conflict spillover. According to Andrade (2015, p. e858), "[t]he relative risk (RR) of an event is the likelihood of its occurrence . . . as compared with the likelihood of its occurrence in a control or reference group". Here, relative risk was expressed as a ratio of the risk of decreased performance given conflict spillover to the risk of decreased performance when

conflict did not spillover. If relative risk was above 1.0, then Hypothesis 3 was supported; the presence of conflict spillover is associated with an increase in the risk of decreased performance.

Relative risk calculations were prepared for concurrent directed relations in Term 1, concurrent directed relations in Term 2, and Term 1–Term 2 directed relations for each cohort. Directed relations with no experience of conflict were excluded from the analysis because there was no conflict to potentially spill over.

Performance Indicator 1 - Rater Project Grade Relative to GPA

The first two columns of data in Table 18 contain the contingency table values that were used to calculate relative risk for directed relations in Cohort A that experienced conflict on at least one project. These values are the number of projects sorted according to two variables: decreased versus same/ or increased performance (in columns), and conflict spillover versus no conflict spillover (in rows). Two additional columns were included. The column titled '*n* of ratings' contains the total number of projects with conflict spillover and with no conflict spillover. The column titled 'n of directed relations' indicates the number of directed relations whose project ratings were represented in the relative risk calculations. The final column contains the relative risk (RR) ration, with 95% confidence intervals and *p* values.

Taking an example from the top portion of Table 18, there were seven concurrent Term 1 directed relations with conflict spillover in Cohort A. These seven directed relations completed a combined total of 14 projects. All 14 of those projects received a grade that was greater than the rater's GPA. There were four directed relations with conflict which did not spill over. Those four relations completed nine projects in total. Eight of those projects overperformed the rater's GPA while one of those projects underperformed the rater's GPA. These values were used to calculate relative risk.

Table 18

Relative Risk of Decreased Performance for Directed Relations With Conflict Spillover, Relative to Directed Relations With No Conflict Spillover - Cohort A

Term and spillover	Decreased performance	Same or increased performance	*n* of ratings	*n* of directed relations	Relative risk, 95% CI, and significance
Term 1 multiple team membership (MTM)					
Conflict spillover	0	14	14	7	0.222 (0.010, 4.928)
No conflict spillover	1	8	9	4	$p = .342$
Term 2 MTM					
Conflict spillover	2	55	57	21	0.561 (0.083, 3.797)
No conflict spillover	2	30	32	13	$p = .554$
Term 1–Term 2 MTM					
Conflict spillover	1	64	65	17	0.062 (0.005, 0.813)
No conflict spillover	1	3	4	2	$p = .034$*

*$p < .05$

Note. Performance measured as project grade relative to rater's grade point average (GPA).

Before focusing on the relative risk for different types of multiple team membership in Cohort A, two observations are worth noting. First, the probability of same or increased performance is higher than the probability of decreased performance for directed relations in Cohort A, regardless of whether conflict spilled over across multiple projects. This is a positive finding, suggesting that working with the same team member in multiple course projects typically yielded positive performance outcomes. It is not surprising, perhaps, that many students enjoyed working with the same partners on multiple projects, as synergies are often manifested in project grades that are higher than grade point averages. A second observation is that the

number of directed relations with conflict spillover exceeded the number of directed relations with no conflict spillover. This observation is to be expected; results from Hypothesis 1 confirmed that the majority of concurrent Term 1 directed relations included conflict spillover. In this respect, findings from Hypothesis 1, Hypothesis 2, and Hypothesis 3 are linked together.

Relative risk results for Cohort A showed insufficient evidence to support Hypothesis 3 for concurrent Term 1 directed relations (RR = 0.222, p = .342) and concurrent Term 2 directed relations (RR = 0.561, p = .554). Results were significant for Term 1–Term 2 directed relations (RR = 0.062, p = .034). For Term 1–Term 2 directed relations, the relative risk of decreased performance given the presence of conflict spillover was 0.062 times the risk of decreased performance given no conflict spillover. These results were significant but the risk of decreased performance was, for practical purposes, quite low. The second row from the bottom of Table 18 indicates that Term 1–Term 2 directed relations with conflict spillover were overwhelmingly likely to experience the same or increased performance (where the project grades were the same or higher than the rater's grade point average) in their MTM projects. Indeed, when both of the bottom rows of Table 18 are considered, only two MTM projects out of 29 received a project grade that was lower than the rater's grade point average. Thus, even though the findings were significant for Term 1–Term 2 directed relations in Cohort A, the practical implications are negligible because the probability of decreased performance was so low.

Table 19 includes contingency table data, the number of MTM project ratings, the number of directed MTM relations, and relative risk information for concurrent Term 2 directed relations with conflict.

Table 19

Relative Risk of Decreased Performance for Directed Relations With Conflict Spillover, Relative to Directed Relations With No Conflict Spillover - Cohort B

Term and spillover	Decreased performance	Same or increased performance	*n* of ratings	*n* of directed relations	Relative risk, 95% CI, and significance
Term 1 multiple team membership (MTM)					
Conflict spillover	7	67	74	27	1.577 (0.428, 5.808)
No conflict spillover	3	47	50	20	p = .494
Term 2 MTM					
Conflict spillover	4	22	26	9	1.419 (0.476, 4.230)
No conflict spillover	9	74	83	31	p = .530
Term 1–Term 2 MTM					
Conflict spillover	8	90	98	24	0.753 (0.304, 1.864)
No conflict spillover	8	57	65	13	p = .539

Note. Performance measured as project grade relative to rater's grade point average (GPA).

Results for Cohort B show insufficient evidence to support Hypothesis 3. This was true for concurrent Term 1 directed relations (RR = 1.577, p = .494), concurrent Term 2 directed relations (RR = 1.419, p = .530), and Term 1–Term 2 directed relations (RR = 0.753, p = .539). Because the confidence intervals for each category of relations included the value of 1.000, any increase in risk was not statistically significant (because a RR value of 1.000 indicates no difference in risk and that value is within the confidence interval for the results).

Table 20 summarizes results for directed relations in Cohort C.

Table 20

Relative Risk of Decreased Performance for Directed Relations With Conflict Spillover, Relative to Directed Relations With No Conflict Spillover - Cohort C

Term and spillover	Decreased performance	Same or increased performance	*n* of ratings	*n* of directed relations	Relative risk, 95% CI, and significance
Term 1 multiple team membership (MTM)					
Conflict spillover	31	183	214	89	1.345 (0.622, 2.910)
No conflict spillover	7	58	65	28	$p = .451$
Term 2 MTM					
Conflict spillover	20	115	135	55	0.817 (0.494, 1.352)
No conflict spillover	35	158	193	81	$p = .431$
Term 1–Term 2 MTM					
Conflict spillover	52	170	222	60	1.676 (0.960, 2.926)
No conflict spillover	13	80	93	32	$p = .070$

Note. Performance measured as project grade relative to rater's grade point average (GPA).

As with Cohort B results in Table 19, results for Cohort C in Table 20 do not meet the significance threshold of $p < .05$; therefore, there was insufficient evidence to support Hypothesis 3 for directed relations in Cohort B. This includes concurrent Term 1 directed relations (RR = 1.345, $p = .451$), concurrent Term 2 directed relations (RR = 0.817, $p = .431$), and Term 1–Term 2 directed relations (RR = 1.676, $p = .070$). In recent decades, some researchers have described their findings as marginally significant when *p* values of their results are slightly above the $p < .05$ threshold. They have concluded that a hypothesis is supported even though the threshold has not been met (Pritschet et al., 2016). That approach will not be taken here; results for Term 1–Term 2 directed relations did not meet the significance threshold of *p*

< .05 and therefore Hypothesis 3 was not supported for this indicator of performance for Term 1–Term 2 directed relations.

Performance Indicator 2 - Rater Project Grade Compared to the Class Average Project Grade

The second indicator of performance in the data set was the rater's project grade relative to the class average project grade. Tables 21 to 23 indicate the risk of decreased performance for directed relations with conflict spillover. If the rater's project grade was less than the class average project grade, this was classified as decreased performance. Results for directed relations in Cohort A are presented in Table 21.

Table 21

Relative Risk of Decreased Performance for Directed Relations With Conflict Spillover, Relative to Directed Relations With No Conflict Spillover - Cohort A

Term and spillover	Decreased performance	Same or increased performance	*n* of ratings	*n* of directed relations	Relative risk, 95% CI, and significance
Term 1 multiple team membership (MTM)					
Conflict spillover	6	8	14	7	1.929 (0.493, 7.542)
No conflict spillover	2	7	9	4	$p = .345$
Term 2 MTM					
Conflict spillover	13	44	57	21	1.043 (0.464, 2.345)
No conflict spillover	7	25	32	13	$p = .920$
Term 1–Term 2 MTM					
Conflict spillover	2	63	65	17	0.379 (0.021, 6.864)
No conflict spillover	0	4	4	2	$p = .511$

Note. Performance measured as project grade relative to class average project grade.

Results in Table 21 show that directed relations in Cohort A were more likely to include projects with the same or increased performance rather than decreased performance, where project performance is measured as the raters' project grades relative to the class average project grades). Also, directed relations were more likely to have conflict spilled over rather than no conflict spillover. However, we are unable to conclude with confidence that the risk of decreased performance was higher for directed relations with conflict spillover compared to directed relations with conflict that did not spill over. Elevated *p* values for concurrent Term 1 directed relations (RR = 1.929, $p = .345$), concurrent Term 2 directed relations (RR = 1.043, $p = .920$), and Term 1–Term2 directed relations (RR = 0.379, $p = .511$) prevent us from making that conclusion.

Table 22 presents results for directed relations in Cohort B. The pattern of findings from previous tables in this analysis are observed in Table 22 for concurrent Term 1 directed relations (RR = 1.309, $p = .276$) and for Term 1–Term 2 directed relations (RR = 0.663, $p = .078$). For those categories of relations, there was insufficient evidence to support Hypothesis 3. However, the results for concurrent Term 2 directed relations did support Hypothesis 3.

The relative risk for concurrent Term 2 directed relations was 1.995 ($p = .039$). In other words, conflict spillover was associated with a nearly doubled risk (probability) of decreased performance for these directed relations in Cohort B. For concurrent Term 2 directed relations with conflict spillover, the probability of decreased performance on MTM projects that were completed by those relations was 38.5% (10 of 26 MTM projects). The probability of decreased performance for concurrent Term 2 directed relations with no conflict spillover was 19.3% (16 of 83 MTM projects). The ratio of these probabilities is 1.995. Conflict spillover was thus associated with a nearly 100% increase in the risk of decreased performance for concurrent Term

2 directed relations. The relative risk of 1.995 means that there were nearly two directed relations with spillover for every directed relation with no spillover.

Table 22

Relative Risk of Decreased Performance for Directed Relations With Conflict Spillover, Relative to Directed Relations With No Conflict Spillover - Cohort B

Term and spillover	Decreased performance	Same or increased performance	*n* of ratings	*n* of directed relations	Relative risk, 95% CI, and significance
Term 1 multiple team membership (MTM)					
Conflict spillover	31	43	74	27	1.309 (0.806, 2.126)
No conflict spillover	16	34	50	20	$p = .276$
Term 2 MTM					
Conflict spillover	10	16	26	9	1.995 (1.035, 3.844)
No conflict spillover	16	67	83	31	$p = .039$*
Term 1–Term 2 MTM					
Conflict spillover	25	73	98	24	0.663 (0.420, 1.048)
No conflict spillover	25	40	65	13	$p = .078$

*$p < .05$

Note. Performance measured as project grade relative to class average project grade.

Table 23 summarizes results for directed relations in Cohort C. Results in Table 23 show mixed support for Hypothesis 3. There was insufficient evidence to support Hypothesis 3 for concurrent Term 1 directed relations (RR = 1.215, $p = .277$) and for concurrent Term 2 directed relations (RR = 0.948, $p = .650$).

Table 23

Relative Risk of Decreased Performance for Directed Relations With Conflict Spillover, Relative to Directed Relations With No Conflict Spillover - Cohort C

Term and spillover	Decreased performance	Same or increased performance	*n* of ratings	*n* of directed relations	Relative risk, 95% CI, and significance
Term 1 multiple team membership (MTM)					
Conflict spillover	96	118	214	89	1.215 (0.856, 1.725)
No conflict spillover	24	41	65	28	$p = .277$
Term 2 MTM					
Conflict spillover	63	72	135	55	0.948 (0.753, 1.194)
No conflict spillover	95	98	193	81	$p = .650$
Term 1–Term 2 MTM					
Conflict spillover	122	100	222	60	1.345 (1.025, 1.765)
No conflict spillover	38	55	93	32	$p = .033$*

*$p < .05$

Note. Performance measured as project grade relative to class average project grade.

Results for Term 1–Term 2 directed relations in Table 24 require further explanation, however. First, Term 1–Term 2 directed relations with conflict spillover in Cohort C had a higher risk (probability) of decreased performance rather than a lower risk (probability) of decreased performance (122 of 222 projects, or 55.0%, received a project grade that was lower than the class average project grade). Compared to all of the results in Tables 18 to 23, this was the only instance where this occurred. The positive synergies of multiple team membership apparently did not occur for this subset of directed relations. As mentioned elsewhere, decreased performance was defined in Tables 21 to 23 as the rater's project grade being lower than the

class average project grade. The raters in these relations experienced conflict while working with the ratee in Term 1 and also experienced conflict while working with the same team member on one or more projects in Term 2 of the program. As Table 23 shows, there were 60 Term 1–Term 2 directed relations with conflict spillover, so these results represented a substantial number of directed relations in this cohort. The relative risk of decreased performance for directed relations with conflict (relative to directed relations with no conflict) was 1.345 (p = .033), which supports Hypothesis 3. In other words, conflict spillover, relative to no conflict spillover, was associated with a 1.345-fold increased risk of decreased performance.

Summary for Hypothesis 3

In general, directed relations with conflict were more likely to have similar or increased performance instead of decreased performance (using either indicator of performance). There was only one subset of directed relations where this was not observed, namely Term 1–Term 2 directed relations in Cohort C, where decreased performance was measured as the rater's project grade being less than the class average project grade. Aside from the aforementioned exception, these general findings suggest that even with the presence of conflict or conflict spillover, performance outcomes were typically positive. In educational settings, a key implication is that student success increases when students are permitted to work together on projects in multiple courses. In project environments within organizations, there appears to be a performance benefit to having team members participate together on multiple project teams.

Looking specifically at Hypothesis 3, for most forms of multiple team membership in the data set (concurrent Term 1 directed relations with conflict, concurrent Term 2 directed relations with conflict, and Term 1–Term 2 directed relations with conflict), there was insufficient evidence to support Hypothesis 3, namely, that conflict spillover was associated with lower

performance. There were only two subsets of directed relations where significant results supported Hypothesis 3. Concurrent Term 2 directed relations (in Cohort B) and Term 1–Term 2 directed relations (in Cohort C) with conflict spillover were more likely to also have lower performance compared to their counterparts who did not experience conflict spillover. For both of these sets of directed relations, decreased performance was measured as the rater's project grade being less than the class average project grade. In summary, there was very modest support for Hypothesis 3 and an overall finding that directed relations whose raters experienced conflict towards their team members typically experienced similar or increased performance regardless of whether or not conflict spilled over.

In the next chapter, the focus of the analysis will be on directed MTM relations with high intensity conflict (as perceived by the rater towards the ratee). Hypothesis 4a examined whether conflict spillover was more likely to occur in directed relations with higher levels of conflict. Hypothesis 4b assessed whether high intensity conflict was associated with decreased performance.

Chapter 8. Hypothesis 4a - High Intensity Conflict and Conflict Spillover

Given heightened negative emotions that are sometimes associated with high conflict, we would expect that the likelihood of concurrent and/or subsequent conflict spillover would be higher if high conflict was perceived by a MTM rater towards a MTM team member during a project. Hypothesis 4a stated that MTM relations with high intensity conflict (as perceived by the rater towards the ratee) were more likely to be associated with conflict spillover, compared to MTM relations with lower conflict intensity. A rater was defined as experiencing high conflict intensity if he or she gave a peer evaluation rating below 7.0 out of 10 to a ratee. A peer evaluation rating between 7.0 and 9.9 was classified as lower conflict intensity. MTM relations with no conflict were excluded from this analysis.

The analysis of Hypothesis 4a consisted of multiple components. The first two components of the analysis were the same as the first two parts of the analysis for Hypothesis 1 and Hypothesis 2. The third component of the analysis included calculations of relative risk ratios to explore the relative probability of conflict spilllover for directed relations with high conflict versus directed relations with lower intensity conflict. The final component contained an analysis of the association between high conflict and the presence of various attribute characteristics of the rater and/or the ratee.

Breadth of Conflict Spillover Among Directed MTM Relations With High Conflict Intensity

Table 24 displays Jaccard similarity coefficients for directed MTM relations with high intensity conflict in at least one collaboration. For Term 1–Term 2 directed relations in the table, the rater experienced high conflict towards the ratee during Term 1; if the rater experienced

lower conflict towards a ratee in Term 2, this directed relation was excluded from the Term 1–Term 2 calculation.

The Jaccard similarity coefficients were produced by extracting the high conflict relations from each cohort and preparing comparison matrices from those subsets. For each cohort and each type of multiple team membership (i.e., Term 1 concurrent MTM, Term 2 concurrent MTM, and Term 1–Term 2 MTM), two binary adjacency matrices were created. The first matrix (*mtmyn*) contained values of 1 where the rater perceived high conflict towards the ratee. The second matrix (*spillyn*) contained values of 1 where the rater perceived any level of conflict towards the ratee in two or more projects. If all of the raters who experienced high conflict in one project also experienced spillover, the Jaccard similarity coefficient would be 1.0. If raters completed one project with high conflict but no conflict with the ratee in other projects, then the Jaccard similarity coefficient would be 0.0 (thus indicating no association between high conflict and conflict spillover).

Table 24 also contains a column with Jaccard similarity coefficients from Hypothesis 1 and Hypothesis 2. These results enable us to see how the strength of association differed for directed relations with high conflict compared to directed relations with any level of conflict intensity.

Table 24 shows moderate to very strong association between high conflict and conflict spillover, demonstrating support for Hypothesis 4a. All of the high conflict directed relations in Cohort A had conflict in at least one other project. In Cohort B, the association between high conflict and spillover ranged from moderate (Jaccard similarity coefficient = .500 for concurrent Term 2 directed relations) to very strong (Jaccard similarity coefficient = 1.000 for concurrent Term 1 directed relations). The Jaccard similarity coefficient for directed relations in Cohort C

ranged from .667 (for Term 1–Term 2 directed relations) to .933 (for concurrent directed relations in Term 1 and also Term 2). This indicates moderate to strong association between high conflict intensity and conflict spillover. There appeared to be no other patterns of association between or within cohorts.

Table 24

Jaccard Similarity Coefficients by Semester and Cohort (Concurrent and Term 1–Term 2 Conflict Spillover) - High Conflict and All Conflict

Cohort and term	Jaccard coefficient	*n* of directed relations	*n* of ratings	Jaccard coefficient from Hypothesis 1 and Hypothesis 2
Cohort A				
Term 1 MTM	1.000	1	2	0.636 (11 directed relations)
Term 2 MTM	1.000	4	10	0.618 (34 directed relations)
Term 1–Term 2 MTM	-	0	0	0.895 (19 directed relations)
Cohort B				
Term 1 MTM	1.000	8	19	0.575 (47 directed relations)
Term 2 MTM	.500	4	11	0.225 (40 directed relations)
Term 1–Term 2 MTM	.800	5	17	0.645 (37 directed relations)
Cohort C				
Term 1 MTM	.933	15	35	0.761 (117 directed relations)
Term 2 MTM	.933	15	32	0.402 (137 directed relations)
Term 1–Term 2 MTM	.667	6	19	0.652 (92 directed relations)

Note. MTM = multiple team membership.

An examination of the final column of Table 24 yields two interesting observations when compared to the results just discussed. First, the association between any level of conflict and conflict spillover (examined in Hypothesis 1 and Hypothesis 2) was weaker than the association

between high conflict and conflict spillover. This was true for all types of multiple team membership in all three cohorts. Second, the number of directed relations with any intensity of conflict was substantially higher than the number of directed relations with high intensity conflict. This observation is consistent with the description of the data set presented elsewhere, but worth remarking upon here. There was a much smaller number of high conflict directed relations in the data set, but the association with conflict spillover was much higher in this smaller subset of relations. There was a strong breadth of conflict spillover for high conflict directed relations in each cohort.

Depth of Conflict Spillover Among Directed MTM Relations With High Conflict Intensity

Table 25 explores the depth of spillover relative to the number of projects that high conflict raters complete with ratees. For each cohort and type of multiple team membership, two matrices were compared using UCINET's QAP correlation procedure.

The first matrix (*nummtm*) indicated the number of projects that the rater and ratee completed together. The second matrix (*numcon*) indicated the number of projects with conflict (as perceived by the rater towards the ratee). At least one of these conflicts was high intensity, otherwise the directed relation was excluded from the analysis. The final column of Table 25 shows the QAP correlation coefficients (and *p* values) from Hypothesis 1 and Hypothesis 2 so that a comparison could be made for high conflict directed relations versus directed relations with any level of conflict.

Table 25 contains mixed results. The *p* values were high for all cohorts and types of multiple team membership, with the exception of Term 1–Term 2 directed relations in Cohort B. In Term 1–Term 2 directed relations with high conflict in Cohort B, the *p* value was significant

at $p = .026$ but the correlation coefficient of −.080 indicated minimal correlation between the number of projects and the number of projects with conflict.

Table 25

QAP Correlations by Semester and Cohort (Concurrent and Term 1–Term 2 Conflict Spillover) - High Conflict and All Conflict

Cohort and term	QAP correlation coefficient (*p* value)	*n* of directed (rater-to-ratee) relations	*n* of ratings	QAP correlation coefficient (*p* value) from Hypothesis 1 and Hypothesis 2
Cohort A				
Term 1 MTM	-	1	2	−.418 (.007*)
Term 2 MTM	1.000 (.980)	4	10	.310 (.721)
Term 1–Term 2 MTM	-	-	-	.436 (.876)
Cohort B				
Term 1 MTM	.488 (.984)	8	19	.178 (.780)
Term 2 MTM	.636 (.980)	4	11	.291 (.840)
Term 1–Term 2 MTM	−.080 (.026*)	5	17	.201 (.766)
Cohort C				
Term 1 MTM	.783 (.982)	15	35	.414 (.736)
Term 2 MTM	.000 (.997)	15	32	.103 (.692)
Term 1–Term 2 MTM	.949 (.987)	6	19	.556 (.725)

Note. QAP = quadratic assignment procedure; MTM = multiple team membership.

* $p < .05$

Another unusual result in the table can be seen in the row corresponding to concurrent Term 2 MTM relations in Cohort C. The QAP correlation coefficient was .000. Raw data for these 15 directed relations were examined. Fourteen of these relations featured full conflict spillover (the rater perceived conflict on all projects towards the ratee). One of the 15 directed relations included one high conflict project and two projects with no conflict. Thus, even though the correlation coefficient showed no correlation, the depth of conflict spillover within these

relations was substantial. When the final column of Table 25 is examined, it becomes apparent that the correlation coefficients were higher for directed relations with high conflict than for directed relations with any level of conflict. In summary, nearly all of the QAP correlation coefficient values for directed relations with high conflict suggested moderate to strong association with spillover, but the *p* values were nearly all above the $p = .05$ threshold of significance. The result that was significant at $p = 0.026$ accompanied a QAP correlation coefficient of −.080, implying minimal association between the number of projects and number of projects with conflict for high conflict directed relations. Thus, Hypothesis 4a was tentatively supported regarding depth of conflict spillover, but high *p* values limit our confidence about firm conclusions.

Relative Risk of Conflict Spillover for Directed MTM Relations With High Conflict Intensity (Compared to Directed Relations With Lower Conflict Intensity)

Tables 26 to 28 contain results of relative risk calculations that determine the relative likelihood of conflict spillover for directed relations with high intensity conflict compared to the likelihood of conflict spillover for directed relations with lower intensity conflict. To be clear, raters in directed relations in the higher conflict intensity category experienced high intensity conflict towards the ratee in at least one project; spillover was defined as a rater perceiving any level of conflict on any other projects in addition to the high conflict project. In other words, spillover does not necessarily mean that high intensity conflict occurred on multiple projects.

The first columns of Tables 26 to 28 contain contingency table data used in the relative risk calculations: conflict spillover (yes or no) and conflict intensity (directed relations with high conflict intensity or directed relations with lower conflict intensity). Columns were included to indicate the total number of directed relations and the number of project ratings represented by

these relations. The final column in each table contains results from the relative risk calculations. Results are presented for concurrent Term 1 directed relations, concurrent Term 2 directed relations, and Term 1–Term 2 directed relations. Each of the following three tables contain results for Cohort A, Cohort B, and Cohort C, respectively.

Table 26

Relative Risk of Conflict Spillover for Directed MTM Relations in Cohort A With High Conflict Intensity (Relative to Directed Relations With Lower Conflict Intensity)

Term and conflict intensity	Conflict spillover?		*n* of directed relations	*n* of ratings	Relative risk, 95% CI, and significance
	Yes	No			
Term 1 multiple team membership (MTM)					
High conflict intensity	1	0	1	2	1.667
Lower conflict intensity	6	4	10	21	(1.005, 2.765)
					p = .048*
Term 2 MTM					
High conflict intensity	4	0	4	10	1.765
Lower conflict intensity	17	13	30	79	(1.291, 2.413)
					p < .001*
Term 1–Term 2 MTM					
High conflict intensity in Term 1	0	0	0	0	n/a (no high conflict relations)
Lower conflict intensity in Term 1	17	2	19	69	

*p < .05

Table 26 results show that the relative risk of conflict spillover was somewhat increased for directed relations with high conflict intensity relative to directed relations with lower conflict intensity in Cohort A. The relative risk ratio was 1.667 (significant at p = .048) for concurrent Term 1 directed relations with high conflict intensity (relative to relations with lower intensity conflict). Similarly, the relative risk ratio was 1.765 (significant at p < .001) for concurrent Term 2 directed relations with high conflict intensity. In other words, high intensity conflict was associated with a 66.7% increase in the risk of spillover relative to lower intensity conflict for

concurrent Term 1 directed relations. High intensity conflict was associated with a 76.5% increase in the risk of conflict spillover relative to lower intensity conflict in Term 2. There were no Term 1–Term 2 directed relations with high intensity conflict. Therefore, results from Cohort A supported Hypothesis 4a; the risk of conflict spillover was increased for directed relations who experience high intensity conflict.

Table 27 is constructed identically to Table 26, except that it represents students from Cohort B rather than Cohort A.

Table 27

Relative Risk of Conflict Spillover for Directed MTM Relations in Cohort B With High Conflict Intensity (Relative to Directed Relations With Lower Conflict Intensity)

Term and conflict intensity	Conflict spillover?		*n* of directed relations	*n* of ratings	Relative risk, 95% CI, and significance
	Yes	No			
Term 1 multiple team membership (MTM)					
High conflict intensity	8	0	8	19	2.053
Lower conflict intensity	19	20	39	102	(1.488, 2.832)
					$p < .001$*
Term 2 MTM					
High conflict intensity	2	2	4	11	2.57
Lower conflict intensity	7	29	36	98	(0.787, 8.404)
					$p = .118$
Term 1–Term 2 MTM					
High conflict intensity in Term 1	4	1	5	17	1.200
Lower conflict intensity in Term 1	20	10	30	138	(0.723, 1.990)
					$p = .481$

*$p < .05$

Similar to concurrent Term 1 directed relations in Cohort A, there was an elevated risk of conflict spillover for concurrent Term 1 directed relations with high intensity conflict. The relative risk ratio was 2.053 (significant at $p < .001$), suggesting that the risk of conflict spillover for concurrent Term 1 directed relations with high conflict intensity is 2.053 times that of lower

conflict intensity directed relations. Concurrent Term 2 directed relations and Term 1–Term 2 directed relations showed elevated relative risk ratios but the *p* values exceeding .05 for those sets of relations indicate that there was insufficient evidence to support Hypothesis 4a for those sets of relations.

Table 28 presents results for Cohort A. Again, the structure of this table is comparable to Tables 26 and 27, but the focus here is on relations in Cohort C.

Table 28

Relative Risk of Conflict Spillover for Directed MTM Relations in Cohort C With High Conflict Intensity (Relative to Directed Relations With Lower Conflict Intensity)

Term and conflict intensity	Conflict spillover?		*n* of directed relations	*n* of ratings	Relative risk, 95% CI, and significance
	Yes	No			
Term 1 multiple team membership (MTM)					
High conflict intensity	14	1	15	35	1.269
Lower conflict intensity	75	27	102	242	(1.062, 1.517)
					$p = .009$*
Term 2 MTM					
High conflict intensity	14	1	15	32	2.754
Lower conflict intensity	41	80	121	293	(2.075, 3.656)
					$p < .001$*
Term 1–Term 2 MTM					
High conflict intensity in Term 1	4	2	6	19	1.024 (0.569, 1.841) $p = .937$
Lower conflict intensity in Term 1	56	30	86	291	

*$p < .05$

Results for Table 28 demonstrated statistically significant elevated relative risk ratios for concurrent Term 1 and concurrent Term 2 directed relations with high conflict intensity (relative to directed relations with lower conflict intensity. The relative risk of conflict spillover for concurrent Term 1 directed relations with high conflict intensity (relative to relations with lower conflict intensity) was 1.269 (significant at $p = .009$), and the relative risk of conflict spillover

for concurrent Term 2 directed relations with high conflict was 2.754 (significant at $p < .001$). These results supported Hypothesis 4a. However, there was insufficient evidence to support Hypothesis 4a for Term 1–Term 2 directed relations. The absolute risk of conflict spillover was similar for directed relations with high intensity conflict (4 out of 6 directed relations, or 66.7% absolute risk) as for the directed relations with lower intensity conflict (56 out of 86 directed relations, or 65.1% absolute risk). Thus, the relative risk was somewhat higher but this difference was not statistically significant.

This result was similar to Term 1–Term 2 directed relations in Cohort B (Table 27). In Cohort A (Table 26), there were no Term 1–Term 2 directed relations with high intensity conflict in the first term of the program. Perhaps the emotions surrounding high conflict that was experienced in Term 1 dissipated somewhat during the second semester, or some raters who experienced high intensity conflict with ratees in Term 1 chose not to work with those team members in Term 2 (thus removing themselves from the opportunity of potentially experiencing further issues with those rates). Or, perhaps the reasons for the high intensity conflict were task or process related and the dyads with high conflict intensity, knowing that there were problems in the first term projects, made a more concerted effort to set expectations and resolve conflict more productively in the second semester. It is also possible that the factors contributing to high conflict were unique to that project and were not present in subsequent projects in which the rater and ratee worked together. Without understanding reasons for conflict, we can only speculate as to why Hypothesis 4a was not supported for Term 1–Term 2 directed relations with high conflict.

An examination of contingency table data in Tables 26 to 28 reveals a further pattern that is worth noting. In all types of multiple team membership in all of the cohorts, the number of high conflict directed relations with conflict spillover exceeded the number of high conflict

directed relations with no conflict spillover. In other words, the majority of directed relations with high conflict intensity experienced conflict spillover. This was not the case for concurrent Term 2 directed relations with high intensity conflict in Cohort B. For that set of high conflict relations, there was an equal number of relations with spillover and with no spillover. Perhaps the stability of enrollment (relative to students in Cohort C) and inter-personal familiarity (relative to virtual students in Cohort A) ameliorated conflict intensity in Cohort B. We can see that a high proportion of lower conflict concurrent Term 2 directed relations in Cohort B did not experience conflict spillover either, so perhaps the explanation proposed in the previous sentence applies here as well. On the other hand, there was no widespread observable pattern regarding the relative proportion of relations with spillover versus no spillover for directed relations with lower conflict intensity elsewhere among Tables 26 to 28.

When Tables 26 to 28 are taken together, all of the statistically significant relative risk calculations showed elevated risk of conflict spillover for directed relations with high intensity conflict (relative to directed relations with lower intensity conflict). We know this because the relative risk ratios for those results were above 1.0. Tables 27 and 28 contained relative risk ratios that were higher than 2.000, which prompts a possible question about interpreting the magnitude of the ratio. According to Andrade,

> As a measure of effect size, an RR value is generally considered clinically significant if it is less than 0.50 or more than 2.00; that is, if the risk is at least halved, or more than doubled. However, RR values that are closer to 1.00 can also be considered clinically significant if the event is serious or if it is important to public health. (2015, p. e859)

Although Andrade's (2015) comments were written for audiences in health science, the guideline regarding interpretation of the magnitude of relative risk is worthy of consideration. As noted, there were directed relations with relative risk ratios exceeding 2.000 for conflict spillover in high conflict intensity directed relations (relative to lower conflict intensity relations) in both

Cohort B and Cohort C. Those results were statistically significant, but do these higher relative risk ratios have a practical significance for practitioners? The following analysis of Hypothesis 4b provides insights on this issue, as it explored the relationship between high conflict intensity and performance.

Attribute Analysis

Although the focus of Hypothesis 4a was the investigation of high conflict and spillover, it was worthwhile to explore the relationship between high conflict and the presence of various student attribute characteristics. Of the various attributes examined (see detailed tables in Appendix B), characteristics related to the grade point average (GPA) of the rater or the ratee were most noteworthy. There were two statistically significant findings associated with this attribute. First, there was a moderate negative correlation between high conflict and the ratee's GPA for concurrent Term 1 directed relations in Cohort A (QAP correlation coefficient of -.536, p = .009) and a weaker negative correlation between high conflict and the ratee's GPA for Term 1-Term 2 directed relations in Cohort C (QAP correlation coefficient of -.254, p = .043).

Summary for Hypothesis 4a

This hypothesis investigated the relationship between high conflict intensity and conflict spillover. The first component of the analysis examined the breadth of conflict spillover among directed relations in each cohort. Results indicated that higher proportions of directed relations experienced conflict spillover if there was at least one project with high intensity conflict. When depth of conflict spillover was analyzed using QAP correlation, correlation coefficients demonstrated a stronger linear relationship between number of projects and number of projects with spillover for directed relations with high conflict intensity. However, these results were not statistically significant at the .05 level and so there is no evidence to support the hypothesis. The

calculations of relative risk of spillover for directed relations with high conflict intensity (relative to directed relations with lower conflict intensity) provided moderate support for Hypothesis 4a; five of the eight relative risk calculations showed statistically significant elevated risk of conflict spillover for directed relations with high conflict intensity (relative to relations with lower conflict intensity).

When each component of the analysis is considered in totality, there was moderate support for Hypothesis 4a. Perhaps more importantly, the evidence to support Hypothesis 4a was generally stronger than the evidence to support Hypothesis 1 or Hypothesis 2. This has implications for practice, suggesting that there is more opportunity or greater risk for potential problems among dyads over time where high conflict intensity exists. As we explore Hypothesis 4b and review open-ended comments by team members, more clarity around this speculation will be provided.

Chapter 9. Hypothesis 4b - High Intensity Conflict and Performance

In the analysis of Hypothesis 4a, moderate but significant support for the relationship between high conflict intensity and conflict spillover was demonstrated for directed MTM relations in each cohort in the data set. Hypothesis 4b extended this analysis by considering the implications of high intensity conflict for directed relations. It is worthwhile to consider the impact of high conflict intensity on project performance for MTM team members, given that conflict spillover was more pervasive or more likely for high intensity directed relations. If it can be demonstrated that high intensity conflict is associated with a higher likelihood of decreased performance outcomes, then reducing the likelihood of high intensity conflict among MTM team members should become a priority for practitioners interested in improving team effectiveness. Thus, Hypothesis 4b posited that high intensity conflict in MTM relations was more likely to be associated with decreased performance, compared to lower conflict in directed relations.

The analysis of Hypothesis 4b consisted of the calculation of relative risk ratios for each cohort and each type of multiple team membership (i.e., concurrent Term 1 MTM, concurrent Term 2 MTM, and Term 1–Term 2 MTM). The relative risk ratios indicated the relative risk of decreased performance for directed relations with high intensity conflict, relative to directed relations with lower intensity conflict. Similar to the analysis in Hypothesis 3, decreased performance in Hypothesis 4b was measured using two different indicators: the rater's project grade relative to the rater's grade point average (GPA), and the rater's project grade relative to the class average project grade.

Performance Indicator 1 - Rater Project Grade Relative to GPA

Tables 29 to 31 show the relative risk of decreased performance for high intensity conflict directed relations (compared to low intensity conflict relations) for Cohort A, Cohort B,

and Cohort C, where performance was measured as the rater's project grade relative to his/her GPA. For each category of MTM, directed relations were divided into two categories (presented in rows of the table): directed relations that included at least one project with high intensity conflict, and directed relations that included at least one project with lower intensity conflict (but no high intensity conflict). The performance outcome of each project undertaken by the dyad was sorted into the categories of 'Decreased Performance' or 'Same or Increased Performance' based on the rater's project grade relative to the rater's grade point average (these data are presented in columns on the left side of the tables). These values were used to calculate the relative risk ratio of decreased performance for directed relations with high intensity conflict (relative to directed relations with lower intensity conflict). The tables also included the total number of project ratings and the total number of directed relations represented by each category of high conflict intensity and lower conflict intensity directed relation. Relative risk calculations (ratios, 95% confidence intervals, and *p* values) are presented in the farthest right column in each table.

Table 29 contains results for Cohort A. As we know from the analysis of previous hypotheses, there were 11 directed relations in this cohort. In other words, there were 11 team members who worked with the same partner on multiple course projects in Term 1 of the program and supplied peer evaluation ratings regarding that partner for each of those multiple projects. According to an examination of the raw data, one of those rater-to-ratee directed relations included at least one project where the rater gave a peer rating below 7.0 when evaluating the ratee. The rater and ratee completed two projects together during Term 1. For both of those projects, the rater's project grade exceeded his or her grade point average. This

information is summarized along the first row of data in the table because this directed relation was categorized as 'High conflict intensity'.

Moving to the second row of data in the table, for the remaining 10 directed relations, each of those raters perceived conflict towards a ratee for at least one project, but gave no peer evaluation ratings below 7.0. Thus, their data were summarized in the 'Lower conflict intensity' row.

Taken together, these 10 rater-to-ratee relations represented a total of 21 projects. Of those projects, only one project received a grade that was lower than the rater's grade point average. The other 20 projects completed by lower conflict intensity directed relations received a grade that was higher than the rater's grade point average.

The final column of this portion of Table 29 shows that the relative risk of decreased performance for directed relations with high conflict intensity was 2.444 times the risk for directed relations with lower conflict intensity. The *p* value of .555 does not meet the threshold of significance, however, so there was insufficient evidence to support Hypothesis 4b for concurrent Term 1 directed relations in Cohort A. In other words, there was insufficient evidence to conclude that the risk of decreased performance is higher for directed relations with high intensity conflict (relative to directed relations with lower intensity conflict).

There was also insufficient evidence to support Hypothesis 4b for concurrent Term 2 directed relations, as the *p* value for the relative risk ratio of 0.808 was $p = .884$. There were no directed relations with high conflict in Term 1 who also worked together during Term 2. Thus, results demonstrated insufficient evidence to support Hypothesis 4b for directed relations in Cohort A.

Table 29

Risk of Decreased Performance for Directed MTM Relations With High Conflict Intensity - Cohort A

Term and conflict intensity	Decreased performance	Same or increased performance	*n* of ratings	*n* of directed relations	Relative risk, 95% CI, and significance
Term 1 multiple team membership (MTM)					
High conflict intensity	0	2	2	1	2.444 (0.126, 47.392)
Lower conflict intensity	1	20	21	10	$p = .555$
Term 2 MTM					
High conflict intensity	0	10	10	4	0.808 (0.047, 14.012)
Lower conflict intensity	4	75	79	30	$p = .884$
Term 1–Term 2 MTM					
High conflict intensity in Term 1	0	0	0	0	n/a (no high conflict relations)
Lower conflict intensity in Term 1	2	67	69	19	

Note. Performance measured as project grade relative to rater's grade point average (GPA).

Table 30 summarizes results for each type of multiple team membership in Cohort B. As with Cohort A, there was insufficient evidence to support Hypothesis 4b for concurrent Term 1 (RR = 1.342, $p = .695$) and concurrent Term 2 (RR = 0.306, $p = .400$) directed relations in Cohort B. However, the relative risk ratio of 2.824 for Term 1–Term 2 directed relations was significant at $p = .045$. The absolute risk of decreased performance was 23.5% (4 of 17) for directed relations with high intensity conflict. The absolute risk of decreased performance was 8.3% (12 of 144) for directed relations with lower intensity conflict. Thus, the relative risk ratio was 23.5%/8.3%, or 2.824. High intensity conflict in directed relations was associated with a

nearly tripled risk of decreased performance, compared to lower intensity conflict. Hypothesis 4b was therefore supported for Term 1–Term 2 directed relations in Cohort B.

Table 30

Risk of Decreased Performance for Directed MTM Relations With High Conflict Intensity - Cohort B

Term and conflict intensity	Decreased performance	Same or increased performance	*n* of ratings	*n* of directed relations	Relative risk, 95% CI, and significance
Term 1 multiple team membership (MTM)					
High conflict intensity	2	17	19	8	1.342 (0.309, 5.837)
Lower conflict intensity	8	94	102	39	$p = .695$
Term 2 MTM					
High conflict intensity	0	11	11	4	0.306 (0.019, 4.820)
Lower conflict intensity	13	85	98	36	$p = .400$
Term 1–Term 2 MTM					
High conflict intensity in Term 1	4	13	17	5	2.824 (1.024, 7.782)
Lower conflict intensity in Term 1	12	132	144	32	$p = .045$*

*$p < .05$

Note. Performance measured as project grade relative to rater's grade point average (GPA).

Table 31 summarizes results for directed relations in Cohort C. As with the two previous tables, the indicator of performance was the rater's project grade relative to his or her grade point average.

Results for each of the relative risk calculations in Table 31 showed insufficient evidence to support Hypothesis 4b due to *p* values exceeding the $p < .05$ threshold of significance. A *p* value of .362 (RR = 0.593) was calculated for concurrent Term 1 directed relations, a *p* value

of .134 (RR = 0.352) was given for concurrent Term 2 directed relations, and a *p* value of .580 (RR = 0.741) was associated with the relative risk ratio calculation for Term 1–Term 2 directed relations. There were no significant differences in the risk of decreased performance for high intensity conflict versus lower intensity conflict directed relations in this cohort.

Table 31

Risk of Decreased Performance for Directed MTM Relations With High Conflict Intensity - Cohort C

Term and conflict intensity	Decreased performance	Same or increased performance	*n* of ratings	*n* of directed relations	Relative risk, 95% CI, and significance
Term 1 multiple team membership (MTM)					
High conflict intensity	3	32	35	15	0.593 (0.192, 1.825)
Lower conflict intensity	35	207	242	102	*p* = .362
Term 2 MTM					
High conflict intensity	2	30	32	15	0.352 (0.090, 1.378)
Lower conflict intensity	52	241	293	121	*p* = .134
Term 1–Term 2 MTM					
High conflict intensity in Term 1	3	16	19	6	0.741 (0.256, 2.143)
Lower conflict intensity in Term 1	62	229	291	86	*p* = .580

Note. Performance measured as project grade relative to rater's grade point average (GPA).

Performance Indicator 2 - Rater Project Grade Compared to the Class Average Project Grade

The previous three tables displayed results showing the relative risk of decreased performance for directed relations with high conflict intensity (relative to directed relations with lower conflict intensity). The performance indicator used in those calculations Tables 29 to 31

was the rater's project grade relative to the rater's grade point average (GPA). For the following three tables (Tables 32 to 34), an alternate measure of performance was used - the rater's project grade relative to the class average project grade.

When the top portion of Table 32 is examined, we can see that there was one concurrent Term 1 directed relation with high intensity conflict in at least one project. In other words, the rater in that relation evaluated the ratee in that relation with a peer evaluation rating below 7.0 on a scale from 0 to 10 on at least one project. There were 10 directed relations with lower intensity conflict, meaning that there were 10 rater-to-ratee relations where the rater gave a peer evaluation rating that was between 7.0 and 9.9 on a scale from 0 to 10 on at least one project. This directed relation represented two projects (where the same rater provided a peer evaluation rating to the same ratee for two different projects). We can see from the top portion of Table 32 that these 10 directed relations completed a total of 21 with team members. This description and content of the top portion of Table 32 is identical to Table 29. However, the criteria for performance is different in Table 32: the rater's project grade relative to the class average project grade. Each of the 21 projects represented in the top portion of Table 32 was divided into two performance categories depending on the rater's project performance relative to the class average project grade. If the rater's project grade on a project was lower than the class average project grade, that project was tallied in the 'Decreased Performance' column of the table. If the rater's project grade on a project was the same or higher than the class average project grade, that project was tallied in the 'Same or Increased Performance' column of the table. These tallies were used to calculate relative risk, with those results appearing on the rightmost column of the table.

Tables 32 to 34 resemble Tables 29 to 31, but the performance indicator was different in each set of tables and thus the relative risk ratios were different as well. Results for Cohort A (using the second indicator of performance) are summarized in Table 32.

Table 32

Risk of Decreased Performance for Directed MTM Relations With High Conflict Intensity - Cohort A

Term and conflict intensity	Decreased performance	Same or increased performance	*n* of ratings	*n* of directed relations	Relative risk, 95% CI, and significance
Term 1 multiple team membership (MTM)					
High conflict intensity	1	1	2	1	1.500 (0.331, 6.805)
Lower conflict intensity	7	14	21	10	$p = .599$
Term 2 MTM					
High conflict intensity	3	7	10	4	1.394 (0.495, 3.929)
Lower conflict intensity	17	62	79	30	$p = .530$
Term 1–Term 2 MTM					
High conflict intensity in Term 1	0	0	0	0	n/a (no MTM relations with high conflict)
Lower conflict intensity in Term 1	2	67	69	19	

Note. Performance measured as project grade relative to class average project grade.

Results for Cohort A showed insufficient evidence to support Hypothesis 4b. The relative risk ratios above 1.000 suggest increased risk of decreased performance for directed relations with high conflict among concurrent Term 1 directed relations (RR = 1.500) and concurrent Term 2 directed relations (RR = 1.394); however, p values of .599 and .530, respectively, exceeded the threshold value of $p = .05$ for significance. There were no Term 1–Term 2 directed relations with high conflict in the first semester that also worked together in the second semester.

Results for Cohort B using the second performance indicator are shown in Table 33.

Table 33

Risk of Decreased Performance for Directed MTM Relations With High Conflict Intensity - Cohort B

Term and conflict intensity	Decreased performance	Same or increased performance	*n* of ratings	*n* of directed relations	Relative risk, 95% CI, and significance
Term 1 multiple team membership (MTM)					
High conflict intensity	11	8	19	8	1.640 (1.031, 2.611)
Lower conflict intensity	36	66	102	39	$p = .037$*
Term 2 MTM					
High conflict intensity	3	8	11	4	1.162 (0.415, 3.252)
Lower conflict intensity	23	75	98	36	$p = .775$
Term 1–Term 2 MTM					
High conflict intensity in Term 1	11	6	17	5	2.389 (1.536, 3.716)
Lower conflict intensity in Term 1	39	105	144	32	$p < .001$*

*$p < .05$

Note. Performance measured as project grade relative to class average project grade.

Results for Cohort B showed mixed support for Hypothesis 4b. The relative risk ratio for concurrent Term 1 directed relations was 1.640 (significant at $p = .037$). In other words, the risk of decreased performance for directed relations with high conflict intensity was 164% that of lower conflict intensity. There was insufficient evidence to support Hypothesis 4b for concurrent Term 2 directed relations with high conflict intensity (relative to lower conflict intensity), as reflected in the higher *p* value of .775 (RR = 1.162). The risk of decreased performance for Term

1–Term 2 directed relations with high conflict intensity was 2.389 times that of lower conflict intensity; these results were significant at $p < .001$.

The significant results in this table reflected performance outcomes that had different characteristics compared to the previous four tables in this analysis. In Cohort B, the majority of projects by concurrent Term 1 directed relations with high conflict (11 of 19 projects) received grades that were lower than the class average project grade. Similar observations were also found for Term 1–Term 2 directed relations with high conflict intensity, where 11 of 17 projects received grades that were lower than the class average grade. For both of these sets of directed relations, the majority of projects completed by directed relations with lower conflict intensity received grades that were equal to or greater than the class average project grade.

Results for Cohort C are presented in Table 34. There was only moderate support for Hypothesis 4b among directed relations with high conflict intensity in Cohort C. The relative risk of decreased performance for concurrent Term 1 directed relations with high conflict intensity was 1.640 (significant at $p = .007$), relative to directed relations with lower conflict intensity. Among concurrent Term 1 directed relations with high conflict intensity, the majority of projects achieved project grades that were lower than the class average project grade. Conversely, most projects completed by concurrent Term 1 directed relations with lower conflict intensity achieved project grades that were higher than the class average grade for those projects. These were the only significant results for this performance indicator in Cohort C.

The relative risk ratios for concurrent Term 2 directed relations (RR = 0.821, $p = .373$) and for Term 1–Term 2 directed relations (RR = 1.24, $p = .240$) were associated with p values exceeding the $p = .05$ threshold of significance and thus Hypothesis 4b was not supported for those types of multiple team membership in Cohort C.

Table 34

Risk of Decreased Performance for Directed MTM Relations With High Conflict Intensity - Cohort C

Term and conflict intensity	Decreased performance	Same or increased performance	*n* of ratings	*n* of directed relations	Relative risk, 95% CI, and significance
Term 1 multiple team membership (MTM)					
High conflict intensity	23	12	35	15	1.640 (1.233, 2.179)
Lower conflict intensity	97	145	242	102	$p = .007$*
Term 2 MTM					
High conflict intensity	13	19	32	15	0.821 (0.532, 1.268)
Lower conflict intensity	145	148	293	121	$p = .373$
Term 1–Term 2 MTM					
High conflict intensity in Term 1	12	7	19	6	1.242 (0.865, 1.783)
Lower conflict intensity in Term 1	148	143	291	86	$p = .240$

*$p < .05$

Note. Performance measured as project grade relative to class average project grade.

It is worth noting that, for Term 1–Term 2 directed relations with conflict, the majority of raters achieved grades that were lower than the class average project grades; this was true for directed relations with high intensity conflict as well as directed relations with lower intensity conflict and was a unique result that was not found elsewhere in Tables 29 through 34.

Summary for Hypothesis 4b

Hypothesis 4a posited that the relative likelihood of conflict spillover was higher given the presence of high intensity conflict in a directed relation (relative to the presence of lower conflict intensity). Hypothesis 4b extended this linkage by evaluating the relative likelihood of

decreased performance given the presence of high intensity conflict in a directed relation (relative to the presence of lower conflict intensity). A key reason for completing the analysis of Hypothesis 4b was to increase our understanding of an important potential implication of conflict spillover, namely, negative performance outcomes.

To complete the analysis of Hypothesis 4b, two different indicators of individual performance outcome were derived from variables in the data set. The first performance indicator was the difference between the grades that the raters received on projects relative to the raters' grade point averages (GPAs). If a rater experienced high conflict with a ratee, this might result in a project grade that was below the average academic performance (or the performance expectation) of the rater. For example, perhaps the ratee contributed material to a project deliverable that was of a lower quality than the rater would have produced, but the dyad was unable to come to a resolution about improvements so a lower quality deliverable was submitted. The quality of the deliverable might have been objectively satisfactory, but nevertheless of lower quality than the rater's personal expectation.

The second performance indicator was the difference between the grade that the raters received on projects relative to the class average grade for each project. This second performance indicator could be considered to be a more objective benchmark, because the team's deliverables would be evaluated relative to the deliverables of other teams in the course, as well as relative to the Professor's expectations that would (hopefully) be applied consistently to deliverables submitted by all of the teams in the course. Here, a project grade that was lower than the class average grade would be a clear indicator that the team produced a relatively less satisfactory deliverable.

There was a deliberate decision to analyze directed relations with at least one high conflict project, and calculate the relative risk of decreased performance that took into consideration *all* MTM projects completed by that directed relation (and not the high conflict projects only). The reason for doing this was because the analysis of Hypothesis 4b was a conceptual extension of Hypothesis 4a. Recall that Hypothesis 4a explored the relative risk of conflict spillover given the presence of at least one high conflict project. If conflict was high in a project, perhaps the negative emotions from that high conflict might spread to other projects with the rater (resulting in lower peer evaluation ratings in those other projects as well as the high conflict project). Similarly, in Hypothesis 4b, the intention was to observe whether the consequences of high conflict - decreased performance outcomes - also spilled to other projects and not solely the project with high conflict. In other words, Hypothesis 4a assessed whether there was a spillover effect of high intensity conflict (in terms of lower peer evaluation ratings in multiple projects with the ratee) and Hypothesis 4b assessed whether there was a spillover effect of high intensity conflict in terms of performance outcomes.

The analysis of Hypothesis 4b explored the relative likelihood of decreased performance outcomes for directed relations with high intensity conflict, relative to directed relations with lower intensity conflict. In summary, only four of the 16 relative risk ratios presented in Tables 29 through 34 achieved statistical significance at $p < .05$, suggesting limited support for Hypothesis 4b. These four significant results were as follows: 1) Term 1–Term 2 directed relations with high conflict in Cohort B (RR = 2.824, $p = .045$, where performance is the rater's project grade relative to the rater's grade point average); 2) concurrent Term 1 directed relations with high conflict in Cohort B (RR = 1.640, $p = .037$, where performance is the rater's project grade relative to the class average project grade); 3) Term 1–Term 2 directed relations with high

conflict in Cohort B (RR = 2.389, $p < .001$, where performance is the rater's project grade relative to the class average project grade); and, 4) concurrent Term 1 directed relations with high conflict in Cohort C (RR = 1.640, $p = .007$, where performance is the rater's project grade relative to the class average project grade). One of these significant findings was observed for the first performance indicator, while the remaining significant results were observed for the second performance indicator. Thus, there appears to be no pattern in terms of significant findings regarding the type of performance indicator.

On the other hand, all of the significant findings (regardless of type of performance indicator) featured relative risk ratios that were higher than 1.000. Where results were significant, they were all consistent in demonstrating an increase in risk of decreased performance for directed relations with high conflict (relative to directed relations with lower conflict intensity). The increased risk of decreased performance is consistent with literature suggesting that high conflict intensity can have a negative impact on performance (e.g., O'Neill et al., 2013). (If there were significant results with relative risk ratios below 1.000, this would imply that there was a lower risk of decreased performance for directed relations with high conflict intensity - a counter-intuitive finding.).

Two further observations are of interest because they suggest a pattern concerning the lack of significant results. First, there were no significant relative risk results for any type of directed relations with high conflict in Cohort A (see Tables 29 and 32). Perhaps this reflects the low number of high conflict directed relations in Cohort A (resulting in higher p values due to the smaller sample size). Perhaps the reasons for high conflict were more easily resolved for virtual team members so that project deliverables for the other MTM teams were not impacted.

Or, perhaps high conflict intensity and lower conflict intensity have comparable impacts on performance in virtual team environments.

Second, regardless of the performance indicator, there was insufficient evidence to support Hypothesis 4b for concurrent Term 2 directed relations with high conflict in any of the cohorts. This is apparent upon examination of the middle portion in Tables 29 to 34. Regardless of performance indicator or cohort, the proportion of MTM projects with decreased performance was comparable for directed relations with high conflict as well as directed relations with lower conflict intensity. Perhaps students in the second semester of the program had developed more effective team processes such as conflict management and were thus able to produce high quality deliverables despite the presence of conflict. Alternately, perhaps by this point in time, relationship conflicts were generally resolved and task conflicts were the main source of conflict; if debates around task result in better decision-making, then perhaps the conflict was ultimately beneficial for those team members.

Results for concurrent Term 2 directed relations with high conflict intensity from Hypothesis 4a show that conflict spillover was widespread for concurrent Term 2 directed relations. For example, Table 28 shows that 14 of 15 directed relations with high conflict in Cohort C (or 93.3%) experienced conflict spillover. This is in comparison to only 41 of 121 directed relations with lower conflict intensity in Cohort C (or 33.9%) that experienced conflict spillover. Yet, the risk of decreased performance for concurrent Term 2 directed relations with high conflict was statistically comparable to the risk of decreased performance for concurrent Term 2 directed relations with lower intensity conflict. Conflict spillover was clearly prevalent for concurrent Term 2 directed relations with high conflict, yet performance outcomes were statistically similar to their counterparts with lower intensity conflict spillover. Conflict was

occurring in projects, including at least high conflict project, but this doesn't seem to have affected project performance for concurrent Term 2 directed relations. This general observation has positive implications for practice, as it possibly speaks to the benefits of familiarity, trust, and/or cohesion as factors that ameliorate the performance impacts of high intensity conflict. These factors did not appear to be consistently present among concurrent Term 1 directed relations with high conflict, or among Term 1–Term 2 directed relations that included high intensity conflict in the first semester.

In Hypothesis 1 through Hypothesis 4b, attempts to explain findings were hampered by lack of understanding about reasons for conflict. In Hypothesis 5, efforts were made to address this. Conflict spillover and performance impacts of different types of conflict will be examined in the next chapter.

Chapter 10. Hypothesis 5a - Conflict Type and Conflict Spillover

The first three hypotheses examined the prevalence and performance outcomes of conflict spillover for team members who participated together on multiple projects. In the fourth hypothesis, results suggested that conflict spillover and performance patterns differed somewhat for directed relations with high intensity conflict, relative to relations with lower conflict intensity. The fifth hypothesis examined conflict spillover and performance patterns related to conflict type. This hypothesis was divided into two parts. Hypothesis 5a proposed that directed MTM relations with relationship conflicts were more likely to be associated with conflict spillover, compared to directed relations with task or process conflicts. Subsequently, Hypothesis 5b explored the association between relationship conflict and performance outcomes.

The analysis for Hypothesis 5a comprised multiple components, each examining relationship conflict and spillover from a different perspective. First, a distribution of peer evaluations by conflict type was summarized. The second and third components examined the association between relationship conflict and conflict spillover. The fourth component of the analysis summarized the relative risk of conflict spillover for directed relations with relationship conflict, relative to directed relations with task and/or process conflict. The final component consisted of a two-part attribute analysis. The first part of the attribute analysis explored the strength of association between relationship conflict and presence (or absence) of the attributes. The second part of the attribute analysis explored whether the presence of specific team member attributes was more or less likely to be associated with relationship conflict.

The data used for the analysis of this hypothesis were a subset of the overall data set. Due to variations in the design of peer evaluation forms across the courses and/or decisions by raters not to provide open-ended comments describing reasons for conflict, it was not possible to

ascertain conflict types for all responses where the rater perceived conflict towards the ratee. Accordingly, for directed relations where conflict was perceived but the conflict type was not discernable, all peer evaluations for those directed relations were excluded from the analysis in Hypothesis 5a and 5b.

Frequency Distribution of Conflict Types

Before examining conflict spillover patterns, it is worthwhile to examine a frequency distribution summary of peer evaluation ratings by conflict type (see Table 35). The table is organized by cohort and type of multiple team membership (i.e, concurrent Term 1 MTM, concurrent Term 2 MTM, and Term 1–Term 2 MTM).

Table 35 summarizes the frequency distribution of peer evaluations based on conflict type(s). For most of the of peer evaluations, the reason(s) for the rating could be categorized into multiple conflict types. For example, among concurrent Term 1 directed relations with conflict, only 1 of 15 peer evaluations was characterized as having one type of conflict (process conflict, in this example). On the other hand, 9 of 15 peer evaluations were characterized as having all three types of conflict (task, process, and relationship conflict). The prevalence of conflict that could be categorized into multiple conflict types), illustrated in the final column of the table, was an unexpected finding. Literature on team conflict types tends to conceptualize conflict into clearly delineated types (e.g., De Wit et al., 2011). Most of the peer evaluations in this data set, however, describe conflict with characteristics in multiple categories of conflict type.

A second general finding from Table 35 was that the most common conflict type was process conflict for nearly all cohorts and forms of multiple team membership. The two exceptions to this were for concurrent Term 1 directed relations in Cohort B, and for Term 1–Term 2 directed relations in Cohort C. For both of these exceptions, the most common conflict

type was relationship conflict. This was an interesting finding because many scholars prefer to consider task versus relationship conflict and omit process conflict or conflate it with either task or relationship conflict (see Chapter 2 literature review). Later in the Discussion chapter, specific reasons for conflict will be explored and most commonly cited reasons will be identified.

A third general finding was that the frequency of process or relationship conflict was comparable. For seven of the nine cohorts and forms of multiple team membership, the difference in frequency between the number of ratings with process conflict and the number of ratings with relationship conflict was five or less. For example, there were 34 ratings that included process conflict among Term 2 directed relations in Cohort A. There were 29 ratings that included relationship conflict among this subset of directed relations, a difference in frequency of only five ratings. Conversely, relative to process or relationship conflict, task conflict was less prevalent as a reason for conflict. The lower frequency of task conflict is an interesting finding. It is possible that raters experienced productive task conflict (e.g., they engaged in positive debates about project tasks that were respectful and yielded a mutually satisfactory outcome); however, the rater might not have interpreted these incidents as conflict if the rater perceived no ill-feelings toward the ratee. An examination of open-ended comments by raters uncovered examples of this, implying possible research implications about the definition of conflict when analyzing archival data sets.

Table 35

Distribution of MTM Peer Evaluation Ratings by Conflict Type (Task [T], Process [P], and Relationship [R])

Cohort and term	T	P	R	T & P	T & R	P & R	T & P & R	Total *n* of conflict ratings	*n* of ratings that include T	*n* of ratings that include P	*n* of ratings that include R	*n* of ratings with multiple conflict types
Cohort A												
Term 1 MTM	0	1	0	2	0	3	9	15	11 (73.3%)	15 (100.0%)	12 (80.0%)	14 (93.3%)
Term 2 MTM	0	5	0	1	1	10	18	35	20 (57.1%)	34 (97.1%)	29 (82.9%)	30 (85.7%)
Term 1–Term 2 MTM	0	3	1	3	1	4	20	32	24 (75.0%)	30 (93.8%)	26 (81.3%)	28 (87.5%)
Cohort B												
Term 1 MTM	0	1	4	2	1	6	20	34	23 (67.6%)	29 (85.3%)	31 (91.2%)	29 (85.3%)
Term 2 MTM	0	2	0	1	0	2	10	15	11 (73.3%)	15 (100.0%)	12 (80.0%)	13 (86.7%)
Term 1–Term 2 MTM	0	4	3	3	0	5	20	35	23 (65.7%)	32 (91.4%)	28 (80.0%)	28 (80.0%)
Cohort C												
Term 1 MTM	0	14	14	12	3	24	114	18	129 (71.3%)	164 (90.6%)	155 (85.6%)	153 (84.5%)
Term 2 MTM	0	29	14	5	2	14	61	125	68 (54.4%)	109 (87.2%)	91 (72.8%)	82 (65.6%)
Term 1–Term 2 MTM	0	12	20	9	4	20	82	147	95 (64.6%)	123 (83.7%)	126 (85.7%)	115 (78.2%)

Note. MTM = multiple team membership

In the analysis of this hypothesis, a decision was made to use a conflict classification scheme consisting of three conflict types because of the possibility that task conflict might be project-specific. If process conflict were conflated with task conflict, this might obscure the specific reason for spillover. Given that the most common type of conflict in this data set was process conflict and the least common type of conflict was task conflict, the decision to distinguish between task and process conflict appears to have been reasonable.

Breadth of Conflict Spillover Among Directed MTM Relations With Relationship Conflict

The association between conflict spillover and relationship conflict was evaluated in different ways. Results in Table 36 summarize the overlap of conflict spillover with the presence of relationship conflict across directed relations in the data set. This represents an indicator of the breadth of conflict spillover among directed relations with relationship conflict. Two data matrices were constructed and compared using the Jaccard similarity measure in UCINET social network analysis software. The first matrix (*relconyn*) contained values of 1 to indicate the presence of directed relations where the rater experienced relationship conflict in at least one project with the ratee (for Term1 to Term 2 directed relations, the rater experienced relationship conflict in at least one term 1 project). Values of 0 were assigned to directed relations where other types of conflict were experienced on at least one project but relationship conflict was not perceived on any of those projects. The second matrix (*spillyn*) contained values of 1 for directed relations with conflict in more than one project, and values of 0 for directed relations with conflict in only one project but not more than one.

Results showed a mix of low-moderate to strong association between relationship conflict and conflict spillover, depending on the cohort and form of multiple team membership. Thus, for this indicator of conflict spillover, there was mixed support for Hypothesis 5a. Jaccard

coefficients ranged from .375 (for concurrent Term 2 directed relations in Cohort B) to .857 (for concurrent Term 1 directed relations in Cohort A).

Table 36

Jaccard Similarity Coefficients by Semester and Cohort - Conflict Spillover for Relationship Conflict and All Conflict

Cohort and term	Jaccard coefficient (directed relations with relationship conflict)	Jaccard coefficient from Hypothesis 1 and Hypothesis 2 (directed relations with any conflict type)
Cohort A		
Term 1 multiple team membership (MTM)	.857 (7 directed relations, 14 ratings)	.636 (11 directed relations, 23 ratings)
Term 2 MTM	.650 (20 directed relations, 51 ratings)	.618 (34 directed relations, 89 ratings)
Term 1–Term 2 MTM	.818 (11 directed relations, 37 ratings)	.895 (19 directed relations, 69 ratings)
Cohort B		
Term 1 MTM	.409 (22 directed relations, 60 ratings)	.575 (47 directed relations, 121 ratings)
Term 2 MTM	.375 (8 directed relations, 19 ratings)	.225 (40 directed relations, 109 ratings)
Term 1–Term 2 MTM	.600 (15 directed relations, 67 ratings)	.645 (37 directed relations, 161 ratings)
Cohort C		
Term 1 MTM	.760 (89 directed relations, 213 ratings)	.761 (117 directed relations, 277 ratings)
Term 2 MTM	.403 (72 directed relations, 171 ratings)	.402 (137 directed relations, 328 ratings)
Term 1–Term 2 MTM	.600 (65 directed relations, 209 ratings)	.652 (92 directed relations, 310 ratings)

Three distinct patterns emerged in the consideration of the Jaccard similarity coefficients in the second column of the table. The first pattern was that, for each form of multiple team membership, the association between relationship conflict and conflict spillover was consistently higher for relations in Cohort A (one online class section of students) than for relations in Cohort B (one colocated class section of students) or Cohort C (two colocated class sections, with enrollment shuffling at the midway through the program).

The second pattern was that for each form of multiple team membership, the association between relationship conflict and conflict spillover was the same or higher for relations in Cohort C than for relations in Cohort B. Taken together, these two patterns suggested a stronger association between relationship conflict and conflict spillover for virtual team members, who do not have the same opportunities to get to know each other as their counterparts in colocated teams. Furthermore, among colocated team members, the weaker association between relationship conflict and conflict spillover was observed among team members in a stable and consistent environment (where all team members and all potential team members interacted in the same classroom environment for the duration of the two-semester program). Cohort C contained the least stable pool of actual and potential team members because the students in the two sections of that cohort were re-assigned to the other section part way through the program.

The third pattern was that, for all cohorts, the association between relationship conflict and conflict spillover was stronger for concurrent Term 1 directed relations than for concurrent Term 2 directed relations. One implication of this finding is that team members who are new and unfamiliar, working in an unfamiliar environment (the first semester of a graduate studies program), may experience relationship conflict issues with their concurrent Term 1 team members that persist across multiple concurrent projects in the first semester of the program.

However, this situation evolves by the time students are in the second term of the program - the association between relationship conflict and spillover weakens for concurrent Term 2 directed relations.

The final column of Table 36 contains the Jaccard coefficients for all directed relations in the data set (measuring the association between conflict and spillover across directed relations, regardless of conflict type). Of the three patterns characterizing the association between relationship conflict and conflict spillover that were described in the previous paragraphs, the second and third patterns were also present for the overall data set regardless of conflict type. Given the prevalence of relationship conflict in the peer evaluations for all cohorts and forms of multiple team membership, it seems reasonable that the general findings for the subset of directed relations with relationship conflict tracked closely with the overall data set of relations.

Depth of Conflict Spillover Within Directed MTM Relations With Relationship Conflict

Another way to assess the association of conflict spillover with relationship conflict was to understand the depth of conflict spillover throughout projects completed by team members. For example, if a rater participated on four different projects with a ratee and relationship conflict was present in one of these projects, was relationship conflict also perceived by the rater towards the ratee in some or all of the other three projects? The procedure for examining the depth of conflict spillover within directed relations was completed in Hypothesis 1 (the analysis of concurrent conflict spillover), Hypothesis 2 (the analysis of subsequent conflict spillover), and Hypothesis 4a (the analysis of high conflict spillover). This analysis included directed relations where conflict type was known for all conflicts and at least one conflict was a relationship type conflict. Term 1–Term 2 directed relations were excluded from this analysis if there was no relationship conflict in first-semester projects.

Two continuous adjacency matrices were prepared by extracting only the directed relations with relationship conflict. The first matrix (*nummtm*), indicated the number of projects completed by directed relations that had at least one project with relationship conflict. The second matrix (*numcon*) indicated the number of projects with conflict, for each of the directed relations in the *nummtm* matrix. If conflict fully spilled over across all projects within these relations, we would expect the values in both matrices to be identical and the QAP correlation coefficient to equal 1.0. If conflict occurred in a smaller proportion of projects completed by the dyad, then the correlation coefficient would be lower. Matrices were correlated using UCINET's QAP correlation procedure. Results are summarized in Table 37.

Table 37

QAP Correlations by Semester and Cohort - Conflict Spillover for Relationship Conflict and All Conflict

Cohort and term	QAP correlation coefficient (p value) (directed relations with relationship conflict)	QAP correlation coefficient (p value) from Hypothesis 1 and Hypothesis 2 (directed relations with any conflict type)
Cohort A		
Term 1 MTM	- (7 directed relations, 14 ratings)	−.418 (p = .007*) (11 directed relations, 23 ratings)
Term 2 MTM	.415 (p = .930) (20 directed relations, 51 ratings)	.310 (p = .721) (34 directed relations, 89 ratings)
Term 1–Term 2 MTM	.686 (p = .955) (11 directed relations, 37 ratings)	.436 (p = .876) (19 directed relations, 69 ratings)
Cohort B		
Term 1 MTM	.311 (p = .968) (22 directed relations, 60 ratings)	.178 (p = .780) (47 directed relations, 121 ratings)
Term 2 MTM	.635 (p = .982) (8 directed relations, 19 ratings)	.291 (p = .840) (40 directed relations, 109 ratings)
Term 1–Term 2 MTM	−.322 (p = .056) (15 directed relations, 67 ratings)	.201 (p = .766) (37 directed relations, 161 ratings)

Cohort and term	QAP correlation coefficient (*p* value) (directed relations with relationship conflict)	QAP correlation coefficient (*p* value) from Hypothesis 1 and Hypothesis 2 (directed relations with any conflict type)
Cohort C		
Term 1 MTM	.488 (*p* = .774) (89 directed relations, 213 ratings)	.414 (*p* = .736) (117 directed relations, 277 ratings)
Term 2 MTM	−.012 (*p* = .093) (72 directed relations, 171 ratings)	.103 (*p* = .692) (137 directed relations, 328 ratings)
Term 1–Term 2 MTM	.508 (*p* = .796) (65 directed relations, 209 ratings)	.556 (*p* = .725) (92 directed relations, 310 ratings)

Note. QAP = quadratic assignment procedure.

For concurrent Term 1 directed relations in Cohort A, six of the seven directed relations had full conflict spillover (conflicts were reported in both of two projects completed by each directed relation). The seventh directed relation had no spillover (where two projects were completed and only one included conflict). Thus, a correlation coefficient could not be computed and the cell in Table 37 was left blank.

Support for Hypothesis 5a was mixed when depth of conflict spillover was examined for directed relations with relationship conflict. Aside from concurrent Term 1 directed relations in Cohort A (where a correlation was not available), there were eight other QAP correlation coefficients in the second column of Table 37 that measured depth of conflict spillover for directed relations with relationship conflict. Five of these coefficients were higher for directed relations with relationship conflict (coefficients in the second column of the table) compared to directed relations with any type of conflict (coefficients in the fifth column of the table). This finding was observed for concurrent Term 2 directed relations and Term 1–Term 2 directed relations with relationship conflict in Cohort A, for concurrent Term 1 directed relations in Cohort B, and for concurrent Term 1 directed relations in Cohort C. In other words, for directed

relations with relationship conflict, there was a stronger association between number of projects and number of projects with conflict, compared to directed relations with any type of conflict.

For concurrent Term 2 directed relations in Cohort B, the QAP correlation coefficient was substantially higher for relations having at least one project with relationship conflict (QAP correlation coefficient = .635, p = .982) than for directed relations with any conflict type (QAP correlation coefficient = .291, p = .840). An examination of the raw data showed that four of the eight directed relations represented in the calculation were part of the same triad of team members (i.e., student #105 rating student #170, student #170 rating student #105, student #105 rating student #121, and student #170 rating student #121). It appears that conflict among these team members may have skewed the results of the correlation calculation. The number of directed relations with relationship conflict was relatively low compared to other cohorts and forms of multiple team membership, so the higher correlation coefficient of .635 may have been influenced by the dynamics in that particular team.

The QAP correlation coefficient for Term 1–Term 2 directed relations in Cohort B was negative (−.322, p = .056). An examination of the raw data showed that there were a few directed relations who worked together on several projects but had only one project with conflict. For example, student #124 worked together with student #271 on seven projects throughout the program, but perceived conflict towards student #271 on only one of those projects. Two other raters worked with their respective ratees on six projects but perceived conflict on only one of those projects. The correlation coefficient was also negative (−.012, p = .093) for concurrent Term 2 directed relations in Cohort C. The size of the coefficient was nearly zero, so the strength of the negative association was very low. However, the explanation for this negative coefficient is logically the same as for Term 1–Term 2 directed relations in Cohort C. Namely, there was

low conflict spillover across multiple projects for raters who experienced conflict on one of those projects. Substantial coefficient differences were not observed for other types of multiple team membership or other cohorts. None of the QAP correlation coefficients listed in the second column of the table demonstrated significance. Thus, there was mixed support for Hypothesis 5a when this measure of association was employed.

Relative Risk of Conflict Spillover for Directed MTM Relations With Relationship Conflict (Compared to Directed Relations With No Relationship Conflict)

In Hypothesis 4a, relative risk ratios were calculated to determine whether the risk of conflict spillover was higher or lower for directed MTM relations with high conflict in at least one project (relative to directed relations with lower intensity conflict). Similarly, Tables 38 to 40 contain relative risk ratios that were calculated to determine whether the risk of conflict spillover was higher or lower for directed relations with relationship conflict in at least one project (relative to directed relations with conflict that did not include relationship conflict). Tables 38 to 40 are structured in a similar manner as the relative risk tables from Hypothesis 4a. The first columns contain contingency table data used in the calculations of relative risk. The next two columns in each table indicate the number of directed relations and the number of projects represented in the calculations. The final column of each table summarizes the relative risk data for each cohort and type of multiple team membership (i.e., concurrent Term 1 MTM, concurrent Term 2 MTM, and Term 1–Term 2 MTM in each of Cohorts A, B, and C).

Table 38 contains results for Cohort A. The table shows that the absolute risk of conflict spillover for directed relations with relationship conflict was high for each category of multiple team membership: six out of seven concurrent Term 1 directed relations with relationship conflict experienced conflict spillover, 13 out of 20 concurrent Term 2 directed relations with

relationship conflict experienced conflict spillover, and nine out of eleven Term 1–Term 2 directed relations with relationship conflict experienced conflict spillover. However, the number of directed relations that did not include relationship conflict was low (two concurrent Term 1 directed relations, one concurrent Term 2 directed relation, and one Term 1–Term 2 directed relation), and so it was not possible to determine relative risk with statistical confidence. The *p* values were all above the $p < .05$ threshold for significance and therefore Hypothesis 5a was not supported for Cohort A using this measure.

Table 38

Relative Risk of Conflict Spillover for Directed MTM Relations in Cohort A With Relationship Conflict (Relative to Directed Relations With No Relationship Conflict)

Term and conflict type	Conflict spillover?		*n* of directed relations	*n* of ratings	Relative risk, 95% CI, and significance
	Yes	No			
Term 1 multiple team membership (MTM)					
Conflict included relationship type	6	1	7	14	4.875 (0.380, 62.569) $p = .224$
Conflict did not include relationship type	0	2	2	4	
Term 2 MTM					
Conflict included relationship type	13	7	20	51	2.571 (0.228, 28.964) $p = .445$
Conflict did not include relationship type	0	1	1	3	
Term 1–Term 2 MTM					
Conflict included relationship type	9	2	11	37	0.818 (0.619, 1.081) $p = .158$
Conflict did not include relationship type	2	0	2	9	

Table 39 summarizes results for directed relations in Cohort B. As with Cohort A, there was insufficient evidence to support Hypothesis 5a for directed relations in Cohort B. The absolute risk of conflict spillover for directed relations with relationship conflict in Cohort B was not consistent across each type of multiple team membership in this cohort. For Term 1–Term 2 directed relations, the absolute risk of conflict spillover for directed relations with relationship conflict was slightly higher (9 of 15 directed relations experienced conflict spillover). However, for concurrent Term 1 and concurrent Term 2 directed relations, relatively fewer directed relations with relationship conflict experienced conflict spillover. The absolute risk of spillover was low - only nine of 22 concurrent Term 1 directed relations and three of eight concurrent Term 2 directed relations experienced conflict spillover). The number of directed relations with no relationship conflict was low and this contributed to the higher *p* values associated with the relative risk ratios in the final column of Table 39.

Table 39

Relative Risk of Conflict Spillover for Directed MTM Relations in Cohort B With Relationship Conflict (Relative to Directed Relations With No Relationship Conflict)

Term and conflict type	Conflict spillover?		*n* of directed relations	*n* of ratings	Relative risk, 95% CI, and significance
	Yes	No			
Term 1 multiple team membership (MTM)					
Conflict included relationship type	9	13	22	60	1.652
Conflict did not include relationship type	0	1	1	2	(0.143, 19.135) $p = .688$
Term 2 MTM					
Conflict included relationship type	3	5	8	19	3.111
Conflict did not include relationship type	0	3	3	8	(0.205, 47.186) $p = .413$
Term 1–Term 2 MTM					
Conflict included relationship type	9	6	15	67	1.200
Conflict did not include relationship type	1	1	2	4	(0.283, 5.096) $p = .805$

Results for Cohort C are presented in Table 40. Results for Cohort C demonstrate partial support for Hypothesis 5a. There was a much higher number of directed relations with no relationship conflict among concurrent Term 2 directed relations in this cohort, which increased the significance level for that subset of directed relations. The relative risk ratio of 8.861 was significant at $p = .027$. There was a nearly nine-fold increase in risk of conflict spillover for directed relations with relationship conflict compared to directed relations with other types of conflict for concurrent Term 2 directed relations in Cohort C.

Table 40

Relative Risk of Conflict Spillover for Directed MTM Relations in Cohort C With Relationship Conflict (Relative to Directed Relations With No Relationship Conflict)

Term and conflict type	Conflict spillover?		*n* of directed relations	*n* of ratings	Relative risk, 95% CI, and significance
	Yes	No			
Term 1 multiple team membership (MTM)					
Conflict included relationship type	68	21	89	213	2.292 (0.461, 11.404)
Conflict did not include relationship type	1	2	3	7	$p = .311$
Term 2 MTM					
Conflict included relationship type	29	43	72	171	8.861 (1.279, 61.384)
Conflict did not include relationship type	1	21	22	51	$p = .027$*
Term 1–Term 2 MTM					
Conflict included relationship type	39	26	65	209	0.900 (0.494, 1.639)
Conflict did not include relationship type	4	2	6	14	$p = .731$

*$p < .05$

In summary, Table 38 to 40 show that the absolute risk of conflict spillover for directed relations with relationship conflict was high for Cohort A. However, the number of directed

relations with no relationship conflict was low, so the relative risk ratio *p* value was high and results were not significant. For Cohorts B and C, the absolute risk of conflict spillover for directed relations with relationship conflict was high for some forms of multiple team membership (i.e., Term 1–Term 2 directed relations in Cohorts B and C, and concurrent Term 1 directed relations in Cohort C). On the other hand, the absolute risk of conflict was lower for concurrent Term 1 and concurrent Term 2 directed relations in Cohort B, and concurrent Term 2 directed relations in Cohort C. With the exception of concurrent Term 2 directed relations, relative risk ratio values were not significant for Cohort B or Cohort C because of low counts of directed relations with no relationship conflict.

Thus, there was not sufficient evidence to support Hypothesis 5a using relative risk ratio calculations because of the low counts of directed relations with no relationship conflict; *p* values exceeded the threshold for significance. In the sole instance where the counts of directed relations with no relationship conflict was sufficiently high to yield significant results, the relative risk of conflict spillover was nearly nine-fold higher for directed relationship with relationship conflict (relative to directed relations with no relationship conflict). It is difficult to draw any firm conclusions from this particular analysis, because significant results were observed for only one form of multiple team membership in only one cohort.

Attribute Analysis

An attribute analysis was conducted to assess the relationship between student attributes (age, gender, grade point average (GPA), and domestic versus international status) and relationship conflict. Detailed data tables are located in Appendix B while selected findings are presented here.

Table 41 summarizes results of the attribute analysis measuring the association between relationship conflict and age-related attributes.

Table 41

QAP Correlations of Age Attributes With Relationship Conflict

Cohort and term	*n* of directed MTM relations	Rater's age (*rrage)*	Ratee's age (*reage)*	Rater's age difference from ratee (*diffage)*
Cohort A				
Term 1 MTM	9	−.569 (p = .031*)	0.542 (p = .959)	−.641 (p = .030*)
Term 2 MTM	21	−.240 (p = .016*)	.188 (p = .977)	−.276 (p = .018*)
Term 1–Term 2 MTM	13	−.507 (p = .028*)	.401 (p = .964)	−.586 (p = .027*)
Cohort B				
Term 1 MTM	23	.154 (p = .990)	.165 (p = .988)	.023 (p = .989)
Term 2 MTM	11	.020 (p = .979)	.292 (p = .976)	−.228 (p = .024*)
Term 1–Term 2 MTM	17	.171 (p = .980)	−.871 (p = .016*)	.676 (p = .974)
Cohort C				
Term 1 MTM	92	−.026 (p = .033*)	−.043 (p = .035*)	.011 (p = .959)
Term 2 MTM	94	−.064 (p = .141)	.072 (p = .850)	−.099 (p = .153)
Term 1–Term 2 MTM	71	.083 (p = .948)	−.169 (p = .040*)	.236 (p = .970)

Note. QAP = quadratic assignment procedure; MTM = multiple team membership.

*$p < .05$

Most of the significant age-related findings in Table 41 were observed for directed relations in Cohort A. For example, moderate and significant negative correlations between the rater's age (*rrage*) and relationship conflict (*relconyn*) were observed for concurrent Term 1 directed relations (QAP correlation coefficient = −.569, p = .031), concurrent Term 2 directed relations (QAP correlation coefficient = −.240, p = .016), and Term 1–Term 2 directed relations

(QAP correlation coefficient = −.507, p = .028) in Cohort A. Moderate and significant negative correlations were also observed in Cohort A between the the rater and ratee age difference (*diffage*) and relationship conflict (*relconyn*) for concurrent Term 1 directed relations (QAP correlation coefficient = −.641, p = .030), concurrent Term 2 directed relations (QAP correlation coefficient = −.276, p = .018), and Term 1–Term 2 directed relations (QAP correlation coefficient = −.586, p = .027).

Further investigation of the underlying data confirmed that these negative correlations were due to relatively younger raters perceiving relationship conflict towards relatively older ratees. Perhaps younger raters resented their older team members, who may have been more confident with their opinions, more assertive regarding team leadership, or less sympathetic towards their fellow team members; a review of rater and ratee comments, presented in a subsequent chapter, may provide insights to increase our understanding of these results.

While the significant findings for Cohort A were consistent across different forms of multiple team membership, the results for directed relations in Cohort B were mixed. In Cohort B, only three significant associations were observed. Of particular note are is a moderate to strong negative correlation with relationship conflict for Term 1–Term 2 directed relations: ratee's age (*reage* - QAP correlation coefficient = −.871, p = .016). The strong negative correlation for ratee's age suggests that, for this particular subset of directed relations, it was older raters who perceived relationship conflict with younger ratees. This was not observed for any of the forms of multiple team membership in Cohort A. Conversely, the moderate negative correlations between rater's age and relationship conflict that were observed in Cohort A were absent in Cohort B.

Results for Term 1–Term 2 directed relations in Cohort C were similar as for Cohort B for Term 1–Term 2 directed relations, with significant negative correlations for ratee's age and age difference between rater and ratee. However, the values of the correlation coefficients were lower for those directed relations in Cohort C (QAP correlation coefficient = −.169, p = .040 for *reage*. Also in Cohort C, there were two significant correlations for concurrent Term 1 directed relations: relationship conflict and rater's age (*rrage* - QAP correlation coefficient = −.026, p = .033), and relationship conflict and ratee's age (*reage* - QAP correlation coefficient = −.043, p = .035). However, the values of the correlation coefficients suggested that the associations were quite weak.

These findings for age-related attributes are intriguing because the attribute analyses for the other hypotheses revealed very few significant age-related correlations with conflict spillover or high conflict intensity, whereas several significant associations were found with relationship conflict.

Similarly interesting results were found for the association between relationship conflict and grade point average (GPA) attributes. A selection of results are shown in Table 42. For directed relations in Cohort A, there were modest to moderate negative and significant correlations between relationship conflict (*relconyn*) and rater's GPA (*rrgpa*). For concurrent Term 1 directed relations, the QAP correlation coefficient was −.082 (p = .035), for concurrent Term 2 directed relations, the QAP correlation coefficient was −.094 (p = .019), and for Term 1–Term 2 directed relations, the QAP correlation coefficient was −.217 (p = .016). There were also negative and significant correlations between relationship conflict and the ratee's GPA (*regpa*), and these correlation coefficients were stronger than the aforementioned rater GPA coefficients. For concurrent Term 1 directed relations, the QAP correlation coefficient was −.612

(p = .027). For concurrent Term 2 directed relations, the QAP correlation was −.481 (p = .016). Finally, for Term 1–Term 2 directed relations, the QAP correlation coefficient was -.400 (p = .025) .

Table 42

Association of Grade Point Average (GPA) Attributes With Relationship Conflict

Cohort and term	*n* of directed MTM relations	Rater's GPA (*rrgpa)*	Ratee's GPA (*regpa)*	Rater's GPA difference from ratee (*difgpa)*
Cohort A				
Term 1 MTM	9	−.082 (p = .035*)	−.612 (p = .027*)	.418 (p = .966)
Term 2 MTM	21	−.094 (p = .019*)	−.481 (p = .016*)	.229 (p = .975)
Term 1–Term 2 MTM	13	−.217 (p = .016*)	−.400 (p = .025*)	.361 (p = .966)
Cohort B				
Term 1 MTM	23	−.128 (p = .011*)	.072 (p = .991)	−.244 (p = .012*)
Term 2 MTM	11	−.207 (p = .025*)	−.585 (p = .025*)	.399 (p = .973)
Term 1–Term 2 MTM	17	−.163 (p = .018*)	.268 (p = .975)	−.435 (p = .014*)
Cohort C				
Term 1 MTM	92	−.068 (p = .037*)	−.085 (p = .040*)	.022 (p = .958)
Term 2 MTM	94	.040 (p = .835)	−.029 (p = .164)	.051 (p = .826)
Term 1–Term 2 MTM	71	.072 (p = .946)	−.104 (p = .048*)	.179 (p = .939)

*p < .05

A review of the raw data shows that these associations were typically due to raters with higher grade point averages perceiving relationship conflict towards ratees with lower grade point averages. Perhaps the raters felt a sense of frustration that the ratees were not understanding or executing their tasks competently; maybe the raters ended up re-doing the

ratees' work and the raters felt resentful about this. It is possible that these negative feelings were particularly acute for the online student in Cohort A. Given the lack of ongoing personal interaction, it might have been more difficult to discover incompatibilities regarding academic abilities of team members. The strength of negative correlations between relationship conflict and ratee GPA diminishes from concurrent Term 1 to concurrent Term 2 to Term-1 to Term 2 directed relations, so perhaps raters were getting to know their online classmates better over time and during the second half of the program they tried to avoid being on the same team with ratees who were not academically compatible with them.

The negative association between ratee GPA and relationship conflict was weak or absent for students in Cohort B or Cohort C. Perhaps colocated team members were able to ascertain academic compatibility more easily during classroom interactions so they may have been more likely to self-select compatible partners (it is not unusual for the most engaged students to choose to sit at the front of the class and the least engaged students to sit in the back rows, for example - visual cues such as this would be absent for online students in Cohort A). An exception occurred in Cohort B, where there was a moderately strong negative association between relationship conflict and ratee GPA (QAP correlation coefficient = .585, p = .025) for concurrent Term 2 directed relations. Perhaps Cohort B students in the second semester of the program may have been placed into groups by their Professor rather than self-selecting their partners, so raters had no choice but to work with classmates that they knew were less scholarly.

A final observation regarding the selected findings in Table 42 is the weak/moderate negative and significant correlations between GPA difference and relationship conflict among concurrent Term 1 directed relations and Term 1–Term 2 directed relations in Cohort B. An examination of the data shows that there were large GPA gaps between the rater and ratee for

directed relations with relationship conflict as well as directed relations with no relationship conflict. However, there were many more directed relations with relationship conflict who had smaller (positive and negative) GPA differences between the rater the the ratee, which produced a stronger negative correlation between GPA and relationship conflict.

The second type of attribute analysis explored the probability of relationship conflict, given the presence of a specific attribute. Each probability was compared to the overall probability of relationship conflict for the Hypothesis 5a data set using an exact binomial test, to identify which attributes were more or less likely to be associated with relationship conflict compared to the reference data set. Full data tables are provided in Appendix B. Results indicate that the pattern of probabilities of relationship conflict for directed relations with specific attribute variables were consistent with the overall probability of relationship conflict for the overall data set used in the analysis of Hypothesis 5a. In other words, no significant findings were observed.

Summary for Hypothesis 5a

The intent of Hypothesis 5a was to explore the role of conflict type with respect to multiple team membership conflict spillover. Previous research suggests that task-related conflict can be productive if differing points of view are discussed and debated among group members to achieve improved outcomes. Since task-related conflict would likely be project-specific, we would not expect task-related conflict to spill over for team members whose multiple projects in this data set related to entirely different courses and topics. As discussed earlier in the literature review, a more pressing concern would be relationship conflict because team member personalities and temperaments would be more stable across multiple projects during the two-semester program. If interpersonal conflict occurred between team members because of

personality differences, that discord might persist across multiple concurrent projects and also across subsequent projects. Thus, the implications of personality conflict between members of multiple project teams might be more widespread than personality conflict between team members who only work together on one project.

The analysis for Hypothesis 5a comprised multiple approaches and findings suggested mixed support for Hypothesis 5a. There was insufficient evidence to show that MTM relations with relationship conflicts were more likely to be associated with conflict spillover. The data set was characterized by directed relations whose conflict was overwhelmingly multiplex. Varying on the form of multiple team membership and cohort, between 72.8% and 91.2% of MTM projects with conflict (as perceived by the rater towards the ratee) included relationship conflict. Between 83.7% and 100.0% of MTM projects with conflict included process conflicts. Finally, between 54.4% and 75.0% of MTM projects with conflict included task conflicts. Between 65.6% and 93.3% of all MTM team member evaluations by raters included more than one type of conflict. Furthermore, as indicated by these summary results, process conflict appeared to be even more prevalent than relationship conflict or task conflict in this data set. The practical implications of these findings are discussed in a future chapter.

The first type of analysis for this hypothesis explored the prevalence or breadth of conflict spillover across the directed relations with relationship conflict (as perceived by the rater towards the ratee). In other words, was relationship conflict spillover isolated to a small proportion of relations in the data set, or was it a more widespread phenomenon? Results revealed three interesting patterns. First, the association between relationship conflict and conflict spillover was consistently stronger for the online relations in Cohort A compared to the other (colocated) cohorts. Second, the association between relationship conflict and conflict

spillover was stronger for the stable colocated cohort (Cohort B) compared to the shuffled, larger colocated cohort (Cohort C). Third, the association between relationship conflict and conflict spillover was stronger for concurrent Term 1 directed relations than for concurrent Term 2 directed relations.

The second type of analysis explored the depth of conflict spillover for directed relations with relationship conflict. If two team members worked together on several projects, did relationship conflict persist across some or all of those projects, or was it isolated to one project? The results of this analysis showed no significant findings; the *p* values for all QAP correlations were all above the $p < .05$ threshold for significance. The correlation coefficients themselves generally suggested that the depth of spillover for directed relations with relationship conflict was stronger relative to directed relations with any type of conflict (particularly for directed relations in Cohort A and for concurrent Term 1 directed relations in all cohorts).

The third type of analysis calculated relative risk ratios that compared the probability (risk) of conflict spillover for directed relations with relationship conflict versus the probability of conflict spillover for directed relations with non-relationship conflict. Possibly due to the low counts of directed relations with non-relationship conflict, results of this analysis (with only one exception) did not yield statistically significant findings. To be clear, these findings do not imply that the relative risk of conflict spillover was comparable between the two groups; rather, we cannot draw any meaningful conclusion from the results, as indicated by the high *p* values generated by the calculations. There was one relative risk ratio with statistical significance: for concurrent Term 2 directed relations in Cohort C, there was a nearly nine-fold risk of conflict spillover for directed relations with conflict spillover, compared to directed relations with other

types of conflict. As this result was not observed for other forms of multiple team membership in other cohorts, we cannot draw meaningful conclusions from these results.

The final two components of analysis for this hypothesis examined the relationship between relationship conflict and the presence of various rater or ratee attributes (age, gender, grade point average (GPA), domestic versus international status). There were interesting and significant associations between relationship conflict and certain age- and GPA-related attributes. These findings were particularly intriguing because patterns were different for online versus colocated cohorts. For example, results suggested the younger raters in Cohort A perceived relationship conflict towards older ratees. However, there was some evidence suggesting that older raters perceived relationship conflict towards younger ratees in Cohort B (however, this pattern was not present for directed relations in Cohort C). With respect to grade point average, results suggested that raters with higher grade point averages perceived relationship conflict towards ratees with lower grade point averages in Cohort A (the online cohort), while this pattern was not observed for colocated students in Cohort B or Cohort C.

In summary, the analysis provided some support for Hypothesis 5a. However, the topic of conflict type appears to be quite nuanced in the context of multiple team membership and deserves further study with more sophisticated analysis. The findings here showed that relationship conflict was widespread, that there was evidence that relationship conflict spills over across multiple projects, and that relationship conflict dynamics were influenced by form of multiple team membership (e.g., concurrent Term 1 MTM versus concurrent Term 2 MTM), type of cohort (i.e., online versus stable colocated versus mixed colocated), and attributes of the raters and ratees (e.g., age-related attributes, grade point average attributes). In the next chapter,

the concept of relationship conflict is extended, to explore the performance outcomes for MTM raters who perceive relationship conflicts towards their MTM team members.

Chapter 11. Hypothesis 5b - Relationship Conflict and Performance Outcomes

In Hypothesis 5a, analysis of the data set showed that directed relations with relationship conflict experienced conflict spillover across multiple projects. Hypothesis 5b examined performance outcomes for directed relations with relationship conflict. This hypothesis proposed that directed relations with relationship conflict were more likely to be associated with decreased performance, compared to relations with task or process conflict.

One of the findings from Hypothesis 5a was that most conflicts were multiplex, that is, characterized by more than one conflict type. Furthermore, the most common type of conflict was process conflict. Many directed relations with relationship conflict also experienced other types of conflict with the same team member. Therefore, Hypothesis 5b contrasted directed relations having relationship conflict with directed relations having 'conflict that doesn't include relationship conflict' (instead of 'task or process conflict').

Team member performance outcomes were measured using two different variables: the rater's project grade relative to his or her grade point average (GPA), and the rater's project grade relative to the class average project grade. These were the same performance variables that were used earlier in the analysis of Hypothesis 3 and Hypothesis 4b. Indeed, the relative risk ratio analysis and the structure of the results tables for Hypothesis 5b closely paralleled the ones described in those earlier chapters. Recalling Hypothesis 3, that analysis determined whether lower performance was more likely to occur among directed relations experiencing conflict spillover (relative to directed relations who experienced conflict that did not spill over). For Hypothesis 4b, the analysis determined whether lower performance was more likely to occur among directed relations experiencing high intensity conflict (relative to directed relations who experienced lower intensity conflict). For Hypothesis 5b, the analysis examined whether lower

performance was more likely to occur among directed relations experiencing relationship conflict (relative to directed relations who experienced conflict that was not relationship conflict).

As with the analysis of Hypothesis 5a, directed relations were categorized as having relationship conflict if at least one of the rater's MTM projects with the ratee included relationship conflict. For Term 1–Term 2 relations, at least one project with relationship conflict occurred in Term 1 to be included in these calculations. Tables 43 to 45 describe results for performance outcomes that considered the rater's project grade relative to the rater's grade point average (GPA). Tables 46 to 48 describe results for performance outcomes represented as the rater's project grade relative to the class average project grade. Contingency table data used in the calculations of risk are shown on the left side of the tables are structured similarly to tables in the analysis of Hypothesis 3 and Hypothesis 4b. The final column of each table presents the relative risk ratio along with confidence intervals and *p* values. If Hypothesis 5b were supported, then we would expect the relative risk ratios to be 1.000 or higher with *p* values below the *p* = .05 threshold of significance.

Performance Indicator 1 - Rater Project Grade Relative to Rater GPA

Tables 43 to 45 show the relative risk of decreased performance for directed relations with relationship conflict, where performance was measured as the rater's project grade relative to the rater's grade point average (GPA). Table 43 contains results for Cohort A.

Results from Table 43 demonstrated that the overwhelming number of projects that were completed by directed relations with relationship conflict in Cohort A received a project grade that was the same or higher than the rater's grade point average. Similarly, most directed relations with non-relationship conflict typically also achieved increased performance outcomes.

The relative risk ratios for all three forms of multiple team membership were not statistically significant.

Table 43

Relative Risk of Decreased Performance for Directed Relations With Relationship Conflict, Relative to Directed Relations With No Relationship Conflict - Cohort A

Term and conflict type	Decreased performance	Same or increased performance	*n* of ratings	*n* of directed relations	Relative risk, 95% CI, and significance
Term 1 multiple team membership (MTM)					
Directed relation included at least one project with relationship conflict	0	14	14	7	0.111 (0.005, 2.315) p = .156
Directed relation included conflict that is not relationship type	1	3	4	2	
Term 2 MTM					
Directed relation included at least one project with relationship conflict	2	49	51	20	0.385 (0.022, 6.723) p = .513
Directed relation included conflict that is not relationship type	0	3	3	1	
Term1 to Term 2 MTM					
Directed relation included at least one project with relationship conflict in Term 1	2	35	37	11	1.316 (0.069, 25.276) p = .856
Directed relation included conflict that is not relationship type	0	9	9	2	

Note. Performance measured as project grade relative to the rater's grade point average (GPA).

Table 44 shows results for directed relations in Cohort B.

Table 44

Relative Risk of Decreased Performance for Directed Relations With Relationship Conflict, Relative to Directed Relations With No Relationship Conflict - Cohort B

Term and conflict type	Decreased performance	Same or increased performance	*n* of ratings	*n* of directed relations	Relative risk, 95% CI, and significance
Term 1 multiple team membership (MTM)					
Directed relation included at least one project with relationship conflict	3	57	60	22	0.100 (0.017, 0.588) $p = .011$*
Directed relation included conflict that is not relationship type	1	1	2	1	
Term 2 MTM					
Directed relation included at least one project with relationship conflict	3	16	19	8	3.150 (0.181, 54.834) $p = .431$
Directed relation included conflict that is not relationship type	0	8	8	3	
Term 1–Term 2 MTM					
Directed relation included at least one project with relationship conflict in Term 1	5	62	67	15	0.809 (0.052, 12.639) $p = .880$
Directed relation included conflict that is not relationship type	0	4	4	2	

*$p < .05$

Note. Performance measured as project grade relative to the rater's grade point average (GPA).

Results for Cohort B in Table 44 showed a similar pattern as the results for Cohort A. Again, most direct relations with relationship conflict experienced similar or increased

performance outcomes. There were significant results for concurrent Term 1 directed relations (RR = 0.100, p = .011). However, this particular result should be interpreted with caution because there was only one concurrent Term 1 directed relation with non-relationship conflict. That rater completed two projects with the ratee in the first semester of the program. One of those projects received a grade that was below the rater's GPA while the other project received a grade that was the same or higher than the rater's GPA. The absolute risk of decreased performance for this relation was 50.0% (one out of two projects). For the directed relations with relationship conflict, only 5.0% (three of 60 projects) received a grade that was below the raters' respective GPAs. The relative risk ratio of 0.100 suggests a negligible decrease in relative risk for directed relations with relationship conflict, but that result was based on very low counts (one directed relation accounting for two MTM projects) for the category of directed relations with non-relationship conflict.

Results for Cohort C are shown in Table 45.

Consistent with the findings for Cohort A and Cohort B, a minority of directed relations in Cohort C experienced negative performance outcomes regardless of the presence of relationship conflict in the relationship. The absolute risk of decreased performance for directed relations with relationship conflict was statistically comparable to the absolute risk of decreased performance for directed relations with non-relationship conflict. Thus, the relative risk ratios were close to 1.000 for all three forms of multiple team membership in Cohort C and the p values were not significant.

Table 45

Relative Risk of Decreased Performance for Directed Relations With Relationship Conflict, Relative to Directed Relations With No Relationship Conflict - Cohort C

Term and conflict type	Decreased performance	Same or increased performance	*n* of ratings	*n* of directed relations	Relative risk, 95% CI, and significance
Term 1 multiple team membership (MTM)					
Directed relation included at least one project with relationship conflict	30	183	213	89	0.986 (0.156, 6.237) $p = .988$
Directed relation included conflict that is not relationship type	1	6	7	3	
Term 2 MTM					
Directed relation included at least one project with relationship conflict	32	139	171	72	0.868 (0.472, 1.596) $p = .648$
Directed relation included conflict that is not relationship type	11	40	51	22	
Term 1–Term 2 MTM					
Directed relation included at least one project with relationship conflict in Term 1	51	158	209	65	0.569 (0.297, 1.091) $p = .090$
Directed relation included conflict that is not relationship type	6	8	14	6	

Note. Performance measured as project grade relative to the rater's grade point average (GPA).

Performance Indicator 2 - Rater Project Grade Relative to Class Average Project Grade

The second indicator of performance outcome was the rater's project grade relative to the class average project grade. Tables 46 to 48 contain results from the relative risk ratio analysis for Cohorts A, B, and C, respectively.

Results for Cohort A (Table 46) showed a similar pattern of non-significance that was observed in the previous three tables. Most project grades for directed relations with relationship conflict exceeded the overall class average for those projects. These similarities were also observed for directed relations with non-relationship conflict. The relative risk ratios for all three forms of multiple team membership were not significant.

Table 46

Relative Risk of Decreased Performance for Directed Relations With Relationship Conflict, Relative to Directed Relations With No Relationship Conflict - Cohort A

Term and conflict type	Decreased performance	Same or increased performance	*n* of ratings	*n* of directed relations	Relative risk, 95% CI, and significance
Term 1 multiple team membership (MTM)					
Directed relation included at least one project with relationship conflict	6	8	14	7	1.714 (0.283, 10.391) $p = .558$
Directed relation included conflict that is not relationship type	1	3	4	2	
Term 2 MTM					
Directed relation included at least one project with relationship conflict	11	40	51	20	1.769 (0.126, 24855) $p = .672$
Directed relation included conflict that is not relationship type	0	3	3	1	

Term and conflict type	Decreased performance	Same or increased performance	*n* of ratings	*n* of directed relations	Relative risk, 95% CI, and significance
Term 1–Term 2 MTM					
Directed relation included at least one project with relationship conflict in Term 1	1	36	37	11	0.790 (0.035, 17.949) $p = .882$
Directed relation included conflict that is not relationship type	0	9	9	2	

Note. Performance measured as project grade relative to class average project grade.

The findings for Cohort B (Table 47) continued the pattern demonstrated in previous tables. The absolute risk of decreased performance for all forms of multiple team membership in Cohort B was low; most projects completed by directed relations with relationship conflict outperformed the overall class average on those projects. Directed relations with non-relationship conflict also tended to outperform the class average. Relative risk ratios were non-significant.

Table 47

Relative Risk of Decreased Performance for Directed Relations With Relationship Conflict, Relative to Directed Relations With No Relationship Conflict - Cohort B

Cohort B	Decreased performance	Same or increased performance	*n* of ratings	*n* of directed relations	Relative risk, 95% CI, and significance
Term 1 multiple team membership (MTM)					
Directed relation included at least one project with relationship conflict	17	43	60	22	1.721 (0.133, 22.291) $p = .678$
Directed relation included conflict that is not relationship type	0	2	2	1	
Term 2 MTM					
Directed relation included at least one project with relationship conflict	8	11	19	8	3.368 (0.500, 22.700) $p = .212$
Directed relation included conflict that is not relationship type	1	7	8	3	
Term 1–Term 2 MTM					
Directed relation included at least one project with relationship conflict in Term 1	18	49	67	15	1.075 (0.188, 6.140) $p = .936$
Directed relation included conflict that is not relationship type	1	3	4	2	

Note. Performance measured as project grade relative to class average project grade.

Results for Cohort C are presented in Table 48.

Table 48

Relative Risk of Decreased Performance for Directed Relations with Relationship Conflict, Relative to Directed Relations With No Relationship Conflict - Cohort C

Term and conflict type	Decreased performance	Same or increased performance	*n* of ratings	*n* of directed relations	Relative risk, 95% CI, and significance
Term 1 multiple team membership (MTM)					
Directed relation included at least one project with relationship conflict	92	121	213	89	1.512 (0.464, 4.927) $p = .493$
Directed relation included conflict that is not relationship type	2	5	7	3	
Term 2 MTM					
Directed relation included at least one project with relationship conflict	78	93	171	72	0.831 (0.617, 1.119) $p = .223$
Directed relation included conflict that is not relationship type	28	23	51	22	
Term 1–Term 2 MTM					
Directed relation included at least one project with relationship conflict in Term 1	107	102	209	65	0.896 (0.559, 1.437) $p = .649$
Directed relation included conflict that is not relationship type	8	6	14	6	

Note. Performance measured as project grade relative to class average project grade.

Results for Cohort C were similar to the previous tables in the sense that the relative risk ratios were not statistically significant and thus showed insufficient evidence to support Hypothesis 5b. Unlike the previous tables, Table 48 contains three instances where a (slight)

majority of projects underperformed the class average. These instances included concurrent Term 2 and Term 1–Term 2 directed relations whose conflict did not include relationship conflict, and Term 1–Term 2 directed relations whose conflict did include relationship conflict. Despite these anomalies, the relative risk ratios for concurrent Term 2 and Term 1–Term 2 were nevertheless non-significant; the two categories of directed relations (i.e., those who experienced relationship conflict and those who experienced non-relationship conflict) were not statistically different from each other.

Summary for Hypothesis 5b

Taken together, the findings from Tables 43 to 48 provided insufficient evidence to support Hypothesis 5b. We cannot conclude with confidence that directed relations with relationship-type conflict had lower performance outcomes relative to directed relations whose conflict did not include relationship conflict.

For the first performance outcome indicator (rater project grade relative to rater grade point average [GPA]), both categories of directed relations -. those who experienced relationship conflict and those who experienced non-relationship conflict - had a higher probability of similar or increased performance outcomes rather than decreased performance outcomes. This was true for all cohorts and all forms of multiple team membership, and it was also consistent with the findings from Hypothesis 3. Relative risk ratio calculations indicated that the probabilities of decreased performance were not statistically different for the relationship conflict and non-relationship conflict categories.

There was one significant finding, observed for concurrent Term 1 directed relations in Cohort B (Table 44). In that instance, the relative risk of negative performance was higher for directed relations with non-relationship conflict (RR = 0.100, $p = 0.011$). However, while this

result was statistically significant, it is not practically relevant because the relative risk calculation incorporated only one directed relation with non-relationship conflict among the concurrent Term1 directed relations in Cohort B.

The second performance indicator was rater project grade relative to the class average project grade. Using this measure of performance, the results for each form of multiple team membership and cohort demonstrated insufficient evidence to support Hypothesis 5b. Lack of significance in each of the relative risk ratios in Tables 46 to 48 suggest that the two categories of directed relations (i.e., those with relationship conflict and those with non-relationship conflict) were not statistically different from each other.

Although two different measures of performance outcomes were employed in this analysis, there was insufficient evidence to support Hypothesis 5b. It was determined from Hypothesis 5a that relationship conflict was prevalent among MTM team members and that it did spill over to other MTM projects. However, for this data set the presence of relationship conflict did not appear to be associated with negative performance impacts. Perhaps MTM team members in the data set developed trust/cohesion by working together on multiple projects, so that they were able to resolve personality conflicts in a productive way (e.g., using a conflict avoidance strategy) that did not impact performance outcomes.

Chapter 12. Discussion, Implications, and Future Research

In reviewing the findings from the quantitative analysis, six key themes were identified. First, an overarching theme is that multiple team membership was generally determined to be beneficial, as indicated by quantitative comparisons between MTM and non-MTM dyads as well as open-ended comments that raters provided in their evaluations of team members that they worked with across multiple projects.

Second, conflict spillover among directed MTM relations was not uncommon. The majority of directed relations in all cohorts experienced some conflict spillover when working on concurrent projects in Term 1. Furthermore, the proportion of directed relations with concurrent conflict spillover decreased in Term 2 for each cohort and spillover was also lower for students who experienced conflict in Term 1 and worked with the same partner again in Term 2. However, there was insufficient evidence to indicate a contagion effect, whereby conflict might potentially infect most or all of the multiple projects that a dyad completed together.

Third, where conflict was observed by raters, it was typically of lower intensity and team members were able to surmount their problems and achieve positive outcomes. Although higher intensity conflict was less common among MTM team members compared to non-MTM team members, there was some evidence demonstrating that the relative risk of conflict spillover was higher for directed relations who perceived higher intensity conflict (relative to lower intensity conflict). There was also some evidence to suggest that performance outcomes decreased for directed MTM relations with higher intensity conflict relative to directed MTM relations with lower intensity conflict.

Fourth, there were some distinct differences among cohorts - particularly students in Cohort A, who worked exclusively in virtual teams and who tended to experience more conflict in general and more high conflict intensity than MTM team members in the collocated cohorts.

Fifth, an analysis of conflict type showed that all three major types of conflict (i.e, task, process, and relationship) were perceived by MTM raters and most conflict was multiplex, complicating our understanding of the role of relationship conflict and spillover.

Finally, an examination of rater and/or ratee attributes showed few patterns or consistency, but there were intriguing findings suggesting associations between some student attributes (particularly for age and grade point average (GPA)) and conflict.

These themes have implications for researchers and practitioners and each are discussed below.

Theme 1: Multiple Team Membership is Generally Beneficial

A quantitative description of the data set indicated that perfect peer evaluation ratings (i.e., ratings of 10.0) were more prevalent among MTM dyads than among non-MTM dyads. With respect to project performance, average project grades were higher for MTM dyads relative to non-MTM dyads. Open-ended comments from MTM raters supported these quantitative findings and provided additional insights.

Some team members appreciated working with the same partners on multiple projects because those partners could be relied upon. For example, one rater commented, “I have worked with these members before so I knew what to expect and overall we worked well together” (Case 2543). When students worked with team members for the first time, their lack of familiarity may have reduced their team efficiency. As one team member noted, “I learned that it is often necessary to add in more time to a rough draft’s due date, especially if I am working with people

I have not worked with before" (Case 2655). Some students clearly recognized synergies that derived from working repeatedly with the same partners. According to one rater, "[we] have worked [together] for a few projects now and have learned that we work very well together, who has strengths in what, and how we can maximize those to make the most of our final product" (Case 794).

Even though the entire program duration was less than one year, many students realized that working with the same partners in multiple course projects created benefits that helped to improve their team processes and outcomes. These findings are consistent with existing literature describing benefits of multiple team membership (e.g., Pluut et al., 2014).

Despite acknowledging the advantages of multiple team membership, some team members also recognized detrimental aspects to multiple team membership. One rater commented:

> Working with the majority of these girls has become routine as we tended to gravitate towards working together on a few other group projects. This has pros and cons. It's a pro because we know how each other works and what each others' strengths are, but it's also a con because we can get a little sick of each other or the need of some to "always" have a specific task. (Case 761)

Similarly, another MTM team member noted, "In reflecting on the entire year, I am beginning to wonder if it would have been beneficial to switch groups and work with new people to get different experiences" (Case 2676). These ambivalent observations are consistent with literature (e.g., Mortensen et al., 2007) describing multiple team membership as having disadvantages that may offset its benefits.

Theme 2: Conflict Spillover is Not Uncommon But is Not Contagious

As the quantitative findings from Hypothesis 1 and Hypothesis 2 indicated, conflict was not uncommon among MTM dyads. This is perhaps not surprising, given the context of the projects and pressures of working in multi-project settings. At the start of the program, all of the

students found themselves in a new environment, interacting with classmates and Professors that they had no prior familiarity with. There were considerable time pressures to learn the material and complete coursework. Because the program met educational requirements for professional designations in their career fields, there was additional pressure to achieve good grades in their assessments. The environment was ripe for task conflict, process conflict, and relationship conflict.

Pressures arising from having to work on multiple concurrent projects have been noted by other MTM researchers (e.g., Leroy, 2009; Zika-Viktorsson et al., 2006). One team member noted, "With this group assignment our group did struggle with the completion of it. We were all so focused on another assignment that this . . . slipped by us" (Case 1499). Another student noted, "This has been the busiest week for us in the program with several large assignments due so it has been slightly more frustrating for all of us . . ." (Case 599). However, some students found that their stresses were ameliorated by support from sympathetic and supportive team members, as illustrated in the following two comments:

> [T]his week the assignment was due, we had a lot of other assignments due for other courses. I felt a lot of pressure at that time and was able to rely on my teammates for support and assistance where needed. The calm nature of my other group members help to keep me on task and I have confidence in the fact that I would be able to complete the assignment with their help. (Case 2646)

> [She] has been my side-kick since this program started so I may be biased but I have 100% faith in her and her work. She always works with me and I couldn't have survived this program, including this case study report and presentation, without her. (Case 2690)

Aside from individual stress from workload challenges, several MTM team members acknowledged that they experienced interpersonal conflict but were able to overcome their issues successfully. For example, one rater commented, "This is my second group together with her . . . generally, the working was good and we were all able to work beyond our differences" (Case 418). Many explicitly expressed a willingness to work together again despite challenges that they

experienced. As one rater noted, “I found that our group worked really well together and even when we disagreed, we were respectful and would listen to what each other had to say. I would love to work with this group again” (Case 1292). This willingness to work together despite experiencing conflict supports other research (e.g., Jehn, 1997) describing factors that influence conflict outcomes. In the aforementioned student reflection, the emotionality was positive even though the student was describing interpersonal conflict. From a team development perspective (Tuckman & Jensen, 1977), it is possible that working together on multiple projects allowed team members to accumulate interactions and experiences, enabling them to move through forming and storming stages and into norming and performing stages. If team members worked together on only one project, there would be fewer interactions so they might not be able to overcome challenges faced in the storming stage of development.

Not all MTM team members were able to develop trust and cohesiveness after working together on other projects. Some team members were disappointed to find that positive experiences in one course project did not guarantee a positive experience in other projects. One team member noted, “I was very disappointed with the effort from [her]. I have known her to be a good team member but her effort and focus for this project seemed to be lacking” (Case 2676). Conversely, some team members had the opposite experience: “I have worked with [her] before in other classes and found her collaboration in this group far better than in other groups” (Case 294). These two comments, although opposite to each other, demonstrate that for some MTM team members the experience was not always consistently positive or consistently negative. Furthermore, these comments support quantitative findings from Hypothesis 1 and Hypothesis 2 which demonstrated insufficient evidence to suggest that interpersonal conflict between MTM team members was contagious across their multiple projects.

Theme 3: High Conflict Intensity is Less Common But is Potentially More Problematic than Lower Conflict Intensity

A quantitative description of the data set showed that high-intensity conflict ratings were more common for non-MTM dyads than for MTM dyads. However, the analysis of Hypothesis 4 showed that the conflict spillover was more prevalent for directed MTM relations with high intensity conflict compared to directed MTM relations with lower conflict intensity. Findings also suggested that the relative risk of decreased performance outcomes was higher (relative to directed relations with lower conflict intensity) for some cohorts and forms of multiple team membership. Qualitative comments provided some interesting insights to complement these findings.

Some students had a wide range of experiences with team members whom they worked with on multiple projects. For example, student #105 worked (the rater) with student #121 (the ratee) on three projects during the second semester of the program. In one project, student #105 gave a rating of 10.0 to student #121, along with the following comment: "This team was amazing! I feel that we worked very well together. . . . All pieces of the assignment were completed early and done well. Overall, I would love to work with any of these ladies again" (Case 1001). The rater received a grade of 88.1% on that project. In a concurrent project, student #105 gave a rating of 7.4 to student #121, along with this observation: "I felt that she waited for me to create a timeline for final completion. . . . She did not offer suggestions for what components to include. . . . I had to review the plan with her as she had not attended class to learn about that component" (Case 2987). The rater received a grade of 88.8% on that project. In a third concurrent project, student #105 gave a rating of 3.0 to student #121. The rater provided the following observation, "Did not fully complete her part so sent it out asking for help. . . . Did

not follow up with how her part was coming along, just washed her hands of it" (Case 1499). The rater received a grade of 76.5% on this project. Although it was impossible to determine the overall perception of the rater towards the ratee, this example suggests that the rater realized little benefit from working with student #121 on these concurrent course projects. It is also worth noting that the rater received a much lower grade on the project with the high conflict. On the other hand, this example shows that high conflict intensity is not always fatal to the interpersonal relationship between two team members who work on multiple projects together even though the project outcome was less satisfactory.

Another insight from qualitative comments was that several raters noted that the ratee's contribution needed to be edited or redone by other team members. For example, one rater noted, "[we] had to rewrite his part because no matter how we explained it to [him], he just did not understand or he ignored what we suggested. He was respectful to others and worked hard, but others still had to pick up his slack" (Case 2719). A rater in a different team commented, "Overall was unorganized and produced subpar work, leaving [the] rest of [the] group to edit and rewrite work" (Case 679). This suggests possible resentment by raters who unexpectedly discovered that the ratee did not meet expectations regarding his or her contributions to project deliverables. Remaining group members may have felt compelled to improve the ratee's work while facing deadline pressures. In MTM environments where team members must be particularly mindful of how they allocate their time on various projects (Cummings & Haas, 2012), these types of surprises would be particularly undesirable. This example is also interesting because it shows that the interpersonal conflict might not have translated to decreased performance if other group members improved upon the poor work of team members prior to submitting their deliverables. Of the comments quoted in this example, the project grade

received by the rater who provided the first comment (Case 2719) was 85.5%, which was higher than the class average of 84.5%. The project grade received by the rater who provided the second comment (Case 679) was 72.0%, which was lower than the class average of 75.4%.

In summary, the qualitative analysis demonstrated that high conflict intensity may be problematic in terms of conflict spillover and decreased performance. However, when specific examples were reviewed, the quantitative findings were more nuanced. High intensity conflict may be isolated to a single project without spreading to other projects or it might be undetected, hidden behind positive project outcomes.

Theme 4: Findings for Each Cohort Were Typically Distinct

This research was quasi-experimental in the sense that teams in all three cohorts completed the same group projects in the same graduate program; despite some demographic differences in the cohorts, all students were unfamiliar to each other at the start of the program and there was no expectation of prior knowledge or experience with course concepts. However, the quantitative analysis of the hypotheses demonstrated a lack of consistency in findings across the three cohorts. This consistent lack of consistency reinforces the importance of recognizing unique contextual and team-compositional factors when conducting or applying team research. Perhaps the most obvious contextual difference in the cohorts was that students in Cohort A were online learners who had no opportunity to interact with team members in person during the program. Students in Cohort B were collocated and interacted in a classroom with other members of the cohort and during on-campus group meetings with their team members. Students in Cohort C were also collocated but this was a larger cohort that was divided into two separate sections; enrollment in each section was shuffled after the first semester, so that students in the second semester encountered a mixture of familiar and new faces in their classes. It is possible

that these differences contributed to the lack of consistency in the quantitative analysis. The fact that Cohort A students were fully online is an important distinction from the other two cohorts.

It has become generally accepted that conflict in virtual teams may occur because of communication issues. This was apparently an issue for some team members in Cohort A, as noted in the following comment, "I think one of the big things I learned was that because it is online, you cannot read people's emotions, body language, etc. so I instead told myself not to take anything personally" (Case 844). Inability to perceive and interpret non-verbal communication cues is a challenge for virtual team members, but there is another aspect to online communication which may pose challenges that are exacerbated in MTM settings. A team member from Cohort A provided a detailed comment which speaks to this challenge:

> The importance of communication, especially with it being entirely online, became very evident with our group in order to get full participation from all group members. We had issues with communication with members not answering and this affected our group report being completed on time. I reached out before the report date to both of my group members, saying if they needed help to let me know. I did not hear back from any of them until last minute and found that neither had their part completed. By the time this was discovered, it was too late for me to complete the rest of the report to have it done on time. [team member X] had her part done by the deadline, however, [team member Y] did not. In the following day we could not get in touch with [team member Y], putting us further behind. If there was good communication, I believe our project would have been completed on time and to the best of our ability. Secondly, I believe that I learned that if I do not hear from group members I should take over and do some of their work on my own, in case the work is not being done. . . . The last thing I learned from this group assignment is time management. It is important to meet deadlines and have things completed by the set deadlines that have been laid out in advance. (Case 789)

This comment is interesting in light of other research on multiple team membership and virtual teams. Recalling the literature review from an earlier chapter, in a study of global virtual teams, Maynard et al. (2012) found that team effectiveness was significantly and positively related to time spent in planning and preparation. However, they determined that less time was spent on planning and preparation when task interdependence was low, and when team members were working on multiple concurrent projects. These two factors were detrimental to

performance; however, online communication technologies might help virtual teams become more efficient in planning and preparation and thus improve performance outcomes. The comment provided by the rater in the aforementioned quote exemplifies some of the concepts in the Maynard et al. research.

There appeared to be low task interdependence among members of the rater's team, and so regular contact among group members was not necessary. As a full-time student, the rater would have been completing other group projects and coursework concurrently, which meant that the focal time on any particular project was likely limited. There was insufficient time to effectively address the lack of timely communication and incomplete work by fellow team members. As a result, the rater's project grade was 67.2% on this project, compared to a class average of 80.6% on the project. Communication challenges in this particular example were more complex than misinterpretation of virtual communications. Also of interest in this rater quotation is the rater's willingness to take on the work of other team members in the absence of their communication. Earlier in this chapter, other team members were shown to be unhappy at having to re-do work that other team members were responsible for. And yet, in this example of the virtual team member, proactively completing the work allocated to other team members was preferable to waiting for erstwhile silent team members to start communicating. In the final portion of the rater's comment, the rater emphasized the importance of time management - a typical challenge faced by team members working in multi-project environments.

Although virtual Cohort A team members differed from collocated team members in Cohorts B and C, comments from collocated team members suggests that perhaps this 'virtual versus collocated' distinction may be somewhat blurred. A rater on a collocated team observed, "The only suggestion I would have for her is to attempt to be a more active face-to-face team

member, rather than simply e-mailing us her parts" (Case 2748). This is an interesting comment, albeit unfortunate in its lack of additional detail. Perhaps the rater particularly valued face-to-face collaboration as a means of improving task collaboration, to strengthen team cohesion, or to improve the inter-personal relationship with the ratee. Perhaps the ratee did not want to interact in person with team members because of conflict or lack of fellowship with his or her team members. Or, perhaps the ratee, as someone who had competing priorities arising from multiple project responsibilities, felt that it was simply more efficient to interact with team members using electronic communications. Regardless, it is interesting that some collocated team members chose to use information and communications technology while other team members explicitly preferred in-person interactions (particularly while sharing material for project deliverables). The boundary between online and collocated teamwork became blurred, making the distinction potentially problematic.

Another collocated rater made the following observation:

> Overall, it was great to work with this group; we met and discussed the outline and how we could break it up fairly. We set deadlines and everyone met the deadlines with no excuses. We started a Google doc so that everyone could edit the final report which worked great for our busy schedules. There were no complaints and we were all very happy with the final draft of our project. (Case 289)

The comment shown above is especially interesting because the rater - in a collocated cohort - described effective steps to complete a project that would be consistent with recommendations from the Maynard et al. (2012) study of virtual teams. The team engaged in planning and preparation, mindful of task allocation and time management. Although tasks were allocated, internet technology was used to collaborate interdependently while respecting team member workloads. The team member appeared to be satisfied with the process and the outcome. Again, the boundary between virtual and collocated teamwork blurred, but more effectively in this example.

Theme 5: Reasons for Conflict Span Multiple Conflict Categories

The quantitative analysis in Hypothesis 5a and Hypothesis 5b explored relationship conflict in connection with conflict spillover and performance outcomes. Findings regarding relationship conflict and conflict spillover were mixed, although the analysis generally suggested that spillover was relatively more prevalent among MTM dyads in Cohort A and also in concurrent Term 1 relations in all cohorts.

There was generally insufficient evidence to demonstrate a relationship between relationship conflict and performance outcomes, contrary to extensive research on conflict types (e.g., De Dreu & Weingart, 2003; De Wit et al., 2011; Jehn, 1995). Explanations for this divergence in findings for performance outcomes and relationship conflict are not clear. Methodological limitations associated with secondary data used for the analysis may explain the lack of convergence (e.g., how performance outcomes were measured, how conflict types were defined). Alternately, it is possible that multiple team membership might be a moderating factor; perhaps synergies from working together on multiple projects increases performance outcomes regardless of conflict type. Perhaps the prevalence of multiplex conflict demands more sophisticated analytical techniques than the ones employed here. Of all the themes summarized in this discussion, this is particularly worthy of future research.

It was possible to distinguish specific reasons for conflict by examining open-ended comments and multi-item scales in the peer evaluation instruments in some of the courses in the data set. Detailed reasons for conflict were coded and ranked in descending order of frequency. The rankings of the five most common reasons for conflict in each cohort are presented in Table 49.

Table 49

Ranking of Top Reasons for Conflict (Among Directed MTM Relations With and Without Conflict Spillover)

Reason for conflict rating	Cohort A ranking	Cohort B ranking	Cohort C ranking
Didn't actively initiate/contribute useful ideas, let others solve problems or generate ideas	1	2	1
Didn't keep in touch with the group, ignored emails, didn't reply to emails in reasonable time	3	3.5	-
Didn't understand or sympathize with other people's problems or their feelings, wasn't sensitive to the feelings of other team members	-	-	5
Missed deadlines	4	3.5	4
Quality of his/her work was unsatisfactory or could have been improved	2	1	2
Wasn't a very good leader	5	5	3

Note. MTM = multiple team membership.

Results from Table 49 indicate that four of the top five reasons for conflict in each cohort were common to all three cohorts, albeit in somewhat different orders. The most common reasons for conflict spanned multiple conflict types and it was difficult to categorize each reason into a single conflict type based on short descriptive statements. For example, one of the most common reasons for conflict was “didn’t actively initiate/contribute useful ideas, let others solve problems or generate ideas”. This reason could have been classified as relationship conflict if the team member did not contribute ideas because he or she was lazy. If the team member did not contribute ideas because he or she was busy, then one might argue that this was process conflict rather than relationship conflict; perhaps team meetings were not planned effectively to allow sufficient time or opportunities for all team members to contribute ideas. These classification

challenges may be faced by other researchers who attempt to categorize conflict using a bottom-up approach of thematic coding. Or, if researchers use existing survey instruments in primary research to ask respondents to categorize their conflict, classification challenges might be experienced by the respondents as they mentally try to clarify and categorize their conflict perceptions.

Theme 6: Rater and Ratee Attributes May Play Important Roles as Moderators of MTM Conflict

Most of the quantitative analysis included an analysis of rater and/or ratee attributes. The choice of specific attribute variables - age, gender, grade point average (GPA), and domestic versus international status - was based entirely on convenience, that is, the availability of secondary data in the archival data set. Most of the variations for each attribute variable (such as 'female rater-male ratee') were formulated based on general social network theories of homophily and heterophily (Borgatti et al., 2013).

The analysis of attributes were exploratory and somewhat tangential to the main research questions about multiple team membership (they tended to be associated more with conflict than with multiple team membership), and so findings were mostly inconclusive for each type of attribute and hypothesis. Significant findings from the attribute analysis were included in the quantitative analysis chapters; they represent interesting starting points for future researchers wishing to explore connections between multiple team membership and team member attributes. Selected examples of open-ended comments from raters add depth to those quantitative findings.

Age

The range of ages in this data set were possibly more narrow than one might encounter in most workplaces. However, for some hypotheses, there was evidence to suggest that age gaps

between the rater and ratee might be relevant. For example, a 45 year old team member made the following observation:

> What I have learned from this assignment is that being a mature student has its advantages and disadvantages. The advantages to this is that I bring life experience and previous education to the group. In addition, I bring other intangibles such as time management skills and project management skills. However, these skills were not always appreciated as some of the members, due to their life priorities, may not have taken the same approach to the project in the same fashion that I did. At times, because of the difference in maturity, I felt more of a "father figure" than that of a team member. Reminding some of the members to "not forget their due date" was portrayed as "fatherly" than that of a team member providing input. (Case 2774)

Comments from one of this student's fellow group members - who was 23 years old- suggest that the 'father figure' role was not appreciated:

> He was a very difficult individual to work with... He would not take others' opinions into consideration unless they were along the same line as his thoughts and ideas. He constantly fought us on what we thought would be the best way to approach the assignment. He was constantly degrading and rude to another group member about the work she submitted and refused to accept it 'as is' at times, when in my opinion there was absolutely nothing wrong with it. As stated previously, he did do a significant amount of work on the assignment; however, this was only because he and another group member would meet frequently without the rest of the group. He always thought that his opinion was the only one that mattered and that only he was able to produce a high quality of work. (Case 2779)

Age is an interesting and relevant variable for MTM research because the variable itself cannot be changed when significant associations between age and conflict in multiple team membership environments are identified. It is also possible that there is a more clear connection between age and relationship conflict, if age differences generate feelings of inter-generational or elder/superior versus younger/inferior resentment. As demonstrated in the comments above, it is particularly helpful to research insights from both the rater and the ratee, to help researchers (or practitioners) to understand the influence of age on conflict dynamics.

Domestic Versus International Status

There were both positive and negative comments from domestic students regarding their international team members. For example one domestic team member made the following comment about an international student team member: "It was beneficial to have international students also in the group because I learned new angles of thoughts and point of views from them as well" (Case 1523). Conversely, some team members noted that issues with English fluency created additional challenges for the team: "His work was thorough, although did require me to edit it for spelling and grammar issues more than the other group members" (Case 588, international student rater to domestic student ratee). It may be possible to explore this in more depth, in search of patterns relating to communication fluency, conflict management patterns, communication style patterns, culture-related gender dynamic patterns, or other culture-related patterns such as perceptions of time, deadlines, and punctuality. Again, however, an exploration of this type might be more associated with conflict research rather than multiple team membership research and so its practical relevance may be limited for MTM researchers.

Gender

There were no open-ended comments that specifically spoke to gender dynamics or stereotypes, possibly because of a reluctance to appear sexist in tone or message. An examination of comments might reveal gender-based patterns in language usage, but there did not appear to be gender-related conflict patterns in the quantitative analysis of peer evaluation ratings.

GPA

The fourth attribute variable was student grade point average (GPA). Unlike some of the other attribute variables, student GPA might be more relevant for MTM research. Among the significant findings of attribute analysis, GPA attributes (along with age-related attributes) were

most often identified. GPA attributes might be associated with conflict if more academically proficient raters are working with academically weaker team members (or vice versa); this competency gap might manifest in personality clashes if the team members behave dominantly due to confidence in their opinions (or defensively due to lack of confidence). Competency differences might also manifest in task conflict if the more competent team member knows that his or her viewpoint is factually or logically correct and the less competent team member's viewpoint is wrong. Hints of these dynamics were found in open-ended comments. For example, a team member with a GPA of 80% made the following comment about a team member with a GPA of 55%:

> He did not work well as a group, did not communicate with the group, would go off and choose the easiest portions of the assignment to complete without prior conversation then tell us his contribution was complete while the bulk of the assignment was yet to be complete. . . . I would not work with [him] again, the quality of his work was not good. I had to edit the entire portion. (Case 505)

Frustration was perceived in the other direction as well. In the following comment, the rater's GPA was 57% and the ratee's GPA was 70%: "He seems to think his way is the right way, he argues and does not let people finish what they are saying, I feel the way he is going will be wrong and is not what we discussed as a group but there is no winning with him, he is getting to be very difficult to work with" (Case 3623). Based on comments such as this, the attribute of competency - proxied in this research as grade point average - might be worth exploring.

Implications for Practitioners in Project-Intensive Environments

This research has potentially important implications for practitioners in environments where project-based work is common. Project managers or leaders might not be aware of other projects that their team members are working together (or have worked together) on, or how interpersonal dynamics are evolving (or have evolved) on those teams.

Cohesion from multiple team membership appears to generate synergies that are not especially damaged by the presence of conflict. For that reason, multiple team membership should not be discouraged. Indeed, some raters valued having partners who were willing to express differences of opinion. Channelling conflict interactions so that they're respectful and productive is important in helping to ensure that conflict is productive rather than detrimental to relationships and outcomes.

Low- or moderate-intensity conflict did not appear to spill over consistently, nor did it generally produce negative performance outcomes. However, managers or team leaders should not presume that team members will eventually work out their differences if they work together long enough. Higher conflict intensity may have serious consequences in terms of negative emotions and performance outcomes, and efforts should be made to ensure that productive conflict management strategies are employed so that conflict intensity is low or moderate.

Relationship conflict did not appear to be a serious issue for team members who work together on concurrent or subsequent/sequential multiple projects. The most commonly cited reasons for conflict suggest that ineffective team processes (e.g., how to deal with team members who miss internal deadlines, how to deal with team members whose contributions are below expectations of other team members) were more problematic than relationship conflicts.

Employing effective conflict management techniques is important, as is setting expectations, being mindful about (task) interdependencies, and teaching self-managed teams best practices for self-management. Shortcomings in all of these areas were cited as reasons why conflict occurred among team members in the data set examined here.

Managers and team leaders also need to consider the task context/environment to understand potential pressure points that might catalyze conflict. For example, in some

workplaces, everyone might be highly competent but project deadline pressures might produce high stress among team members; some might respond by missing deadlines to produce their best quality work, while other team members might respond by producing lower quality work to meet deadlines. In other workplaces, less qualified team members might be assigned to a team because more qualified candidates are unavailable. In those instances, the problem might lie with the team member rather than the task environment. This highlights the importance of understanding both team member relationships and the environment in which projects take place, so that mitigation or response can be effectively applied. This is particularly true in virtual project environments, or in colocated project environments where some work is done virtually. Findings from this research suggest that conflict spillover was more prevalent, conflict intensity was higher, and negative performance outcomes were more common for team members in the virtual cohort.

Finally, research findings revealed some significant associations between team member characteristics and conflict spillover, hinting at possible patterns that might also be observed in the workplace. Heterophilic characteristics such as large age gaps or competency/proficiency gaps among team members might play a role in conflict dynamics; aside from making changes to team composition, it may be more challenging for managers and team leaders to moderate conflicts that involve resentments, defensiveness, or assertiveness stemming from immutable attributes such as age. This research did not investigate causation, so the implication here is not that managers should only have teams with homophilic characteristics. However, if conflicts do arise and managers or team leaders are attempting to understand the nature of those conflicts, team member characteristics may play a role.

Implications for Researchers

Although tasks and specific team compositions change from project to project, interpersonal relationships are not constrained within the boundaries of one project in MTM environments. Team members may have positive memories of working effectively with specific team members, for reasons such as personality compatibility, compatible expectations around processes (such as getting work done early), or compatible approaches to conflict management. Beliefs in these compatibilities persist beyond project boundaries. In some industries and workplace settings, multiple team membership is the norm rather than the exception. MTM projects may be significant to the success of those organizations, so it is desirable for these teams to be high performing. Further research is needed to better understand MTM environments and identify best practices.

Conflict Complexity - Types, Evolution, and Persistence Across Projects

More research is needed on the topic of conflict types. Task versus process conflicts, or task versus relationship versus process conflicts may be too simplistic in MTM settings where tasks are unique to specific projects but processes and relationships might carry over across multiple projects. When coding reasons for conflict in the present research, there were often many reasons that a student gave his/her group partner a lower rating. It was impossible to determine which specific reasons were the most problematic for raters, or if one reason for conflict evolved into a different reason for conflict. Because of this, it might be worthwhile to conduct primary research with data collection instruments that focus on these complex dynamics.

From the present research, an argument could be made for not conflating process conflict into one of the other two process types. Team member comments such as ‘we worked through our problems and succeeded’ may have been referring to productive task conflicts or they may

have been referring to storming that occurs as members evolve effective norms for team processes. It might be sensible to multi-code descriptions of conflict rather than conflate the conflict into one conflict type only. This increases the complexity of analysis, but it might lead to more insightful findings.

Conflict Intensity

In the present research, the distinction between low and high conflict was determined by identifying from open-ended comments the point at which the rater specifically preferred not to work with the ratee in the future. However, everyone has their own tolerance threshold and the rating of 7.0 that was established here as the threshold between low and high conflict is not one that would necessarily apply to other studies of conflict. It is very much an individual and subjective thing, and every person's personal tolerance threshold would possibly be situation-specific. This presents a challenge for researchers. Low conflict and/or productive conflict might not be fatal to a group, while high conflict is certainly problematic. Yet, how do we define what high conflict is? Is it high intensity of conflict, such as a significant event that caused a relationship to break down irretrievably? Or could a person perceive high conflict as an ongoing accumulation of low conflict events? For many raters, the key reason for a high conflict rating was that the ratee failed to perform at a key point during the project (e.g., by failing to submit his/her promised material by a specific internal deadline, so that there was no time for the rest of the teammates to ensure that a high quality deliverable was submitted). Understanding high intensity conflict is particularly worthwhile in multiple team membership environments, because the present research suggests that high conflict intensity poses greater problems regarding conflict spillover and performance outcomes.

Measuring Conflict Outcomes

In team research, one measure of performance outcome is to compare deliverables to objectives, while considering project constraints, assumptions, and risks that might explain why objectives might not have been met. In MTM environments, because team members might work together concurrently or might work together on future projects, non-tangible outcomes are important as well. If team members don't like working together, then conflict risks are higher and this might jeopardize future project outcomes. In this research, high conflict did not always translate into decreased performance; however, the ill-feelings from the high conflict experience had immediate impacts on the stress and well-being of the team members. It possibly also impacted the team member's willingness to work with that partner in the future. Using non-tangible measures, a team may have been dysfunctional while according to other measures (such as quality of project deliverable), the same team may have achieved great success. Therefore, the use of multi-faceted team effectiveness indicators is recommended.

Online Versus Colocated Teams

Researchers and practitioners acknowledge that best practices for online teams include early opportunities to interact in person to facilitate cohesion-building. Face-to-face meetings of virtual team members may offset some of the interpersonal relationship challenges and may reduce conflict. Some virtual team members in this data set recognized this as contributing to conflict with their partners. On the other hand, many colocated team members in this data set used internet technologies to communicate and conduct teamwork virtually (e.g., video conferencing, extensive emailing) as a means of improving efficiency, and they also experienced some of the communication problems that are more commonly found in virtual teams. This observation is a reminder that the distinction between virtual and colocated teams may not be

easy to identify; there might be a need for researchers to ascertain the extent of virtual processes, tasks, and relationship interactions that occur in colocated project settings. This is relevant for MTM research insofar as conflict spillover appears to be more prevalent for virtual teams relative to colocated teams, but because of higher taskloads and context-switching that occurs with MTM teams, these teams might utilize virtual communication to improve efficiencies and inadvertently increase the risk of conflict (and conflict spillover).

Future Research

The intent of the present research was to explore various aspects of conflict spillover in MTM settings. However, additional directions for future research became apparent while organizing and analyzing the data.

The original data source used for the present research contained information for MTM team members who experienced no conflict on any project, but they were reasonably excluded from the analysis of the hypotheses. Nevertheless, there is an opportunity to compare these categories of team members. Just as the present research identified the most common reasons for conflict among MTM team members, it would also be helpful to understand the most common reasons for giving perfect peer evaluation scores. Findings might increase our understanding of the nature of the positive synergies that occur with multiple team membership, and to identify characteristics and best practices of MTM team members who were highly satisfied with their team members.

Another direction for future research would be to study conflict dynamics for MTM dyads compared to non-MTM dyads, including conflict intensity, reasons for conflict, and performance outcomes. A key reason for studying multiple team membership is the belief that multiple team membership has unique characteristics which manifest in interpersonal

relationships. More clarity on the differences in conflict dynamics between MTM team members and non-MTM team members might yield insights for practitioners seeking to optimize performance in project-based organizations.

Yet another direction for future research is to extend the present exploratory analysis of multiple team membership by using other social network analysis techniques. For example, conflict reciprocity in each dyad was not studied in the present research. Concepts such as reciprocity are core to social network analysis, and would be very useful in the study of interpersonal conflict. It is possible that reciprocated conflict might have different characteristics and outcomes than those described in the present analysis. In addition, social network analysis allows us to understand dynamics of entire groups and sub-groups, above and beyond the level of the dyad. For example, it may be beneficial to explore how some group members might be effective conflict moderators while others might be prone to take sides, resulting in the development of factions.

Finally, the present research did not include an analysis of conflict management strategies or conflict responses. While reviewing the open-ended comments, there was evidence among the open-ended comments that some team members were exhibiting specific conflict strategies such as forcing and yielding. It is unknown whether specific techniques or responses are associated with reciprocal conflict perceptions, conflict spillover, or decreased performance outcomes in multiple team membership settings.

Conclusion

More and more organization and education settings are making use of projects to deliver work. Very often workers and students are involved in multiple projects, sometimes with the same people, at the same time. Multiple team membership occurs when individuals work together on multiple project teams. These team members may not have opportunities to develop ongoing relationships, yet their paths cross again and again in each new project setting. Their relationships aren't continuous and so cohesion and trust (and other effective team processes) may not be fully developed.

Multiple team membership has received limited scholarly attention until recently. For that reason, there continues to be ample opportunity to study this organizational phenomenon further. This would allow us to increase our specific understanding of MTM, so that patterns and best practices for practitioners can be identified. This dissertation represents one attempt to explore this topic by answering the question: "What are the effects of conflict spillover in MTM contexts?"

Five hypotheses were specified. Hypothesis 1 and Hypothesis 2 measured conflict spillover for students who worked together on concurrent project teams within the same semester, and for students who worked together on subsequent project teams in both the first and second semesters of the program. Hypothesis 3 explored performance outcomes for directed MTM relations that experienced conflict spillover. Hypothesis 4a and Hypothesis 4b focused on high intensity conflict, measuring conflict spillover and performance outcomes for directed relations with high intensity conflict. Hypothesis 5a and 5b examined conflict spillover and performance outcomes for directed relations with relationship conflict.

The hypotheses were explored using archival data from secondary sources at a Canadian community college. The data set comprised three cohorts of students who completed a two-semester graduate certificate program at a community college in Ontario during a time period spanning 2015-2017. In this graduate certificate program, there were several courses that included major group projects. At the conclusion of each project, each team member prepared peer evaluations of his/her team members. The peer evaluations comprised numeric ratings and for some of these courses, the evaluations included open-ended comments. Project grades for all projects were also available for analysis of performance outcomes.

The three cohorts had different profiles, based on the size/structure of the cohort and the course delivery format. Cohort A comprised one section of online students who did not interact with classmates in person, and who completed course projects with virtual team members. Cohort B comprised one section of classroom-based students. Cohort C comprised two sections of classroom-based students, where the enrollment of students was shuffled between the two sections half-way through the program. Administrative data pertaining to age, gender, domestic versus international status, and grade point averages were obtained for each student in the data set.

The research methodology featured a mixed-method research design. Working with the available data, it was possible to examine the hypotheses using various analytical procedures. This provided an opportunity to consider the hypotheses from different perspectives. This preliminary quantitative exploration did not include in-depth analysis using advanced statistical techniques, but the results of this research will be helpful in designing a more sophisticated methodology should this researcher revisit this data set. The methodology employed in this

dissertation may nevertheless prove to be helpful for future MTM researchers, who are considering research designs of their own.

Summary of Findings

An analysis of Hypothesis 1 showed that a majority of directed relations experienced concurrent conflict spillover in all cohorts in the first semester of the program. The proportion of directed relations with conflict spillover decreased for concurrent directed relations in Term 2, moreso for Cohorts B and C than for Cohort A. There was insufficient evidence of correlation between the total number of projects and the number of projects with conflict. There were some significant findings pertaining to spillover and age, grade point average (GPA), gender, and domestic versus international status for each cohort. However, none of the findings from the attribute analysis revealed a consistent pattern across forms of MTM or across cohorts.

The analysis of Hypothesis 2 showed that a majority of directed relations who experienced conflict in Term 1 also experienced conflict in at least one Term 2 project (moreso for Cohort A than for Cohort B or Cohort C). Significant correlations between the total number of projects and the number of projects with conflict were not demonstrated. There was little evidence of association between Term 1–Term 2 conflict spillover and the presence of student attributes relating to age, gender, grade point average (GPA), or domestic versus international status.

Analysis of Hypothesis 3 showed that directed relations with conflict were typically more likely to have increased performance rather than decreased performance, where project performance was measured relative to the rater's grade point average (GPA) and also relative to the class average project grade. Only Term 1–Term 2 directed relations in Cohort C showed

significantly higher relative risk of decreased performance (where performance was measured as the rater's project grade relative to the class average).

Hypothesis 4a findings showed that higher proportions of directed relations experienced conflict spillover when there was at least one MTM project with high intensity conflict. These findings were consistent for all forms of multiple team membership in all three cohorts. There were no significant findings for the association between the total number of projects and the number of projects with high intensity conflict. There was some evidence showing increased relative risk of spillover for high conflict directed relations (relative to directed relations with lower conflict intensity); statistically significant results were observed for concurrent Term 1 directed relations in all cohorts, and for concurrent Term 2 directed relations in Cohorts A and C. Significant findings were not observed for Term 1–Term 2 directed relations in any cohort. Analysis of attributes showed that characteristics related to age, gender, grade point average (GPA), and domestic versus international status have significant associations with high intensity conflict. However, these significant attribute associations were not consistently observed across cohorts or forms of multiple team membership.

With respect to Hypothesis 4b, when performance was measured as the rater's project grade relative to the rater's GPA, it was found that directed relations with higher conflict intensity were more likely to have same or increased performance rather than decreased performance. Having said that, the relative risk of decreased performance for high conflict directed relations (relative to directed relations with lower conflict intensity) was found to be significantly higher for Term 1–Term 2 directed relations in Cohort C. When performance was measured as the rater's project grade relative to the class average project grade, results were more mixed. In Cohorts B and C, directed relations with high conflict intensity were more likely

to have decreased performance than same or increased performance for concurrent Term 1 directed relations and also for Term 1–Term 2 directed relations. The relative risk of decreased performance for high conflict directed relations (relative to directed relations with lower conflict intensity) was significantly higher for concurrent Term 1 directed relations in Cohort B and Cohort C, and for Term 1–Term 2 directed relations in Cohort B.

Analysis of Hypothesis 5a showed that the association between relationship conflict and conflict spillover was strongest for directed relations in Cohort A, followed by Cohort B and then Cohort C. In Cohort A, the majority of directed relations with relationship conflict experienced conflict spillover. The association between relationship conflict and conflict spillover was strongest for concurrent Term 1 directed relations than for concurrent Term 2 directed relations. There were no significant results in the correlation analysis between the total number of projects and the number of projects with conflict. For concurrent Term 2 directed relations in Cohort C, there was a nearly nine-fold increased risk of conflict spillover for directed relations with relationship conflict, relative to directed relations with other types of conflict. Aside from this significant result, there was no evidence of higher relative risk of conflict spillover for directed relations with relationship conflict. Findings from the analysis of attributes showed no consistent patterns of significant results across forms of multiple team membership or across cohorts. However, significant associations between age and relationship conflict, and between grade point average (GPA) and relationship conflict, were observed for some forms of multiple team membership in Cohort A and Cohort B.

The analysis of Hypothesis 5b showed that for both measures of performance (i.e., performance relative to the rater's GPA and performance relative to the class average project grade), there was insufficient evidence to confirm with significance that the relative risk of

decreased performance was higher for directed relations with relationship conflict (relative to directed relations with non-relationship conflict). With the exception of Term 1–Term 2 directed relations in Cohort C, the majority of directed relations experienced same or increased performance outcomes rather than decreased performance outcomes.

Findings from this research must be considered in light of methodological limitations arising from the use of archival data. Team member peer evaluations were not completed for research purposes, so no consideration was given to validity, reliability, or consistency in design of those instruments. This was a key factor limiting the generalizability of the results and it introduced imprecision in operationalizing variables such as conflict intensity and conflict type. Other limitations included the absence of potentially important contextual data, such as whether students could select their team members, how team members managed conflict, and whether positive synergies from MTM may have offset negative effects of conflict. Additional contextual clarity would have improved our understanding of conflict spillover dynamics in this data set.

Conclusion

This dissertation research yielded several interesting findings while also considering various analytical approaches for exploring conflict in MTM environments. One cannot ignore the practical importance of this type of research. The unique characteristics of multiple team membership - concurrent and subsequent temporary projects with recurring team members - are such that best practices of high performing teams may not be straightforward to adopt; team members and leaders of MTM teams would benefit from the identification of best practices that are directly useful to them.

References

Alfaro, I. (2015). *The impact of multiple team membership on individual creativity* [Unpublished doctoral dissertation]. University of Illinois.

Alhajj, R., & Rockne, J. (Eds.). (2014). *Encyclopedia of social network analysis and mining* (1st ed.). Springer New York.

Alper, S., Tjosvold, D., & Law, K. S. (2000). Conflict management, efficacy, and performance in organizational teams. *Personnel Psychology*, *53*(3), 625–642. https://doi.org/10.1111/j.1744-6570.2000.tb00216.x

Ammons, J. L., & Brooks, C. M. (2011). An empirical study of gender issues in assessments using peer and self evaluations. *Academy of Educational Leadership Journal*, *15*, 49–62.

Andrade, C. (2015). Understanding relative risk, odds ratio, and related terms: As simple as it can get. *Journal of Clinical Psychiatry*, *76*(7), e857–e861. https://doi.org/10.4088/jcp.15f10150

Avgar, A. C., & Neuman, E. J. (2015). Seeing conflict: A study of conflict accuracy in work teams. *Negotiation and Conflict Management*, *8*(2), 65–84. https://doi.org/10.1111/ncmr.12048

Ayoko, O. B., & Callan, V. J. (2010). Teams' reactions to conflict and teams' task and social outcomes: The moderating role of transformational and emotional leadership. *European Management Journal*, *28*(3), 220–235. https://doi.org/10.1016/j.emj.2009.07.001

Ayoko, O. B., Konrad, A. M., & Boyle, M. V. (2012). Online work: Managing conflict and emotions for performance in virtual teams. *European Management Journal*, *30*(2), 156–174. https://doi.org/10.1016/j.emj.2011.10.001

Barsade, S. G. (2002). The ripple effect: Emotional contagion and its influence on group behaviour. *Administrative Science Quarterly*, *47*(4), 644–675. https://doi.org/10.2307%2F3094912

Basil, M. D. (1996). The use of student samples in communication research. *Journal of Broadcasting and Electronic Media*, *40*(3), 431–440. https://doi.org/10.1080/08838159609364364

Bedwell, W. L., Salas, E., Funke, G. J., & Knott, B. A. (2014). Team workload: A multilevel perspective. *Organizational Psychology Review*, *4*(2), 99–123. https://doi.org/10.1177%2F2041386613502665

Behfar, K. J., Friedman, R., & Brett, J. (2016). Managing co-occurring conflicts in teams. *Group Decision and Negotiation*, *25*, 501–536. https://doi.org/10.1007/s10726-015-9450-x

Behfar, K. J., Mannix, E. A., Peterson, R. S., & Trochim, W. M. (2011). Conflict in small groups: The meaning and consequence of process conflict. *Small Group Research*, *42*(2), 127–176. https://doi.org/10.1177%2F1046496410389194

Bello, D., Leung, K., Radebaugh, L., Tung, R. L., & van Witteloostuijn, A. (2009). From the editors: Student samples in international business research. *Journal of International Business Studies*, *40*(3), 361–364. https://doi.org/10.1057/jibs.2008.101

Belot, M., Duch, R., & Miller, L. (2015). A comprehensive comparison of students and non-students in classic experimental games. *Journal of Economic Behavior & Organization*, *113*, 26–33. https://doi.org/10.1016/j.jebo.2015.02.007

Bergman, M. M. (2011a). The good, the bad, and the ugly in mixed methods research and design. *Journal of Mixed Methods Research*, *5*(4), 271–275. https://doi.org/10.1177%2F1558689811433236

Bergman, M. M. (2011b). The politics, fashions, and conventions of research methods. *Journal of Mixed Methods Research*, *5*(2), 99–102. https://doi.org/10.1177%2F1558689811408318

Bertolotti, F., Mattarelli, E., Vignoli, M., & Macri, D. M. (2015). Exploring the relationship between multiple team membership and team performance: The role of social networks and collaborative technology. *Research Policy*, *44*(4), 911–924. https://doi.org/10.1016/j.respol.2015.01.019

Bevan, J. L., Finan, A., & Kaminsky, A. (2008). Modeling serial arguments in close relationships: The serial argument process model. *Human Communication Research*, *34*, 600–624. https://doi.org/10.1111/j.1468-2958.2008.00334.x

Bodtker, A. M., & Jameson, J. K. (2001). Emotion in conflict formation and its transformation: Application to organizational conflict management. *International Journal of Conflict Management*, *12*(3), 259–275. https://doi.org/10.1108/eb022858

Borgatti, S. P., Everett, M. G., & Freeman, L. C. (2002). *Ucinet 6 for Windows: Software for social network analysis*. Analytic Technologies.

Borgatti, S. P., Everett, M. G., & Johnson, J. C. (2013). *Analyzing social networks*. Sage.

Borgatti, S. P., & Molina, J. (2005). Toward ethical guidelines for network research in organizations. *Social Networks*, *27*(2), 107–117. https://doi.org/10.1016/j.socnet.2005.01.004

Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, *9*(2), 27–40. https://doi.org/10.3316/QRJ0902027

Bryman, A. (2007). Barriers to integrating quantitative and qualitative research. *Journal of Mixed Methods Research*, *1*(1), 8–22. https://doi.org/10.1177%2F2345678906290531

Carr, K., Schrodt, P., & Ledbetter, A. M. (2012). Rumination, conflict intensity and perceived resolvability as predictors of motivation and likelihood of continuing serial arguments. *Western Journal of Communication*, *76*(5), 480–502. https://doi.org/10.1080/10570314.2012.689086

Chan, K. (2014). Multiple project team membership and performance: Empirical evidence from engineering project teams. *South African Journal of Economics and Management Sciences*, *17*(1), 76–90. https://doi.org/10.4102/sajems.v17i1.875

Chen, G., Smith, T. A., Kirkman, B. L., Zhang, P, Lemoine, G. J., & Farh, J-L. (2019). Multiple team membership and empowerment spillover effects: Can empowerment processes cross team boundaries? *Journal of Applied Psychology*, *104*(3), 321-340. https://dx.doi.org/10.1037/apl0000336

Choi, K., & Cho, B. (2011). Competing hypotheses analyses of the associations between group task conflict and group relationship conflict. *Journal of Organizational Behavior*, *32*(8), 1106–1126. https://doi.org/10.1002/job.733

Cohen, S. G., & Bailey, D. E. (1997). What makes teams work: Group effectiveness research from the shop floor to the executive suite. *Journal of Management*, *23*(3), 239–290. https://doi.org/10.1177%2F014920639702300303

Cohen, P., Cohen, J., Aiken, L. S., & West, S. G. (1999). The problem of units and the circumstance for POMP. *Multivariate Behavioural Research*, *34*(3), 315–346. https://doi.org/10.1207/S15327906MBR3403_2

Creswell, J. W. (1998). *Qualitative inquiry and research design: Choosing among five traditions.* Sage.

Creswell, J. W., & Tashakkori, A. (2007). Differing perspectives on mixed methods research [Editorial]. *Journal of Mixed Methods Research*, *1*(4), 303–308. https://doi.org/10.1177%2F1558689807306132

Cummings, J. N., & Haas, M. R. (2012). So many teams, so little time: Time allocation matters in geographically dispersed teams. *Journal of Organizational Behavior*, *33*(3), 316–341. https://doi.org/10.1002/job.777

DeChurch, L. A., Hamilton, K. L., & Haas, C. (2007). Effects of conflict management strategies on perceptions of intragroup conflict. *Group Dynamics: Theory, Research, and Practice*, *11*, 66–78. https://doi.org/10.1037/1089-2699.11.1.66

DeChurch, L. A., Mesmer-Magnus, J. R., & Doty, D. (2013). Moving beyond relationship and task conflict: Toward a process-state perspective. *Journal of Applied Psychology*, *98*(4), 559–578. https://doi.org/10.1037/a0032896

De Dreu, C. K. W., & Van Vianen, A. E. M. (2001). Managing relationship conflict and the effectiveness of organizational teams. *Journal of Organizational Behavior*, *22*(3), 309–328. https://doi.org/10.1002/job.71

De Dreu, C. K. W., & Weingart, L. R. (2003). Task versus relationship conflict, team performance, and team member satisfaction: A meta-analysis. *Journal of Applied Psychology*, *88*(4), 741–749. https://doi.org/10.1037/0021-9010.88.4.741

Denzin, N. (1978). *The research act*. McGraw-Hill.

Desivilya, H. S., & Yagil, D. (2005). The role of emotions in conflict management: The case of work teams. *International Journal of Conflict Management*, *16*(1), 55–69. https://doi.org/10.1108/eb022923

De Wit, F. R. C., Greer, L. L., & Jehn, K. A. (2011). The paradox of intragroup conflict: A meta-analysis. *Journal of Applied Psychology*, *97*(2), 360–390. https://doi.org/10.1037/a0024844

De Wit, F. R. C., Jehn, K. A., & Sheepers, D. (2013). Task conflict information processing, and decision-making: The damaging effect of relationship conflict. *Organizational Behavior and Human Decision Processes*, *122*(2), 177–189. https://doi.org/10.1016/j.obhdp.2013.07.002

Esbati, Z., & Korunka, C. (2021). Does intragroup conflict intensity matter? The moderating effects of conflict management on emotional exhaustion and work engagement. *Frontiers in Psychology, 12*, 614001. https://doi.org/10.3389/fpsyg.2021.614001

Forsyth, D. (2014). *Group dynamics* (6th ed.). Wadsworth CENGAGE Learning.

Furnham, A. (1986). Response bias, social desirability and dissimulation. *Personality and Individual Differences*, *7*(3), 385–400. https://doi.org/10.1016/0191-8869(86)90014-0

Gayle, B. M., & Preiss, R. W. (1998). Assessing emotionality in organizational conflicts. *Management Communication Quarterly*, *12*(2), 280–302. https://doi.org/10.1177%2F0893318998122004

Gilson, L. L., Maynard, M. T., Jones Young, N. C., Vartianen, M., & Hakonen, M. (2015). Virtual teams research: 10 years, 10 themes, and 10 opportunities. *Journal of Management*, *41(5)*, 1313–1337. https://doi.org/10.1177%2F0149206314559946

Gobeli, D. H., Koenig, H. F., & Bechinger, I. (1998). Managing conflict in software development teams: A multilevel analysis. *Journal of Production Innovation Management*, *15*(5), 423–435. https://doi.org/10.1016/S0737-6782(98)00011-3

Greer, L. L., Jehn, K. A., & Mannix, E. A. (2008). Conflict transformation: A longitudinal investigation of the relationships between different types of intragroup conflict and the moderating role of conflict resolution. *Small Group Research*, *39*(3), 278–302. https://doi.org/10.1177/1046496408317793

Grosser, T. J., Park, S., Mathieu, J. E., Roebuck, A. A. (2020). Network thinking in teams research. In D. J. Brass & S. P. Borgatti (Eds.), *Social networks at work* (pp. 79–103). Routledge. https://doi.org/10.4324/9780203701942

Guzzo, R. A., & Dickson, M. W. (1996). Teams in organizations: Recent research on performance and effectiveness. *Annual Review of Psychology*, *47*(1), 307–338. https://doi.org/10.1146/annurev.psych.47.1.307

Hanneman, R. A., & Riddle, M. (2005). *Introduction to social network methods*. University of California. http://faculty.ucr.edu/~hanneman/

Harrigan, N. M., Labianca, G., & Agneessens, F. (2020). Negative ties and signed graphs research: Stimulating research on dissociative forces in social networks. *Social Networks, 60*, 1-10. https://doi.org/10.1016/j.socnet.2019.09.004

Hood, A. C., Cruz, K. S., & Bachrach, D. G. (2017). Conflicts with friends: A multiplex view of friendship and conflict and its association with performance in teams. *Journal of Business Psychology, 32*, 73-86. https://doi.org/10.1007s10869-016-9436-y

Hooghe, M., Stolle, D., Maheo, V. A., & Vissers, S. (2010). Why can't a student be more like an average person?: Sampling and attrition effects in social science field and laboratory experiments. *The ANNALS of the American Academy of Political and Social Science*, *628*(1), 85–96. https://doi.org/10.1177%2F0002716209351516

Holt, J. L., & DeVore, C. J. (2005). Culture, gender, organizational role, and styles of conflict resolution: A meta-analysis. *International Journal of Intercultural Relations*, *29*(2), 165–196. https://doi.org/10.1016/j.ijintrel.2005.06.002

Huisman, M. (2009). Imputation of missing network data: Some simple procedures. *Journal of Social Structure*, *10*(1), 1–29. https://www.cmu.edu/joss/content/articles/volume10/huisman.pdf

Ilies, R., Johnson, M. D., Judge, T. A., & Keeney, J. (2011). A within-individual study of interpersonal conflict as a work stressor: Dispositional and situational moderators. *Journal of Organizational Behaviour*, *32*(1), 44–64. https://doi.org/10.1002/job.677

James, W. L., & Sonner, B. S. (2001). Just say no to traditional student samples. *Journal of Advertising Research*, *41*(5), 63–71. https://doi.org/10.2501/JAR-41-5-63-71

Jehn, K. A. (1995). A multimethod examination of the benefits and detriments of intragroup conflict. *Administrative Science Quarterly*, *40*(2), 256–282. https://doi.org/10.2307/2393638

Jehn, K. A. (1997). A qualitative analysis of conflict types and dimensions in organizational groups. *Administrative Science Quarterly*, *42*, 530–557. https://doi.org/10.2307/2393737

Jehn, K. A., Jonsen, K., & Rispens, S. (2014). Relationships at work: Intragroup conflict and the continuation of task and social relationships in workgroups. *Current Topics in Management*, *17*, 1–22.

Jehn, K. A., Rispens, S., Jonsen, K., & Greer, L. (2013). Conflict contagion: A temporal perspective on the development of conflict within teams. *International Journal of Conflict Management*, *24*(4), 352–373. https://doi.org/10.1108/IJCMA-05-2011-0039

Jehn, K. A., Rispens, S., & Thatcher, S. M. B. (2010). The effects of conflict asymmetry on work group and individual outcomes. *Academy of Management Journal*, *53*(3), 596–616. https://doi.org/10.5465/amj.2010.51468978

Jehn, K. A., & Shah, P. P. (1997). Interpersonal relationships and task performance: An examination of mediation processes in friendship and acquaintance groups. *Journal of Personality and Social Psychology*, *72(*4), 775–790. https://doi.org/10.1037/0022-3514.72.4.775

Jick, T. D. (1979). Mixing qualitative and quantitative methods: Triangulation in action. *Administrative Science Quarterly*, *24*(4), 602–611. https://doi.org/10.2307/2392366

Jin, S., Singh, S., & Yun, C. (2019). Reciprocally causal: The link between task and relationship conflict in teams. *Review of General Management, 30*(2), 68-96.

Johns, G. (2006). The essential impact of context on organizational behavior. *Academy of Management Review*, *31*(2), 386–408. https://www.jstor.org/stable/20159208

Katzenbach, J. R., & Smith, D. K. (1993). *The wisdom of teams: Creating the high-performance organization*. Harvard Business School.

Konecki, K. T. (2008). Triangulation and dealing with the realness of qualitative research. *Qualitative Sociology Review*, *IV*(3), 7–28. https://doi.org/10.18778/1733-8077.4.3.02

Kossinets, G. (2006). Effects of missing data in social networks. *Social Networks*, *28*(3), 247–268. https://doi.org/10.1016/j.socnet.2005.07.002

Labianca, G., & Brass, D. J. (2006). Exploring the social ledger: Negative relationships and negative asymmetry in social networks in organizations. *Academy of Management Review*, *31*(3), 596-614. https://doi.org/10.5465/AMR.2006.21318920

Lee, H. O., & Rogan, R. G. (1991). A cross-cultural comparison of organizational conflict management behaviors. *International Journal of Conflict Management*, *2*(3), 181–199. https://doi.org/10.1108/eb022698

Leentjens, A. F. G., & Levenson, J. L. (2013). Ethical issues concerning the recruitment of university students as research subjects. *Journal of Psychosomatic Research*, *75*(4), 394–398. https://doi.org/10.1016/j.jpsychores.2013.03.007

Levine, J. M., & Moreland, R. L. (1990). Progress in small group research. *Annual Review of Psychology*, *41*, 585–634. https://doi.org/10.1146/annurev.ps.41.020190.003101

Leroy, S. (2009). Why is it so hard to do my work? The challenge of attention residue when switching between work tasks. *Organizational Behavior and Human Decision Processes*, *109*(2), 168–181. https://doi.org/10.1016/j.obhdp.2009.04.002

Liu, E., & Roloff, M. E. (2015). To avoid or not to avoid: When emotions overflow. *Communication Research Reports*, *32*(4), 332–339. https://doi.org/10.1080/08824096.2015.1089849

Luciano, M. M., Mathieu, J. E., & Ruddy, T. M. (2014). Leading multiple teams: Average and relative external leadership influences on team empowerment and effectiveness. *Journal of Applied Psychology*, *99*(2), 322–331. https://doi.org/10.1037/a0035025

Mainali, K. P., Bewick, S., Thielen, P., Mehoke, T., Breitwieser, F. P., Paudel, S., Adhikari, A., Wolfe, J., Slud, E. V., Karig, D., & Fagan, W. F. (2017). Statistical analysis of co-occurrence patterns in microbial presence-absence datasets. *PloS one*, *12*(11), e0187132. https://doi.org/10.1371/journal.pone.0187132

Manata, B. (2016). Exploring the association between relationship conflict and group performance. *Group Dynamics: Theory, Research, and Practice*, *20*(2), 93–104. https://doi.org/10.1037/gdn0000047

Margolis, J. (2019). Multiple team membership: An integrative review. *Small Group Research, 51*(1), 48-86. https://doi.org/10.1177/1046496419883702

Marineau, J. E., Hood, A. C., & Labianca, G. B. (2018). Multiplex conflict: Examining the effects of overlapping task and relationship conflict on advice seeking in organizations. *Journal of Business and Psychology*, *33*, 595–610. https://doi.org/10.1007/s10869-017-9511-z

Martinez-Moreno, E., Zornoza, A., Gonzalez-Navarro, P., & Thompson, L. F. (2012). Investigating face-to-face and virtual teamwork over time: When does early task conflict trigger relationship conflict? *Group Dynamics: Theory and Research*, *16*(3), 159–171. https://doi.org/10.1037/a0029569

Mathieu, J., Maynard, M. T., Rapp, T., & Gilson, L. (2008). Team effectiveness 1997–2007: A review of recent advancements and a glimpse into the future. *Journal of Management*, *34*(3), 410–476. https://doi.org/10.1177%2F0149206308316061

Matthews, T., Whittaker, S., Moran, T. P., Helsley, S. Y., & Judge, T. K. (2012). Productive interrelationships between collaborative groups ease the challenges of dynamic and multi-teaming. *Computer Supported Cooperative Work*, *21*(4-5), 371–396. https://doi.org/10.1007/s10606-011-9154-y

Maynard, M. T., Mathieu, J. E., Rapp, T. L., & Gilson, L. L. (2012). Something(s) old and something(s) new: Modeling drivers of global virtual team effectiveness. *Journal of Organizational Behavior*, *33*(3), 342–365. https://doi.org/10.1002/job.1772

Methot, J. R., & Rosado-Solomon, E. (2020). Multiplex relationships in organizations: Applying an ambivalence lens. In D. J. Brass & S. P. Borgatti (Eds.), *Social networks at work* (pp. 79–103). Routledge. https://doi.org/10.4324/9780203701942

Miller, C. W., & Roloff, M. E. (2014). When hurt continues: Taking conflict personally leads to rumination, residual hurt and negative motivations toward someone who hurt us. *Communication Quarterly*, *62*(2), 193–213. https://doi.org/10.1080/01463373.2014.890118

Mortensen, J., Woolley, A. W., & O'Leary, M. (2007). Conditions enabling effective multiple team membership. *Virtuality and Virtualization*, *236*, 215–228. https://doi.org/10.1007/978-0-387-73025-7_16

O'Leary, M. B., Mortensen, M., & Woolley, A. W. (2011). Multiple team membership: A theoretical model of its effects on productivity and learning for individuals and teams. *Academy of Management Review*, *36*(3), 461–478. https://www.jstor.org/stable/41319181

O'Leary, M. B., Mortensen, M., & Woolley, A. W. (2010). Multiple team membership: Working together effectively before it all goes downhill. *IESE Insight*, *6*, 50–56. https://www.researchgate.net/publication/264703229_Working_together_effectively_before_it_all_goes_downhill

O'Leary, M. B., Woolley, A. W., & Mortensen, M. (2012). Multiteam membership in relation to multiteam systems. In S. Zaccaro, M. Marks, & L. DeChurch (Eds.), *Multi-team systems: An organization form for dynamic and complex environments* (pp. 141–172). Routledge/Taylor & Francis. https://doi.org/10.4324/9780203814772

O'Neill, T. A., Allen, N. J., & Hastings, S. E. (2013). Examining the "pros" and "cons" of team conflict: A team-level meta-analysis of task, relationship, and process conflict. *Human Performance*, *26*(3), 236–260. https://doi.org/10.1080/08959285.2013.795573

Park, S., Mathieu, J. E., & Grosser, T. J. (2020). A network conceptualization of team conflict. *Academy of Management Review*, *45*(2), 253-375. https://doi.org//amr.2016.0472

Payne, J. H. (1995). Management of multiple simultaneous projects: A state-of-the-art review. *International Journal of Project Management*, *13*(3), 163–168. https://doi.org/10.1016/0263-7863(94)00019-9

Pearson, A. W., Ensley, M. D., & Amason, A. C. (2002). An assessment and refinement of Jehn's Intragroup Conflict Scale. *International Journal of Conflict Management*, *13*(2), 110–126. https://doi.org/10.1108/eb022870

Peterson, R. A. (2001). On the use of college students in social science research : Insights from a second- order meta-analysis. *Journal of Consumer Research*, *28*(3), 450–461. https://doi.org/10.1086/323732

Peterson, R. A., & Merunka, D. R. (2014). Convenience samples of college students and research reproducibility. *Journal of Business Research*, *67*(5), 1035–1041. https://doi.org/10.1016/j.jbusres.2013.08.010

Platje, A., Seidel, H., & Wadman, S. (1994). Project and portfolio planning cycle: Project-based management for the multiproject challenge. *International Journal of Project Management*, *12*(2), 100–106. https://doi.org/10.1016/0263-7863(94)90016-7

Pluut, H., Flestea, A. M., & Curseu, P. L. (2014). Multiple team membership: A demand or resource for employees? *Group Dynamics: Theory, Research, and Practice*, *18*(4), 333–348. https://doi.org/10.1037/gdn0000016

Pritschet, L., Powell, D., & Horne, Z. (2016). Marginally significant effects as evidence for hypotheses: Changing attitudes over four decades. *Psychological Science*, *27*(7), 1036–1042. https://doi.org/10.1177%2F0956797616645672

Rahim, M. A. (2002). Toward a theory of managing organizational conflict. *International Journal of Conflict Management*, *13*(3), 206–235. https://doi.org/10.2139/ssrn.437684

Randsley De Moura, G., Leader, T., Pelletier, J., & Abrams, D. (2008). Prospects for group processes and intergroup relations research: A review of 70 years' progress. *Group Processes & Intergroup Relations*, *11*(4), 575–596. https://doi.org/10.1177%2F1368430208095406

Rapp, T. L. (2009). *The psychological dynamics underlying individual responses to working in multiple project teams: An intra-person and inter-person investigation* [Unpublished doctoral dissertation]. University of Connecticut.

Rapp, T.L.& Mathieu, J.E. (2019). Team and individual influences on members' identification and performance per membership in multiple team membership arrangements. *Journal of Applied Psychology*, *104*(3), 303-320. https://dx.doi.org/10.1037/apl0000344

Rispens, S. (2012). The influence of conflict issue importance on the co-occurrence of task and relationship conflict in teams. *Applied Psychology: An International Review*, *61*(3), 349–367. https://doi.org/10.1111/j.1464-0597.2011.00473.x

Roloff, M. E. (2009). Links between conflict management research and practice. *Journal of Applied Communication Research*, *37*(4), 339–348. https://doi.org/10.1080/00909880903233200

Rovira-Asenjo, N., Gumi, T., Sales-Pardo, M., & Guimera, R. (2013). Predicting future conflict between team-members with parameter-free models of social networks. *Scientific Reports, 3*, 1-6. https://doi.org/10.1038/srep01999

Salas, E., Cooke, N. J., & Rosen, M. A. (2008). Teams, teamwork, and team performance: Discoveries and developments. *Human Factors*, *50*(3), 540–547. https://doi.org/10.1518/001872008x288457

Sears, D. O. (1986). College sophomores in the laboratory: Influences of a narrow data base on social psychology' s view of human nature. *Journal of Personality and Social Psychology*, *51*(3), 515–530. https://doi.org/10.1037/0022-3514.51.3.515

Sellitto, C. (2009). The management of student self- and peer-evaluation in university group-work: A theoretical analysis of contemporary literature sources. *International Journal of Learning*, *16*(4), 221–232. https://doi.org/10.18848/1447-9494/CGP/v16i04/46219

Shah, P. P., Peterson, R. S., Jones, S. L., Ferguson, A. J. (2021). Things are not always what they seem: The origins and evolution of intragroup conflict. *Administrative Science Quarterly, 66*(2), 426-474. https://doi.org/10.1177/0001839220965186

Sinha, R., Janardhanan, N. S., Greer, L. L., Conlin, D. E., & Edwards, J. R. (2016). Skewed task conflicts in teams: What happens when a few members see more conflict than the rest? *Journal of Applied Psychology*, *101*(7), 1045–1055. https://doi.org/10.1037/apl0000059

Sitkin, S. B., & Bies, R. J. (1993). Social accounts in conflict situations: Using explanations to manage conflict. *Human Relations*, *46*(3), 349–370. https://doi.org/10.1177%2F001872679304600303

Slonim-Nevo, V., & Nevo, I. (2009). Conflicting findings in mixed methods research. *Journal of Mixed Methods Research*, *3*(2), 109–128.

Smith, J. A., & Moody, J. (2013). Structural effects of network sampling coverage I: Nodes missing at random. *Social Networks*, *35*(4), 652–668. https://doi.org/10.1016%2Fj.socnet.2013.09.003

Solansky, S. T., Singh, B., & Huang, S. (2014). Individual perceptions of task conflict and relationship conflict. *Negotiation and Conflict Management Research*, *7*(2), 83–98. https://doi.org/10.1111/ncmr.12027

Song, M., Dyer, B., & Thieme, R. J. (2006). Conflict management and innovation performance: An integrated contingency perspective. *Journal of the Academy of Marketing Science*, *34*(3), 341–356. https://doi.org/10.1177/0092070306286705

Sparrowe, R., Liden, R. C., Wayne, S. J., & Karimer, M. L. (2001). Social networks and the performance of individuals and groups. *Academy of Management Journal*, *44*(2), 316–325. https://doi.org/10.2307/3069458

Stepanyan, K., Mather, R., & Dalrymple, R. (2014). Culture, role and group work: A social network analysis perspective on an online collaborative course. *British Journal of Educational Technology*, *45*(4), 676–693. https://doi.org/10.1111/bjet.12076

Stevens, C. K. (2011). Questions to consider when selecting student samples. *Journal of Supply Chain Management*, *47*(3), 19–21. https://doi.org/10.1111/j.1745-493X.2011.03233.x

Takeda, S., & Homberg, F. (2014). The effects of gender on group work process and achievement: An analysis through self-and peer-assessment. *British Educational Research Journal*, *40*(2), 373–396. https://doi.org/10.1002/berj.3088

Tannenbaum, S. I., Mathieu, J. E., Salas, E., & Cohen, D. (2012). Teams are changing: Are research and practice evolving fast enough? *Industrial and Organizational Psychology*, *5*(1), 2–24. https://doi.org/10.1111/j.1754-9434.2011.01396.x

Thamhain, H. J., & Wilemon, D. L. (1975). Diagnosing conflict determinants in project management. *IEEE Transactions of Engineering Management*, *EM-22*(1), pp 35–44. https://doi.org/10.1109/TEM.1975.6447198

Thomas, D. R. (2006). A general inductive approach for analyzing qualitative evaluation data. *American Journal of Evaluation*, *27*(2), 237–246. https://doi.org/10.1177%2F1098214005283748

Tuckman, B. W., & Jensen, M. A. C. (1977). Stages of small-group development revisited. *Group & Organization Studies*, *2*(4), 419–427. https://doi.org/10.1177%2F105960117700200404

Vaismoradi, M., Turunen, H., & Bondas, T. (2013). Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. *Nursing and Health Sciences*, *15*(3), 398–405. https://doi.org/10.1111/nhs.12048

Van de Loo, P. M. T. (2014). *The relation between multiple team membership and team adaptability* [Unpublished master's thesis]. Technical University-Eindhoven.

Van de Vliert, E., & Kabanoff, B. (1990). Toward theory-based measures of conflict management. *Academy of Management Journal*, *33*(1), 199–209. https://doi.org/10.2307/256359

Van Gompel, S. (2011). *Participating in the multiple team membership environment* [Unpublished master's thesis]. University of Tilburg.

Wageman, R., Gardner, H., & Mortensen, M. (2012). The changing ecology of teams: New directions for team research. *Journal of Organizational Behavior*, *33*(3), 301–315. https://doi.org/10.1002/job.1775

Wang, S. W., Trincadeo, F., Labianca, G., & Agneessens, F. (2020). Negative ties at work. In D. J. Brass & S. P. Borgatti (Eds.), *Social networks at work* (pp. 79–103). Routledge. https://doi.org/10.4324/9780203701942

Wasserman, S., & Faust, K. (1994). *Social network analysis: Methods and applications*. Cambridge University Press. https://doi.org/10.1017/CBO9780511815478

Weider-Hatfield, D. H., & Hatfield, J. D. (1995). Relationships among conflict, management styles, levels of conflict, and reactions to work. *The Journal of Social Psychology*, *135*(6), 687–698. https://doi.org/10.1080/00224545.1995.9713972

Weingart, L. R., Behfar, K. J., Bendersky, C., Todorova, G., & Jehn, K. A. (2015). The directness and oppositional intensity of conflict expression. *Academy of Management Review*, *40*(2), 235–262. https://doi.org/10.5465/amr.2013.0124

Weston, C., Gandell, T., Beauchamp, J., McAlpine, L., Wiseman, C., & Beauchamp, C. (2001). Analyzing interview data: The development and evolution of a coding system. *Qualitative Sociology*, *24*(3), 381–400. https://doi.org/10.1023/A:1010690908200

Wintre, M. G., North, C., & Sugar, L. A. (2001). Psychologists' response to criticisms about research based on undergraduate participants: A developmental perspective. *Canadian Psychology*, *42*(3), 216–225. https://doi.org/10.1037/h0086893

Wolfer, R., & Hewstone, M. (2017). Beyond the dyadic perspective: 10 reasons for using social network analysis in intergroup contact research. *British Journal of Social Psychology*, *56*, 609-617. https://doi.org/ 10.1111/bjso.12195

Xie, X.-Y., & Luan, K. (2014). When business becomes personal: The catalyst implication of subgroup perception underlying the co-occurrence of task and relationship conflict.

Group Dynamics: Theory, Research, and Practice. 18(1), 87–99. https://doi.org/10.2139/ssrn.2084697

Zika-Viktorsson, A., Sundstrom, P., & Engwall, M. (2006). Project overload: An exploratory study of work and management in multi-project settings. *International Journal of Project Management*, *24*(5), 385–394. https://doi.org/10.1016/j.ijproman.2006.02.010

Appendix A: Thematic Codes for Classification of Conflict Type

Code	Comments about Individuals
1	Was late/skipped meetings (without reasonable notice or explanation)
2	Missed deadlines
3	Didn't bounce back after disappointments (wasn't resilient)
7	Didn't do fair share of work, let others do the work
8	Quality of his/her work was unsatisfactory or could have been improved
9	Didn't listen to, share with, and support the efforts of others
10	Was not a good team player
11	Forgot needed materials or was not prepared for group meetings/discussions, was rarely ready to get to work
13	Didn't focus on the task during meetings, wasn't always attentive
15	Was critical of others, or felt that his/her work was better than others
16	Had a negative attitude, sulked after group discussions
18	Group had to re-adjust deadlines because of the other member's schedule/ poor time management
19	Didn't actively initiate/contribute useful ideas, let others solve problems or generate ideas
20	Didn't participate in discussions
21	Didn't keep in touch with the group, ignored emails, didn't reply to emails in reasonable time
22	Didn't incorporate our suggestions
23	Wasn't very respectful, was argumentative, didn't communicate in a friendly tone
24	Wasn't a very good leader
25	Wasn't willing to compromise/negotiate
26	Tried to take over the project/task
28	Always made excuses for not getting work done
29	Didn't participate - reasonable grounds (e.g., maternity leave)
30	Wasn't willing to take on responsibilities
31	Didn't provide positive feedback to other group members, didn't provide helpful comments
35	Didn't share/communicate feelings with other team members
36	Lost interest in the project
37	Blamed others for setbacks
38	Didn't consult with us before doing stuff (e.g. submitting project, making changes to shared document)
39	Didn't take this project/course seriously enough
41	Didn't promote team morale

42	Wasn't willing to work with others to achieve group success (more focused on working independently)
43	Didn't understand or sympathize with other people's problems or their feelings, wasn't sensitive to the feelings of other team members
44	Was not good at resolving conflicts or issues
45	Was not very good (or nervous) at public discussions/public speaking/presentations
51	He/she wanted to make last minute changes
54	Was unprepared for the presentation
56	He/she needed a lot of assistance, had difficulty following directions, didn't understand the task/project, didn't follow Professor's instructions
58	Was defensive to any criticism
59	Missed the presentation without any explanation
61	Was not willing to be flexible to other team members' schedules when booking meetings
67	He/she left class early
98	Experienced conflict but details not provided
	General impressions - favourable/ unfavourable - individual/ group
70	Enjoyed working with this group, overall positive group experience (general positive observation) [only code this if the rater specifically states that he/she had an overall positive experience, do not code this if the rater appreciated a specific behaviour or characteristic of the ratee]
75	Did not enjoy working with this group, this group was frustrating to work with, overall negative group experience (general observation)
80	Rater stated he/she enjoyed working with this person, person was a good group member, easy to work with; OR rater gave multiple positive comments about various types of characteristics quality of work, communication, etc. (not just one or two specific comments; must get a general favourable impression overall)
85	Did not enjoy working with this person, person was not a good group member (general observation)
90	Enjoyed working with SOME group members (but not others) (general observation)
	Comments about group
47	Some group members excluded other group members from discussions and decisions
48	Communication and/or coordination challenges in the group.
49	Group membership changed after commencement of the project.
53	Not all members of the group contributed equally.
	Comments about degree/intensity of conflict
93	Experienced major or significant problem(s)/issues/conflict with the ratee
94	Experienced conflict/issues/bumps/hiccups with the ratee - but they were resolved
95	Rater specifically indicated that he/she did not have any problems or conflict with the other group member(s)

96	Conflict was minor, not a huge issue
97	Experienced GROUP conflict/issues/bumps/hiccups but they were resolved
	Reference to past work together
52	Have had a positive experience working with a person in the past; negative experience this time.
57	Have had a positive experience working with the same group in the past; negative experience this time.
	Propensity to work together in future
71	"Would work with this group *again in the future*"
76	"Would not like to work with this group again in the future"
81	"Would work with this person *again in the future*"
86	"Would not like to work with this person again in the future"
91	"Would work with SOME of these group members (but not all) in the future"
	Comments not relevant
99	Entire comment is irrelevant to analysis: No comments suggesting individual/group conflict OR general satisfaction with group/members -- irrelevant information in comments (e.g., I learned how to create a budget for this project)

Appendix B: Detailed Attribute Analysis

Student administrative records were an important data source for this research, making it possible to explore the moderating role of four different attribute variables (age, gender, grade point average (GPA), and domestic versus international student status) in the analysis of selected hypotheses: Hypothesis 1, Hypothesis 2, Hypothesis 4a, and Hypothesis 5a. To recall:

- Hypothesis 1 explored conflict spillover among dyads who worked together on concurrent project teams.
- Hypothesis 2 considered conflict spillover among dyads who experienced conflict during Term 1 of the program and worked together on at least one course project during Term 2 of the program.
- Hypothesis 4a examined conflict spillover for directed relations where at least one of the team members perceived high intensity conflict towards his or her MTM team member.
- Hypothesis 5a examined conflict spillover for directed relations where at least one of the team members perceived relationship conflict towards his or her MTM team member.

Investigations of homophily are common in social network analysis (Borgatti et al., 2013), due to the underlying idea that ‘birds of a feather flock together’. Individuals with similar attributes are believed to be more likely to form into groups and have positive affect towards each other. Thus, one might expect that the association with conflict spillover would be stronger for heterophilic dyads than homophilic dyads. For example, team members with a large age difference might be more likely to experience conflict that spills over across projects.

Full data tables for the attribute analysis are presented in this Appendix. However, statistically significant results have been extracted and are discussed in the appropriate chapter pertaining to the relevant hypothesis.

Hypothesis 1

Association Between Student Attributes and Conflict Spillover

Affiliation matrices were created for each attribute variable, which were then compared to binary spillover adjacency matrices for directed MTM relations in each cohort and each semester (where a value of 1 indicated the presence of spillover and 0 indicated the presence of conflict that did not spill over). Results are shown in Tables B1 to B4. For binary (dichotomous) attribute matrices, Jaccard similarity coefficients were calculated. For valued attribute matrices, QAP correlations and *p* values were produced. UCINET social network analysis software was used for both of these calculations.

Table B1

QAP Correlations of Age Attributes With MTM Concurrent Conflict Spillover

Cohort and term	*n* of directed MTM relations	Rater's age (*rrage)*	Ratee's age (*reage)*	Rater's age difference from ratee (*diffage)*
Cohort A				
Term 1 MTM	11	−.168 (p = .034*)	.209 (p = .954)	−.208 (p = .040*)
Term 2 MTM	34	−.131 (p = .233)	.213 (p = .685)	−.218 (p = .203)
Cohort B				
Term 1 MTM	47	.033 (p = .737)	.175 (p = .707)	−.099 (p = .206)
Term 2 MTM	40	.400 (p = .793)	.183 (p = .798)	.209 (p = .777)

Cohort and term	*n* of directed MTM relations	Rater's age (*rrage)*	Ratee's age (*reage)*	Rater's age difference from ratee (*diffage)*
Cohort C				
Term 1 MTM	117	−.058 (p = .208)	−.003 (p = .219)	−.037 (p = .233)
Term 2 MTM	137	.119 (p = .579)	.193 (p = .550)	−.042 (p = .334)

Note. QAP = quadratic assignment procedure; MTM = multiple team membership.

* $p < .05$

Table B2

Association of Gender Attributes With Concurrent Multiple Team Membership (MTM) Conflict Spillover

Cohort and term	*n* of Directed MTM relations	Male rater–male ratee (*rrmale-remale)*	Female rater–female ratee *(rrfemale-refemale)*	Male rater–female ratee (*rrmale-refemale)*	Female rater–male ratee (*rrfemale-remale)*
Cohort A					
Term 1 MTM	11	-	.546	-	.143
Term 2 MTM	34	-	.625	-	.046
Cohort B					
Term 1 MTM	47	.129	.579	.035	.000
Term 2 MTM	40	.333	.143	.000	.000
Cohort C					
Term 1 MTM	117	.263	.430	.095	.122
Term 2 MTM	137	.067	.272	.206	.148

Table B3

QAP Correlation of GPA Attributes With Concurrent MTM Conflict Spillover

Cohort and term	*n* of directed MTM relations	Rater GPA (*rrgpa)*	Ratee GPA *(regpa)*	Rater's GPA difference from ratee (*diffgpa)*
Cohort A				
Term 1 MTM	11	−.302 (p = .033*)	−.590 (p = .039*)	.336 (p = .954)
Term 2 MTM	34	−.206 (p = .209)	−.053 (p = .274)	−.149 (p = .228)
Cohort B				
Term 1 MTM	47	−.224 (p = .224)	−.240 (p = .201)	.019 (p = .711)
Term 2 MTM	40	−.224 (p = .136)	−.262 (p = .133)	.027 (p = .819)
Cohort C				
Term 1 MTM	117	.121 (p = .726)	−.088 (p = .233)	.198 (p = .692)
Term 2 MTM	137	.021 (p = .627)	−.167 (p = .295)	.152 (p = .563)

Note. QAP = quadratic assignment procedure; GPA = grade point average; MTM = multiple team membership.

* $p < .05$

Table B4

Association of Domestic/International Status Attributes With Multiple Team Membership (MTM) Conflict Spillover

Cohort and term	*n* of directed MTM relations	Domestic rater -domestic ratee (*rrdom-redom)*	International rater – international ratee *(rrint-rrint)*	Domestic rater – international ratee (*rrdom-reint)*	International rater – domestic ratee (*rrint-redom)*
Cohort A					
Term 1 MTM	11	.636	-	-	-
Term 2 MTM	34	.618	-	-	-
Cohort B					
Term 1 MTM	47	.368	.333	.035	.036
Term 2 MTM	40	.188	.167	.000	.091
Cohort C					
Term 1 MTM	117	.593	.087	.109	.076
Term 2 MTM	137	.345	.118	.107	.016

Probability of Concurrent Conflict Spillover Given Specific Dyadic Attributes

In addition to the matrix comparisons that explored association between attributes and spillover for each cohort and semester, binomial tests of conditional probability (probability of spillover given the presence of the attribute) were also conducted for the dichotomous attribute variables (i.e., gender and domestic versus international status). The binomial tests assessed directed relations with specific attributes, to determine if they experienced a similar proportion of conflict spillover compared to the entire set of directed relations in the cohort and semester. The binomial tests would also reveal whether the directed relations with the attribute experienced significantly more or significantly less conflict spillover than expected. In simple terms, did conflict spillover occur more, less, or equally frequently than expected *if the specific attribute was present* in the directed relation?

Binomial tests of conditional probability are different from Jaccard similarity coefficients in a fundamental way. Jaccard similarity coefficient calculations (by definition) incorporate

counts of directed relations that experienced spillover but don't possess the attribute being examined; this results in a Jaccard coefficient that might understate the proportion of directed relations with a specific attribute that experience spillover. Tables B1 to B4 presented findings on the direct correspondence between the presence of spillover and the presence of the attribute. For some directed relations, both spillover and the attribute were present. For other directed relations, the attribute was present but spillover was absent. For yet other directed relations, spillover was present but the attribute was absent. The presence of this third value suggests that there might be other factors other than the presence of the attribute that are associated with conflict spillover. As the Jaccard coefficient approaches 1.0, this suggests that the attribute is strongly correlated with conflict spillover. As the Jaccard coefficient approaches 0.0, this implies that the attribute is not strongly correlated with conflict spillover and that other factors (or combinations of factors) are associated with spillover instead. Binomial tests of conditional probability excluded that third value (i.e., the attribute was absent but spillover was present) and focused exclusively on directed relations who possess the attribute.

Binomial tests determine whether the difference in proportions is statistically significant by generating a specific *p* value that can be compared to the threshold *p* value of .05. If the two-tailed *p* value from a binomial test is lower than .05, we can conclude that spillover was higher (or lower, depending on how the observed conditional probability differs from the expected probability) than expected if a directed relation possessed that attribute.

Table B5 and Table B6 contain conditional probabilities, binomial test *p* values, and the number of directed relations possessing various dichotomous attributes relating to gender and domestic/international student status (age and GPA variables were excluded from this analysis as they were continuous variables). Expected probability of spillover is the probability of

concurrent conflict spillover for each cohort and form of multiple team membership (e.g., Cohort A, concurrent Term 1 MTM). The expected probabilities used as the benchmark comparator in the binomial tests for all cohorts and semesters were the Jaccard similarity coefficients given in Table 14 (see Chapter 5), which were generated using UCINET software. The *n* refers to the number of directed MTM relations possessing the attribute listed at the top of the column. Conditional probability is the probability of conflict spillover, given the presence of the attribute at the top of the column. The *p* value is the binomial test significance when comparing the expected probability of spillover with the conditional probability of spillover given the presence of the attribute at the top of the column. If $p < .05$, then the difference in the probabilities is significant. Binomial test *p* values were produced using the R statistical package.

Table B5

Conditional Probability of Concurrent Conflict Spillover by Gender (With Binomial Test p *Values)*

Cohort and term	Expected probability of spillover	Male rater–male ratee (*rrmale-remale)*	Female rater–female ratee *(rrfemale-refemale)*	Male rater–female ratee (*rrmale-refemale)*	Female rater–male ratee (*rrfemale-remale)*
Cohort A					
Term 1 MTM	.636	-	.600 (p = 1.000) n = 10	-	1.000 (p = 1.000) n = 1
Term 2 MTM	.618	-	.645 (p = .854) n = 31	.000 (p = .382) n = 1	.500 (p = 1.000) n = 2

Cohort and term	Expected probability of spillover	Male rater–male ratee (*rrmale-remale)*	Female rater–female ratee *(rrfemale-refemale)*	Male rater–female ratee (*rrmale-refemale)*	Female rater–male ratee (*rrfemale-remale)*
Cohort B					
Term 1 MTM	.575	.500 (p = .730) n = 8	.667 (p = 1.000) n = 33	.333 (p = .579) n = 3	.000 (p = .000) n = 3
Term 2 MTM	.225	.571 (p = .050*) n = 7	.161 (p = .520) n = 31	.000 (p = 1.000) n = 1	.000 (p = 1.000) n = 1
Cohort C					
Term 1 MTM	.761	.722 (p = .571) n = 36	.796 (p = .634) n = 54	.600 (p = .220) n = 15	.917 (p = .316) n = 12
Term 2 MTM	.402	.200 (p = .042*) n = 25	.368 (p = .640) n = 76	.619 (p = .047*) n = 21	.600 (p = .186) n = 15

Note. MTM = multiple team membership.

* $p < .05$

Table B6

Conditional Probability of Concurrent Conflict Spillover by Domestic/International Status (With Binomial Test p *Values)*

Cohort and term	Expected probability of spillover	Dmestic Rater–domestic ratee (*rrdom-redom)*	International rater–international ratee *(rrdom-redom)*	International rater–domestic ratee (*rrint-redom)*	Domestic rater–international ratee (*rrdom-reint)*
Cohort A					
Term 1 MTM	.636	.636 (p = 1.000) n = 11	-	-	-
Term 2 MTM	.618	.618 (p = 1.000) n = 34	-	-	-

Cohort and term	Expected probability of spillover	Dmestic Rater–domestic ratee (*rrdom-redom)*	International rater–international ratee *(rrdom-redom)*	International rater–domestic ratee (*rrint-redom)*	Domestic rater–international ratee (*rrdom-reint)*
Cohort B					
Term 1 MTM	.575	.560 (p = 1.000) n = 25	.647 (p = .630) n = 17	.500 (p = 1.000) n = 2	.333 (p = .579) n = 3
Term 2 MTM	.225	.207 (p = 1.000) n = 29	.400 (p = .315) n = 5	.333 (p = .535) n = 3	.000 (p = 1.000) n = 3
Cohort C					
Term 1 MTM	.761	.771 (p = .898) n = 83	.727 (p = .731) n = 11	.700 (p = .711) n = 10	.769 (p = 1.000) n = 13
Term 2 MTM	.402	.396 (p = 1.000) n = 101	.381 (p = 1.000) n = 21	.125 (p = .156) n = 8	.857 (p = .019*) n = 7

Note. MTM = multiple team membership.

* $p < .05$

Hypothesis 2

Association Between MTM Student Attributes and Term 1–Term 2 (Subsequent) Conflict Spillover

The analysis of rater and ratee attributes for Term 1–Term 2 MTM relations followed exactly the same procedure as in Hypothesis 1, the difference being the definition of conflict spillover. For Hypothesis 1, concurrent conflict spillover was examined (where conflict spilled over to other projects occurring during the same semester). For Hypothesis 2, conflict spillover occurred when a rater perceived conflict towards a ratee during one or more course projects in Term 1 and that rater also perceived conflict towards the same ratee during one or more course projects in Term 2. There was no conflict spillover if the rater perceived conflict towards the

ratee in Term 1 and worked with the ratee in Term 2 but perceived no conflict towards him/her during Term 2. For binary (dichotomous) attribute matrices, Jaccard similarity coefficients were calculated. For valued attribute matrices, QAP correlations and *p* values were produced. UCINET social network analysis software was used for both of these calculations. Results are presented in Tables B7 to B10.

Table B7

QAP Correlation of Age Attributes With Term 1–Term 2 MTM Conflict Spillover

Cohort	Number of directed relations	Rater's age (*rrage)*	Ratee's age (*reage)*	Rater's age difference from ratee (*diffage)*
Cohort A	19	.431 (p = .949)	.021 (p = .957)	.281 (p = .953)
Cohort B	37	.019 (p = .800)	.120 (p = .784)	−.072 (p = .188)
Cohort C	92	−.055 (p = .165)	−.177 (p = .156)	.113 (p = .803)

Note. QAP = quadratic assignment procedure; MTM = multiple team membership.

Table B8

Association of Gender Attributes With Term 1–Term 2 Multiple Team Membership (MTM) Conflict Spillover

Cohort	Number of directed relations	Male rater–male ratee (*rrmale-remale)*	Female rater–female ratee *(rrfemale-refemale)*	Male rater–female ratee (*rrmale-refemale)*	Female rater–male ratee (*rrfemale-remale)*
Cohort A	19	.000	.944	.000	.000
Cohort B	37	.200	.417	.083	.083
Cohort C	92	.203	.342	.162	.156

Table B9

Association of GPA Attributes With Term 1–Term 2 MTM Conflict Spillover

Cohort	Number of directed relations	Rater's GPA (*rrgpa)*	Ratee's GPA (*regpa)*	Rater's GPA difference from ratee (*diffgpa)*
Cohort A	19	.359 (p = .971)	.060 (p = .947)	.025 (p = .961)
Cohort B	37	.118 (p = .774)	−.160 (p = .168)	.281 (p = .743)
Cohort C	92	−.035 (p = .169)	−.209 (p = .168)	.176 (p = .793)

Note. GPA = grade point average; MTM = multiple team membership.

Table B10

Association of Domestic/International Status Attributes With Term 1–Term 2 Conflict Spillover

Cohort	Number of directed relations	Domestic rater–domestic ratee (*rrdom-redom)*	International rater–international ratee *(rrdom-redom)*	International rater–domestic ratee (*rrint-redom)*	Domestic rater–international ratee (*rrdom-reint)*
Cohort A	19	.895	.000	.000	.000
Cohort B	37	.516	.143	.167	.000
Cohort C	92	.459	.048	.115	.048

Probability of Term 1–Term 2 Conflict Spillover Given Specific Student Attributes

Tables B11 and B12 contain results of an analysis to determine whether the conditional probability of possessing an attribute was associated with higher, lower, or similar conflict spillover relative to the overall cohort. This analysis is directly analagous to the conditional probability analysis for Hypothesis 1 (Tables B5 and B6), except that conflict spillover from Term 1 to Term 2 was considered instead of concurrent conflict spillover.

Expected probability of spillover is the probability of Term 1-Term 2 conflict spillover for each cohort. The expected probabilities used as the benchmark comparator in the binomial tests for all cohorts and semesters were the Jaccard similarity coefficients given in Table 16 (see Chapter 6), which were generated using UCINET software. The *n* refers to the number of directed MTM relations possessing the attribute listed at the top of the column. Conditional probability is the probability of Term 1-Term 2 conflict spillover, given the presence of the attribute at the top of the column. The *p* value is the binomial test significance when comparing the expected probability of spillover with the conditional probability of spillover given the presence of the attribute at the top of the column. If $p < .05$, then the difference in the probabilities was significant. Binomial test *p* values were produced using the R statistical package.

Table B11

Conditional Probability of Term 1–Term 2 Conflict Spillover by Gender (with Binomial Test p *Values)*

Cohort	Expected probability of spillover	Male rater–male ratee (*rrmale-remale)*	Female rater–female ratee *(rrfemale-refemale)*	Male rater–female ratee (*rrmale-refemale)*	Female rater–male ratee (*rrfemale-remale)*
Cohort A	.895	-	.944 (p = 1.000) n = 18	-	.000 (p = .105) n = 1
Cohort B	.649	.833 (p = .672) n = 6	.556 (p = .319) n = 27	1.000 (p = .544) n = 2	1.000 (p = .544) n = 1
Cohort C	.652	.765 (p = .448) n = 17	.619 (p = .631) n = 42	.579 (p = .482) n = 19	.714 (p = .783) n = 14

Table B12

Conditional Probability of Concurrent Conflict Spillover by Domestic/International Status (with Binomial Test p *Values)*

Cohort	Expected probability of spillover	Domestic rater–domestic ratee (*rrdom-redom)*	International rater–international ratee *(rrdom-redom)*	International rater–domestic ratee (*rrint-redom)*	Domestic rater–international ratee (*rrdom-reint)*
Cohort A	.895	.895 (p = 1.000) n = 19	-	-	-
Cohort B	.649	.696 (p = .828) n = 23	.500 (p = .464) n = 8	.000 (p = .123) n = 2	1.000 (p = .305) n = 4
Cohort C	.652	.609 (p = .512) n = 64	.786 (p = .405) n = 14	.500 (p = .426) n = 6	.875 (p = .276) n = 8

Hypothesis 4a

Association Between Dyad Attributes and High Conflict Intensity

Tables B13 to B16 summarize results of an examination of rater and/or ratee attribute characteristics and their association with high intensity conflict. This analysis generally paralleled the attribute analysis in Hypothesis 1 and Hypothesis 2, which examined the association between conflict spillover and the presence of specific attribute characteristics. These tables illustrate the extent to which there was a direct linear relationship between student attributes and high intensity conflict. For binary (dichotomous) attribute matrices, Jaccard similarity coefficients were calculated. For valued attribute matrices, QAP correlations and *p* values were produced. UCINET social network analysis software was used for both of these calculations.

Table B13

QAP Correlation of Age Attributes with High Conflict Intensity

Cohort and term	*n* of directed MTM relations	Rater's age (*rrage)*	Ratee's age (*reage)*	Rater's age difference from ratee (*diffage)*
Cohort A				
Term 1 MTM	11	−.164 (p = .012*)	−.013 (p = .014)	−.084 (p = .011)
Term 2 MTM	34	.230 (p = .802)	.075 (p = .801)	.107 (p = .824)
Term 1–Term 2 MTM	19	-	-	-
Cohort B				
Term 1 MTM	47	−.023 (p = .163)	−.127 (p = .153)	.046 (p = .819)
Term 2 MTM	40	.453 (p = .843)	.067 (p = .866)	.341 (p = .847)
Term 1–Term 2 MTM	37	.040 (p = .878)	−.036 (p = .112)	.014 (p = .893)
Cohort C				
Term 1 MTM	117	−.025 (p = .210)	−.153 (p = .176)	.081 (p = .787)
Term 2 MTM	137	.061 (p = .782)	.055 (p = .779)	.009 (p = .800)
Term 1–Term 2 MTM	92	.311 (p = .929)	.107 (p = .931)	.194 (p = .933)

Note. QAP = quadratic assignment procedure; MTM = multiple team membership.

* $p < .05$

Table B14

Association of Gender Attributes with High Conflict Intensity

Cohort and term	*n* of directed MTM relations	Male rater–male ratee (*rrmale-remale)*	Female rater–female ratee *(rrfemale-refemale)*	Male rater–female ratee (*rrmale-refemale)*	Female rater–male ratee (*rrfemale-remale)*
Cohort A					
Term 1 MTM	11	.000	.100	.000	.000
Term 2 MTM	34	.000	.094	.000	.200
Term 1–Term 2 MTM	19	-	-	-	-
Cohort B					
Term 1 MTM	47	.333	.108	.000	.000
Term 2 MTM	40	.100	.094	.000	.000
Term 1–Term 2 MTM	37	.222	.103	.000	.000
Cohort C					
Term 1 MTM	117	.041	.113	.035	.227
Term 2 MTM	137	.081	.083	.059	.111
Term 1–Term 2 MTM	92	.046	.091	.000	.053

Note. MTM = multiple team membership.

Table B15

QAP Correlation of GPA Attributes with High Conflict Intensity

Cohort and term	*n* of directed MTM relations	Rater's GPA (*rrgpa)*	Ratee's GPA (*regpa)*	Rater's GPA difference from ratee (*diffgpa)*
Cohort A				
Term 1 MTM	11	.090 (p = .989)	−.536 (p = .009*)	.519 (p = .987)
Term 2 MTM	34	−.431 (p = .085)	−.259 (p = .114)	−.192 (p = .134)
Term 1–Term 2 MTM	19	-	-	-

Cohort and term	*n* of directed MTM relations	Rater's GPA (*rrgpa)*	Ratee's GPA (*regpa)*	Rater's GPA difference from ratee (*diffgpa)*
Cohort B				
Term 1 MTM	47	−.334 (p = .118)	−.508 (p = .095)	.244 (p = .787)
Term 2 MTM	40	.048 (p = .884)	−.393 (p = .073)	.430 (p = .838)
Term 1–Term 2 MTM	37	−.424 (p = .073)	−.558 (p = .068)	.147 (p = .874)
Cohort C				
Term 1 MTM	117	−.191 (p = .138)	−.301 (p = .116)	.122 (p = .800)
Term 2 MTM	137	.209 (p = .767)	−.061 (p = .161)	.214 (p = .753)
Term 1–Term 2 MTM	92	−.095 (p = .052)	−.254 (p = .043*)	.159 (p = .935)

Note. QAP = quadratic assignment procedure; GPA = grade point average; MTM = multiple team membership.

*p < .05

Table B16

Association of Domestic/International Status Attributes With High Conflict Intensity

Cohort and term	*n* of directed MTM relations	Domestic raterdomestic ratee (*rrdom-redom)*	International rater–international ratee *(rrint-rrint)*	Domestic rater–international ratee (*rrdom-reint)*	International rater–domestic ratee (*rrint-redom)*
Cohort A					
Term 1 MTM	11	.091	.000	.000	.000
Term 2 MTM	34	.118	.000	.000	.000
Term 1–Term 2 MTM	19	-	-	-	-
Cohort B					
Term 1 MTM	47	.065	.316	.000	.000
Term 2 MTM	40	.100	.000	.167	.000
Term 1–Term 2 MTM	37	.037	.300	.125	.000

Cohort and term	*n* of directed MTM relations	Domestic raterdomestic ratee (*rrdom-redom)*	International rater–international ratee *(rrint-rrint)*	Domestic rater–international ratee (*rrdom-reint)*	International rater–domestic ratee (*rrint-redom)*
Cohort C					
Term 1 MTM	117	.101	.083	.167	.000
Term 2 MTM	137	.105	.059	.100	.000
Term 1–Term 2 MTM	92	.029	.111	.167	.000

Note. MTM = multiple team membership.

Probability of High Conflict Intensity Given Specific Dyadic Attributes

In addition to the matrix comparisons that explored association between attributes and high conflict for each cohort and semester, binomial tests of conditional probability (probability of high conflict given the presence of the attribute) were also conducted for the dichotomous attribute variables. The binomial tests assessed whether high intensity conflict occurred more, less, or equally frequently than expected if the specific attribute was present in the directed relation. Results are shown in Tables B17 and B18.

Expected probabilities were derived from Tables 26 to 28 (Chapter 8). For example, referring to Table 26, an examination of concurrent Term 1 directed relations in Cohort A shows one directed relation with high conflict intensity on at least one project. There were 10 directed relations with lower conflict intensity (but no high conflict intensity) on at least one project, thus a total of 11 directed relations were included in that calculation. Therefore, for concurrent Term 1 directed relations in Cohort A, 1 out of 11 (i.e., 1/11 or .091) directed relations was characterized as having high conflict intensity. This was the expected proportion of high conflict intensity for concurrent Term 1 directed relations in Cohort A in Table B17. The observed probability of high conflict intensity was calculated given the presence of each attribute, and

these observed probabilities were compared with the expected using an exact binomial test. The *p* values from the binomial tests were calculated using the R statistical package.

Table B17

Conditional Probability of High Conflict Intensity by Gender (With Binomial Test p *Values)*

Cohort and term	Expected probability of spillover	Male rater–male ratee (*rrmale-remale)*	Female rater–female ratee *(rrfemale-refemale)*	Male rater–female ratee (*rrmale-refemale)*	Female rater–male ratee (*rrfemale-remale)*
Cohort A					
Term 1 MTM	.091	-	.100 (p = 1.000) n = 10	-	.000 (p = 1.000) n = 1
Term 2 MTM	.118	-	.097 (p = 1.000) n = 31	.000 (p = 1.000) n = 1	.500 (p = .222) n = 2
Term 1–Term 2 MTM	.000	-	-	-	-
Cohort B					
Term 1 MTM	.170	.500 (p = .033*) n = 8	.121 (p = .643) n = 33	.000 (p = 1.000) n = 3	.000 (p = 1.000) n = 3
Term 2 MTM	.100	.143 (p = .522) n = 7	.097 (p = 1.000) n = 31	.000 (p = 1.000) n = 1	.000 (p = 1.000) n = 1
Term 1–Term 2 MTM	.135	.333 (p = .189) n = 6	.111 (p = 1.000) n = 27	.000 (p = 1.000) n = 2	.000 (p = 1.000) n = 2
Cohort C					
Term 1 MTM	.128	.056 (p = .313) n = 36	.130 (p = 1.000) n = 54	.067 (p = .710) n = 15	.417 (p = .013*) n = 12
Term 2 MTM	.109	.120 (.750) n = 25	.092 (.854) n = 76	.095 (1.000) n = 21	.200 (.222) n = 15
Term 1–Term 2 MTM	.065	.059 (p = 1.000) n = 17	.095 (p = .351) n = 42	.000 (p = .632) n = 19	.071 (p = .611) n = 14

Note. MTM = multiple team membership.

* $p < .05$

Table B18

Conditional Probability of High Conflict Intensity by Domestic/International Status (With Binomial Test p *Values)*

Cohort and term	Expected probability of spillover	Domestic rater-domestic ratee (*rrdom-redom)*	International rater–international ratee *(rrint-rrint)*	Domestic rater–international ratee (*rrdom-reint)*	International rater–domestic ratee (*rrint-redom)*
Cohort A					
Term 1 MTM	.091	.091 (p = 1.000) n = 11	-	-	-
Term 2 MTM	.118	.118 (p = 1.000) n = 34	-	-	-
Term 1–Term 2 MTM	.000	-	-	-	-
Cohort B					
Term 1 MTM	.170	.080 (p = .296) n = 25	.353 (p = .055) n = 17	.000 (p = 1.000) n = 2	.000 (p = 1.000) n = 3
Term 2 MTM	.100	.103 (p = 1.000) n = 29	.000 (p = 1.000) n = 5	.000 (p = 1.000) n = 3	.333 (p = .271) n = 3
Term 1–Term 2 MTM	.135	.043 (p = .354) n = 23	.375 (p = .082) n = 8	.000 (p = 1.000) n = 2	.250 (p = .441) n = 4
Cohort C					
Term 1 MTM	.128	.108 (p = .742) n = 83	.182 (p = .642) n = 11	.000 (p = .627) n = 10	.308 (p = .070) n = 13
Term 2 MTM	.109	.109 (p = 1.000) n = 101	.095 (p = 1.000) n = 21	.000 (p = 1.000) n = 8	.286 (p = .174) n = 7
Term 1–Term 2 MTM	.065	.031 (p = .442) n = 64	.143 (p = .231) n = 14	.000 (p = 1.000) n = 6	.250 (p = .092) n = 8

Note. MTM = multiple team membership.

* $p < .05$

Hypothesis 5a

Association Between MTM Dyad Attributes and Relationship Conflict

Student attributes were analyzed to determine their associations with relationship conflict. This attribute analysis parallels the attribute analyses in Hypothesis 1, Hypothesis 2, and Hypothesis 4a. However, for this hypothesis the focus was on exploring the association between rater/ratee demographic attributes and the presence of relationship conflict in the directed relation.

For binary (dichotomous) affiliation matrices, Jaccard similarity coefficients were calculated. For valued affiliation matrices, QAP correlations and *p* values were produced. UCINET social network analysis software was used for both procedures.

Table B19

QAP Correlations of Age Attributes With Relationship Conflict

Cohort and term	*n* of directed MTM relations	Rater's age (*rrage)*	Ratee's age (*reage)*	Rater's age difference from ratee (*diffage)*
Cohort A				
Term 1 MTM	9	−.569 (p = .031*)	.542 (p = .959)	−.641 (p = .030*)
Term 2 MTM	21	−.240 (p = .016*)	.188 (p = .977)	−.276 (p = .018*)
Term 1–Term 2 MTM	13	−.507 (p = .028*)	.401 (p = .964)	−.586 (p = .027*)
Cohort B				
Term 1 MTM	23	.154 (p = .990)	.165 (p = .988)	.023 (p = .989)
Term 2 MTM	11	.020 (p = .979)	.292 (p = .976)	−.228 (p = .024*)
Term 1–Term 2 MTM	17	.171 (p = .980)	−.871 (p = .016*)	.676 (p = .974)

Cohort and term	*n* of directed MTM relations	Rater's age (*rrage)*	Ratee's age (*reage)*	Rater's age difference from ratee (*diffage)*
Cohort C				
Term 1 MTM	92	−.026 (p = .033*)	−.043 (p = .035*)	.011 (p = .959)
Term 2 MTM	94	−.064 (p = .141)	.072 (p = .850)	−.099 (p = .153)
Term 1–Term 2 MTM	71	.083 (p = .948)	−.169 (p = .040*)	.236 (p = .970)

Note. MTM = multiple team membership; QAP = quadratic assignment procedure.

*$p < .05$

Table B20

Association of Gender Attributes With Relationship Conflict

Cohort and term	*n* of directed MTM relations	Male rater–male ratee (*rrmale-remale)*	Female rater–female ratee *(rrfemale-refemale)*	Male rater–female ratee (*rrmale-refemale)*	Female rater–male ratee (*rrfemale-remale)*
Cohort A					
Term 1 MTM	9	.000	.667	.000	.143
Term 2 MTM	21	.000	.857	.000	.100
Term 1–Term 2 MTM	13	.000	.769	.000	.091
Cohort B					
Term 1 MTM	23	.136	.696	.091	.046
Term 2 MTM	11	.250	.546	.000	.000
Term 1–Term 2 MTM	17	.200	.588	.133	.000
Cohort C					
Term 1 MTM	92	.253	.456	.146	.135
Term 2 MTM	94	.165	.464	.123	.149
Term 1–Term 2 MTM	74	.182	.439	.191	.167

Table B21

Association of Grade Point Average (GPA) Attributes With Relationship Conflict

Cohort and term	*n* of directed MTM relations	Rater's GPA (*rrgpa)*	Ratee's GPA (*regpa)*	Rater's GPA difference from ratee (*difgpa)*
Cohort A				
Term 1 MTM	9	−.082 (p = .035*)	−.612 (p = .027*)	.418 (p = .966)
Term 2 MTM	21	−.094 (p = .019*)	−.481 (p = .016*)	.229 (p = .975)
Term 1–Term 2 MTM	13	−.217 (p = .016*)	−.400 (p = .025*)	.361 (p = .966)
Cohort B				
Term 1 MTM	23	−.128 (p = .011*)	.072 (p = .991)	−.244 (p = .012*)
Term 2 MTM	11	−.207 (p = .025*)	−.585 (p = .025*)	.399 (p = .973)
Term 1–Term 2 MTM	17	−.163 (p = .018*)	.268 (p = .975)	−.435 (p = .014*)
Cohort C				
Term 1 MTM	92	−.068 (p = .037*)	−.085 (p = .040*)	.022 (p = .958)
Term 2 MTM	94	.040 (p = .835)	−.029 (p = .164)	.051 (p = .826)
Term 1–Term 2 MTM	71	.072 (p = .946)	−.104 (p = .048*)	.179 (p = .939)

Note. MTM = multiple team membership.

* $p < .05$

Table B22

Association of Domestic/International Status Attributes With Relationship Conflict

Cohort and term	*n* of directed MTM relations	Domestic rater–domestic ratee (*rrdom-redom)*	International rater–international ratee *(rrint-rrint)*	Domestic rater–international ratee (*rrdom-reint)*	International rater–domestic ratee (*rrint-redom)*
Cohort A					
Term 1 MTM	9	.778	.000	.000	.000
Term 2 MTM	21	.952	.000	.000	.000
Term 1–Term 2 MTM	13	.846	.000	.000	.000
Cohort B					
Term 1 MTM	23	.565	.318	.046	.046
Term 2 MTM	11	.500	.125	.250	.000
Term 1–Term 2 MTM	17	.625	.200	.133	.000
Cohort C					
Term 1 MTM	92	.725	.112	.089	.056
Term 2 MTM	94	.554	.178	.069	.041
Term 1–Term 2 MTM	71	.652	.152	.092	.061

Note. MTM = multiple team membership.

Probability of Relationship Conflict Given Specific Dyadic Attributes

Binomial tests of conditional probability (probability of relationship conflict given the presence of a specified student attribute) were conducted for the dichotomous attribute variables of gender and domestic versus international status. The binomial tests assessed whether relationship conflict occurred more, less, or equally frequently than expected if the specific attribute was present in the directed relation. Results are shown in Tables B23 and B24.

Expected probabilities were derived from Tables 38 to 40 (see Chapter 10). For example, referring to Table 38, an examination of concurrent Term 1 directed relations in Cohort A shows

that there were seven directed relations with relationship conflict on at least one project. There were two directed MTM relations with conflict that was not relationship conflict, thus a total of nine directed relations were included in that calculation. In other words, for concurrent Term 1 directed relations in Cohort A, seven out of nine (i.e., 7/9 or .778) directed relations were characterized as including relationship conflict. This was the expected proportion of relations with relationship conflict for concurrent Term 1 directed relations in Cohort A. The observed probability of a directed relation having relationship conflict was calculated given the presence of each student attribute. These observed probabilities were compared with the expected probabilities using an exact binomial test. The *p* values from the binomial tests were calculated using the R statistical package. If $p < .05$, then the difference in the probabilities was significant.

Table B23

Conditional Probability Of Relationship Conflict By Gender (With Binomial Test p *Values)*

Cohort and term	Expected probability of spillover	Male rater–male ratee (*rrmale-remale)*	Female rater–female ratee *(rrfemale-refemale)*	Male rater–female ratee (*rrmale-refemale)*	Female rater–male ratee (*rrfemale-remale)*
Cohort A					
Term 1 MTM	.778	-	.750 (p = 1.000) n = 8	-	1.000 (p = 1.000) n = 1
Term 2 MTM	.952	-	.947 (p = .604) n = 19	-	1.000 (p = 1.000) n = 2
Term 1–Term 2 MTM	.846	-	.833 (p = 1.000) n = 12	-	1.000 (p = 1.000) n = 1

Cohort and term	Expected probability of spillover	Male rater–male ratee (*rrmale-remale)*	Female rater–female ratee *(rrfemale-refemale)*	Male rater–female ratee (*rrmale-refemale)*	Female rater–male ratee (*rrfemale-remale)*
Cohort B					
Term 1 MTM	.957	1.000 (p = 1.000) n = 3	.941 (p = .530) n = 17	1.000 (p = 1.000) n = 2	1.000 (p = 1.000) n = 1
Term 2 MTM	.727	1.000 (p = 1.000) n = 2	.667 (p = .712) n = 9	-	-
Term 1–Term 2 MTM	.882	1.000 (p = 1.000) n = 3	.833 (p = .644) n = 12	1.000 (p = 1.000) n = 2	-
Cohort C					
Term 1 MTM	.967	.920 (p = .196) n = 25	.976 (p = 1.000) n = 42	1.000 (p = 1.000) n = 13	1.000 (p = 1.000) n = 12
Term 2 MTM	.766	.650 (p = .287) n = 20	.765 (p = 1.000) n = 51	.900 (p = .470) n = 10	.846 (p = .745) n = 13
Term 1–Term 2 MTM	.915	.923 (p = 1.000) n = 13	.967 (p = .512) n = 30	.813 (p = .148) n = 16	.917 (p = 1.000) n = 12

Note. MTM = multiple team membership.

Table B24

Conditional Probability of Relationship Conflict by Domestic/International Status (With Binomial Test p *Values)*

Cohort and term	Expected probability of spillover	Domestic rater–domestic ratee (*rrdom-redom)*	International rater–international ratee *(rrint-rrint)*	Domestic rater–international ratee (*rrdom-reint)*	International rater–domestic ratee (*rrint-redom)*
Cohort A					
Term 1 MTM	.778	.778 (p = 1.000) n = 9	-	-	-
Term 2 MTM	.952	.952 (p = 1.000) n = 21	-	-	-
Term 1–Term 2 MTM	.846	.846 (p = 1.000) n = 13	-	-	-
Cohort B					
Term 1 MTM	.957	.929 (p = .463) n = 14	1.000 (p = 1.000) n = 7	1.000 (p = 1.000) n = 1	1.000 (p = 1.000) n = 2
Term 2 MTM	.727	.714 (p = 1.000) n = 7	1.000 (p = 1.000) n = 1	.000 (p = .273) n = 1	1.000 (p = 1.000) n = 2
Term 1–Term 2 MTM	.882	.909 (p = 1.000) n = 11	1.000 (p = 1.000) n = 3	.000 (p = .118) n = 1	1.000 (p = 1.000) n = 2
Cohort C					
Term 1 MTM	.967	.971 (p = 1.000) n = 68	1.000 (p = 1.000) n = 10	1.000 (p = 1.000) n = 5	.889 (p = .258) n = 9
Term 2 MTM	.766	.718 (p = .329) n = 71	.929 (p = .212) n = 14	.750 (p=1.000) n = 4	1.000 (p = .597) n = 5
Term 1–Term 2 MTM	.915	.918 (p = 1.000) n = 49	.909 (p = 1.000) n = 11	.800 (p = .357) n = 5	1.000 (p = 1.000) n = 6

Note. MTM = multiple team membership.