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VIRTUAL TEAMS DURING COVID-19: A STUDY ON GROUP PERCEPTIONS, EMERGENT STATES, AND OUTCOMES

A THESIS

submitted in partial fulfillment

of the requirements for the degree of

MASTER OF ARTS IN INDUSTRIAL/ORGANIZATIONAL PSYCHOLOGY

BY

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The University of New Haven
West Haven, Connecticut
February, 2022

VIRTUAL TEAMS DURING COVID-19: A STUDY ON GROUP PERCEPTIONS, EMERGENT STATES, AND OUTCOMES

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ACKNOWLEDGMENTS

My thanks to all of those who participated in the survey upon which this thesis is based. Their effort was crucial for the development of this thesis.

Above all, my most special thanks to Dr. Tara L'Heureux without whom this project would not have been possible. With her help, I not only was able to complete this project but continue to learn throughout the process. For her patience and support throughout the production of this thesis, I hope to have made her proud with the final result.

ABSTRACT

Due to the COVID-19 pandemic, university students were forced to transition to emergency remote learning that, for many, required an abrupt shift from traditional face-to face instruction. The current study leveraged the unique opportunity provided by the change in communication modalities to compare pre and post pandemic perceptions of teamwork. Using the input-mediator-output-input (IMOI) framework, this study sought to discover how group processes, emergent states, and outcomes differed for face-to-face and virtual group work. As part of a retrospective pretest design, a convenience sample of fifty-two graduate students from the University of New Haven completed a single survey that asked them to compare their experiences before and after the transition from face-to-face to virtual team collaboration. Dependent-sample t-tests were used to compare before and after perceptions of team constructs, and correlational data illuminated underlying data trends. Results showed that when in post-pandemic virtual groups, graduate students reported fewer positive experiences with their groups as opposed to when they were able to conduct their teamwork in-person before the pandemic. Both satisfaction with group members and overall group cohesion were significantly lower in virtual groups than they were when the students were face-to-face. Consequently, group performance was also reported as significantly lower than it had been before the pandemic. Major differences were found primarily in second-year students. The study's findings demonstrate that workgroup cohesion is strongly linked to the satisfaction and performance of student project teams and was substantially higher when teams met face-to-face. Recommendations for educational practice regarding building cohesive virtual student teams are put forth.

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CHAPTER I

Introduction

The use of technology as a necessary medium of communication between individuals has been on the rise as technology has become more sophisticated and widely available. This has led researchers to study the ways in which interactions between individuals has changed from in-person, face-to-face settings, to online communication (Wood & Smith, 2005). But the utility of virtual communication did not stop at allowing only two people to converse at a time. Across industries and disciplines, team projects are being planned, developed, and ultimately completed by people who may not have ever seen each other in a face-to-face setting. Out of this emerged the need to research the effects of online communication on entire groups of people and examine the attitudes and outcomes of individuals who routinely use computer-mediated communication (CMC) to accomplish team objectives (Becker-Beck, Wintermantel, & Borg, 2005; Medina & Srivastava, 2016). And in a world where the success of team projects is of the utmost importance, it is essential to explore how different modes of communication, namely computer-mediated communication (CMC) and traditional face-to-face (FtF) communication affect team processes, states, and outcomes (Olaniran, 1994). Much research on face-to-face teams in organizations has focused on how characteristics of teams affect how the team acts, thinks, and feels, that in turn, impact team outcomes (Kozlowski & Chao, 2018). Routinely studied are how team inputs (size, task type) impact team processes (e.g., communication, conflict) and emergent team states (e.g., trust, cohesion) on team effectiveness outcomes (e.g., satisfaction, performance). The result of this work has generated an extensive body of evidence-based knowledge on the factors associated with high functioning FtF teams, but it is unclear if these factors operate the same way for virtual teams who interact exclusively through computer-mediated technology.

Over the past decade, research on virtual team effectiveness has grown considerably and a plethora of studies have compared team processes and outcomes in virtual and face-to-face teams (Rhoads, 2010). Unfortunately, the state of the literature concerning the effects of different communication modalities, (i.e., FtF vs CMC) on team effectiveness has been mixed. For example, Furamo (2006) found that virtual teams were less effective overall than face-to-face teams, whereas others have found that virtual teams offer many performance benefits over FtF teams (Staples & Jhao, 2006), and still others have reported no significant difference in effectiveness between face-to-face and virtual teams on team effectiveness (Berry, 2011; Purvanova, 2013).

Explanations as to why the virtual team literature yields numerous contradictions range from type of investigation (e.g., experimental vs field), levels of team virtuality (traditional vs hybrid vs virtual), type of computer-mediated communication (asynchronous vs synchronous), different operationalizations of team effectiveness (innovation vs performance), and variations in study designs (between-groups, vs within-groups). What's more, a large number of these studies focus on only one aspect of an individual's perception of their group, such as satisfaction or trust, and neglect to look at team effectiveness as multidimensional and dynamic (Furumo, Pillis, & Green, 2009). Further, most studies that have compared virtual teams to traditional face-to-face teams have used between-group designs that fail to adequately capture changed in individuals' experiences as they transitioned from co-located teams to virtual teams (Daniels, 2020; Gilson et al., 2015; Winter 2020). Specifically, the majority of comparative studies have looked at different groups of people and compared them based on whether or not they are in face-to-face or virtual groups, rather than taking the same individuals and having them perform in both face-to-face and virtual groups (Ebrahim, Ahmed, & Taha, 2009). Though these between-group studies are still useful in looking at differences between groups and modes of communication, they allow room

for self-selection among participants and do not control for differences between individuals. With the COVID-19 pandemic forcing nearly everyone to switch to a virtual setting, it seems only more pertinent to a real-life situation to study the same individuals using both methods of group communication.

The COVID-19 crisis offered a rare opportunity to compare perceptions of team functioning in a pre-COVID environment where teams overwhelmingly communicated face-to-face, to a post-COVID context when teams suddenly went virtual and necessarily had to engage via computer-mediated communication. The present study seeks to illustrate the effects that a rapid shift from in-person group collaboration to a purely online format has on the attitudes and experiences of individuals working in classroom project teams. Specifically, this study investigated type of communication modality (face-to-face vs computer-mediated) on team processes such as conflict and social loafing behaviors, team emergent states such as team cohesion and positive affect regard the team experience and team outcomes, namely satisfaction and perceived performance. The purpose of this study is to add to the existing literature a new perspective on how individuals' attitudes toward their own work groups change as a result of a change in the method of communication between group members.

The influence of each of these constructs will be set out before the methods of this research will be described. Later there will be a discussion of how the results of the research can be conceptualized for both academic and industrial settings.

Background

Over the previous seven decades, the introduction of novel technologies – perhaps most influentially, the advent of computer technology – has had an increasingly large effect on both

human communication as well as the nature of scholarly research on communication (Rogers, 1986). Communication is no longer confined to being a synchronous exchange of information between individuals, but can rather be an *asynchronous* exchange between individuals or even entire groups of people at a time (Rogers, 1986; p. 5). Telephone calls, for example, once made it possible for people who were great distances apart to communicate but required the individuals to be engaged in the activity at the same time. Today, not only can voicemail record messages for those who are unable to pick up the call but related functions, such as text and instant messaging, have continued to show that asynchronous communication is not only possible between two people but entire groups (Rogers, 1986; p. 5). Despite the number of advantages afforded by these technologies, studies find that people display discordant feelings and actions when asked about the way these new methods of communication affect them interpersonally. One such study concluded that survey respondents have become more reliant on technologies to communicate with others, with nearly half of respondents reporting that they communicate with family and friends via technology more than in-person, yet these same respondents reported that they were bothered when others used technology when they were spending time together, and that a majority of individuals felt that the overall quality of their communications degraded when using these technologies (Drago, 2015).

The increase in the availability of these technologies, as well as their proliferation of inexpensive and accessible internet communication tools coupled with an increasingly geographically dispersed workforce has increased the use of virtual collaboration in the workplace in a myriad of industries (Long & Meglich, 2013). Multinational corporations have utilized video chatting in order to conduct meetings between strategic partners from all over the world in real time; courts can employ the usage of video chat to conduct trials and depositions; and schools can

hold class over video while students work together on virtual documents. In corporations, specifically, the increased usage of technology as a sufficient medium of communication between coworkers has resulted in a rise in telework and the designation of select workers as remote employees (Golden, 2012).

Today, parsing out who and who is not a remote employee varies between companies and has been a point of definitional contention for years (Bailey & Kurland, 2002). Previous research, however, has considered those who work at least 50 percent of the time outside of the office as remote workers, with those who work remotely between 0 and 50 percent of the time considered partially remote (Gajendran & Harrison, 2007). What is known about the proportion of the United States workforce who have worked at home is murky due to the use of survey items that allow for interpretation. For example, surveys have asked if someone has done *some* work from home rather than defining a particular duration of time that would need to be worked from home to be considered a remote worker. Using items like this, in 2019, the Bureau of Labor Statistics found that almost a quarter of the United States workforce worked at least partially from home, and about 6 percent worked primarily from home (Coate, 2021). While this may not seem like a large number, it is much more than the proportion of workers who worked remotely in prior years; according to a study from the telecommuting research firm FlexJobs, 2.9 percent of the total United States workforce worked at least halftime from home in 2017, which was a 115 percent increase from 2005 (Parris, 2017).

Similar to the trends of the workplace, remote work in the classroom has continued to grow in popularity. According to Lederman (2019), university enrollment exclusively in distance learning increased by 4.2 percent from 2016 to 2017 and another 5 percent from 2017 to 2018, and this was especially pronounced for graduate students who saw an increase of 7.4 percent for those

enrolled in online classes exclusively, whereas undergraduates only saw a 4 percent increase. Further, according to research gathered by the World Economic Forum, global economic investment in virtual tutoring, video conferencing tools, online learning software, and other educational technologies that would facilitate remote learning, was near $19 billion in 2019, and projected to be $350 billion by 2025 (Li & Lalani, 2020). Obviously, there has been a recognition of, and interest in fueling, the growth of technology for the use of remote education. Though, those same institutions were forced to accelerate any previous movement into the new virtual space due to the COVID-19 pandemic.

COVID-19

The COVID-19 pandemic took hold globally at the start of the year 2020 and forced more than two-thirds of the entire United States workforce to adopt some form of remote working arrangement (Zoltek, 2021), and this trend was especially noticeable in those industries that are most equipped to work with and through technology, such as media companies and those that primarily work with software. Statistics from Pew Research show that over 71 percent of employed adults were working from home all or most of the time in December of 2020, while only 20 percent of those same workers worked at home to any extent before the pandemic (Parker, Horowitz, & Minkin, 2020). And the prevailing trend after the pandemic is the permanence of remote work. Researchers at Upwork, a large online work marketplace, have found that over a fifth of the entire United States workforce is now expected to work remotely by 2025, an 87 percent increase from before the pandemic (Gallagher, 2020).

In the realm of higher education, in the United States alone, the pandemic impacted over 4,200 colleges and universities, forcing them to move their operations into a virtual space, which

disrupted 25.7 million students' academic lives in the middle of the school year (Murphy et al., 2020). By the beginning of April 2020, less than a month after the World Health Organization declared COVID-19 a pandemic, higher educational institutions were closed in 185 countries, and this affected the educations of 1.5 billion students, 89.4 percent of the global total of enrolled students (Marinoni et al., 2020). Recent studies have illuminated a myriad of difficulties for students who have had to move their teamwork into an online setting. Students have reported an increased sense of ambiguity surrounding their group projects and an overall loss of momentum (Wildman et al., 2021). More severe side effects of the virtual setting – namely, increased distress, anxiety, and depression – have been seen as an emerging trend in the classroom (Oliveira Dias et al., 2020). And because the pandemic hit in the middle of the academic year, any and all teamwork that was already in place, such as study groups or class projects, students were required to continue working together completely via technological means (Garcia-Morales et al., 2021).

Team-Based Work

At the same time that various institutions have grown more dependent on electronics, they have also seen an increase in group work (Shaw, Duffy, & Stark, 2000). A 1990 survey of Fortune 1000 companies found that between 1990 and 1993 the proportion of those companies with more than 20 percent of their employees in teams increased from 51 to 68 percent (DeMatteo et al., 1998). In 2019, 31 percent of survey respondents reported that most or almost most of their work is done in teams, with another 65 percent saying that some of their work is done in teams (Schwartz et al., 2019). Several experts attribute the rise in teamwork to the growing demands of the workplace in a technological age – mainly, faster movement and better-quality products and services – which have translated into increased pressures on individual workers, and teamwork is

therefore used to lighten that load (Cross et al., 2016). Said simply, due to the increased technical nature of modern enterprise, individuals tend to be placed in work groups to accomplish their goals. What is more, the increased use collaboration in the workplace and work teams has been shown to increase creative thinking, innovation, and profitability (Stockton et al., 2016).

Accordingly, team-based learning models are occupying more of what takes place in higher education, so that students – otherwise known as, future workers – learn how to work in groups effectively (Tullar, Kaiser, & Balthazard, 1998). These team-based learning models have often been defined as a small group of individuals with complementary skills, who are all committed to a common goal, learning from each other about the content of the course as well as how to function in groups (Hills, 2001). Small groups of students working collaboratively has been shown to increase student participation in the learning process, which has helped lead to higher retention rates and test scores (Clark et al., 2008). Studies that have looked at the students' perspectives of team work have shown that students believe that they are providing better deliverables, seeing an increase in conceptual comprehension, reducing each student's workload, and achieving better overall learning experiences when in a group setting (Schultz et al., 2010). And institutions like Pearson and Carnegie Melon University champion the idea that working in a team setting during one's time in higher education teaches them team working skills that are necessary for the workplace (Brown, 2019). These skills include strong communication skills, the ability to give and receive feedback on performance, time management, delegation of roles and responsibilities, challenge assumptions, and more (Calhood & Fewell, 2009). These soft skills are many of the characteristics that companies are increasingly looking for in prospective employees, making their development so critical for those seeking employment (Wilhelm, 2002).

Virtual Teams

A virtual team can be defined as a group of team members who are geographically dispersed but who work together through the use of technology such as teleconferencing and videoconferencing, emails, test messages, group instant messages, and telephone calls (Dorr & Kelly, 2011). The growth in the usage of virtual teams in organizations has been taking place over a number of the past decades and was expected to become increasingly more commonplace before the COVID-19 pandemic occurred (Dulebohn & Hoch, 2017). The precipitous growth in the employment of a virtual team setting has been fueled by increased globalization, inter-organizational alliances, and the development of advanced communication technologies (Kahai, Fjermestad, Zhang, & Avolio, 2007). In 2011, 2.9 million Americans (about 2 percent, of the entire United States workforce) were classified as remote team workers, and by 2018 this number not only increased to 4.3 million (3.2 percent of the US workforce) but 40 percent more companies offered remote work as an option for their workers who worked in teams, demonstrating how industry leaders are warming up to the idea that remote work is a viable option for their employees (Lister & Harnish, 2011; Simovic, 2021).

Beyond the workplace, there has also been growth in virtual teams in higher education. In 2017-18, 501 full-time virtual schools enrolled 297,712 students, and 300 blended schools enrolled 132,960 (Molnar, 2019). Enrollments in virtual classes increased by more than 2,000 students between 2016-17 and 2017-18, and enrollments in blended learning schools increased by over 16,000 during this same time period (p. 2). Other studies have shown that in 2017, 33.5% of higher education students were enrolled in some form of distance or online learning, and 3.1 million students enrolled exclusively in distance education (eLearning Statistics, 2021). Most importantly, though, is the fact that an increase in demand for both the ability to work in teams and being

technologically skilled and savvy in the workplace has given rise to a need for workers to possess virtual team skills, which has consequently encouraged schools to develop in the students in order to prepare them for the conditions they are bound to encounter in the workplace (Chiriac, 2014; Gillies & Boyle, 2010; Rudolph, 2021).

Virtual vs Face-to-face Teams

Existing research that has looked at the differences between virtual and face-to-face teams describe a number of positive and negative effects relating to both designs. For example, Rogers et al. (2021) note that virtual team members, more so than those in face-to-face groups, often rely on a "divide and conquer" approach to their work, despite the fact that the most productive and highest quality group work involves interdependency, resulting in lower quality team outputs. They go on to mention that the need to communicate through technology, being more difficult than simply speaking to another person face-to-face, induces frustration with group members, and feel a lack of support (p. 5). This sentiment echoes that of Saghafian & O'Neill (2018), who state that ineffective communication through technology results in lower overall team satisfaction in students. Other researchers state that virtual teamwork increases perceived proximity between group members, regardless of actual geographical distance between those members, and this actually worsens the groups' decision making and, consequently, their results (Eisenberg & Krishnan, 2018).

Though this all seems to argue in favor of a face-to-face setting, there are still plenty of reasons why virtual work might be beneficial for some groups. Among these reasons is the simple idea that multinational teams can more easily communicate using teleconferencing, both in terms of lessening a language barrier through software to translate for parties of different lingual

backgrounds, and by allowing those in different time zones to communicate in real time (Cisse & Wyrick, 2010). Some have even found examples of virtual teams who reported enhanced communication and collaboration when using a virtual team design, and others argue that the "divide and conquer" approach that is typically used when in a virtual team allows each member to be flexible with their work, unimpeded by needing to rely on others to make their own progress toward the group's final goal (Ebrahim, Ahmed, & Taha, 2009).

Though the traditional educational format is one of strictly face-to-face interaction, the availability of technologies with video chatting and collaborative group software has made the virtual classroom more of a viable alternative to the traditional model than it previously had been. Previous studies that have looked at differences between the in-person and the virtual classroom have found that students have fewer positive attitudes towards teamwork compared to face-to-face students (Vance et al., 2015), but that online students demonstrate a higher level of teamwork self-efficacy (Konak et al., 2018).

Research Problem

The vast majority of the current body of literature concerning teamwork focuses many of the processes and states that are necessary for team success – cohesion, collaboration, communication, satisfaction with the team, etc. – but the research has largely been conducted on face-to-face teams rather than teams that are predominantly virtual (Purvanova, 2013). At the same time, most of the literature involves teams found in organizations, and has chiefly disregarded the teams of students in higher education (Sycara & Sukthankar, 2006). These realities, in conjunction, reveal that there is a blind spot in team literature, and that more research that compares the experiences of virtual and face-to-face teams is required.

Though this study puts an emphasis on those teams in organizations, this is purely for the purpose of clarifying the need for students in higher education to prepare themselves for the workplace by developing competencies that help virtual teams succeed. The current study seeks to discover what differences exist between students in higher education in both face-to-face teams and virtual teams in terms of their team processes, team emergent states, and team outcomes. The study then goes on to explain what can account for the differences that arise.

Research questions include:

1. How are students in higher education's perceptions of team processes altered between face-to-face group work and virtual group work?
2. How are students in higher education's perceptions of team emergent states altered between face-to-face group work and virtual group work?
3. How are students in higher education's perceptions of team outcomes altered between face-to-face group work and virtual group work?

Significance of the present study

Never before has the need for virtual teamwork been so compelling. The COVID-19 pandemic exposed the necessity for a better understanding of how to function as part of a virtual team. By continuing to study the ways in which virtual teamwork differs from face-to-face teamwork, necessary skills that facilitate desired group phenomena (e.g., effective conflict management, promotion of group cohesion) can be more deeply understood and applied.

The following areas of this paper will describe the theoretical infrastructure that will identify and elaborate on key findings concerning relevant variables such as team processes (conflict and social loafing), emergent states (cohesion and positive affect toward group members)

and team outcomes (performance and satisfaction). The study's methodology and results will then be explained and ultimately expanded on in a discussion of the conclusions and implications.

CHAPTER II

Literature Review

Theoretical Framework

The IMOI (input-mediator-output-input) Model of Team Effectiveness, developed by Ilgen et al. (2005), is designed to summarize the cyclical nature of inputs and mediating factors on team performance and outputs. Inputs are those conditions that exist prior to group activity that both enable and constrain members' interactions, such as "*individual team member characteristics* (e.g., competencies, personalities), *team-level factors* (e.g., task structure, external leader influences), and *organizational and contextual factors* (e.g., organizational design features, environmental complexity)" (Mathieu et al., 2008, p. 412). Mediators describe how inputs are made into outputs, and there are two categories of mediators: emergent states and team processes (Ilgen et al., 2005). *Emergent states* are cognitive, motivational, or affective, have arisen from the individuals out of the specific inputs, and influence the final products produced by the group (p. 414). Processes are those actions that teams actually take in pursuit of achieving their goals (Marks et al., 2001). Together, both emergent states and processes can shape the quality of each team member's experience in the group as well as the fruits of the team's efforts. Finally, outputs are the results of the group's efforts over the course of their project.

The focal input in the current study is the modality through which team members communicate with each other (through a virtual medium or face-to-face). Though some may make the case that this input is a mediator, it is treated as an input because the current study is constructed to observe differences between virtual and face-to-face attitudes, and must therefore be treated as

a factor that works *on* the team rather than emerges *from* the team. Variables in the present study referred to as mediators in the IMOI model consist of group conflict and perceived social loafing (team processes) as well as cohesion and positive affect toward group members (emergent states). Outcomes measured in this study were both perceived performance and satisfaction with one's team members.

Processes: Conflict and Social Loafing

Conflict is more common for virtual teams than in-person teams because of issues such as communication delays and possible time zone differences (Kankanhalli et al., 2006). Other researchers such as Mortensen & Hinds (2001), Liu et al. (2008), and Wakefield et al. (2008), have all found that face-to-face teams experienced less conflict and less enduring conflict than remote teams. And while more recent research is exploring the potential productive value of conflict, conflict remains massively stress-inducing and reductive to both workplace satisfaction and performance (Hon & Chon, 2013).

Social loafing is the tendency for individuals to expend less effort when working collectively than when working individually (Karau et al., 1993). When there are individuals in a group who do not put forth an adequate or proportional amount of effort toward the final product of the group's work, frustration and negative feelings toward that individual, as well as toward group projects in general, begin to develop in those who do were not loafing (Aggarwal & O'Brien, 2008). Satisfaction with group work, and perceived fairness of group outcomes, are also lessened as loafing increases (p. 259). Researchers have also found that, because of an increased interdependence on group members in a virtual setting, social loafing exacerbates the perception

of a lack of personal achievement experienced by those who are not loafing (Piezon & Donaldson, 2005).

Emergent States: Cohesion and Positive Affect Toward Group Members

Group cohesion has, historically, been considered to be the most important small group variable, and has previously been defined as "a dynamic process that is reflected in the tendency for a group to stick together and remain united in the pursuit of its instrumental objectives and/or for the satisfaction of member affective needs" (Carron & Brawley, 2000, p. 213). Overall group performance has been shown to be influenced by a number of factors in a virtual setting. Among them are the quality of communication and cohesion (Tan et al., 2019). Research by Warkentin et al. (1997) suggests that virtual teams do not communicate as effectively as face-to-face teams. In one particular study, they found that virtual teams scored lower than face-to-face teams on cohesion, positive group perceptions, and satisfaction with outcomes (1997). Performance in groups has been associated with the degree each group's cohesiveness, with those that are not very cohesive possibly disbanding and those that are cohesive exceeding expectations of productivity (Summers et al., 1988). Cohesion has also been shown to be directly related to the quality of communication in a virtual setting between those in a group (Lin et al., 2008). Warkentin et al. (1997) reported that groups that interacted face-to-face rather than by virtual means had higher degrees of cohesion.

Positive affect has traditionally been synonymized with enthusiasm, optimism, satisfaction, comfort, etc. (Peñalver et al., 2019). The presence of these positive perceptions in groups has been shown to increase group cohesion, coordination, teamwork, and overall team performance (p. 1). Positive affect of group members, in both in-person and virtual settings, has been shown to

facilitate effective interactions between group members, resulting in more productivity and less conflict between group members (Walther et al., 2005).

Outputs: Satisfaction and Performance

Satisfaction with group members has been shown to increase organizational commitment and reduce burnout (Boyle et al., 2006). Findings of other studies support the idea that virtual groups are generally less satisfied with their groups than those who are face-to-face (Staples & Zhao, 2006). In one study that examined the differences in group satisfaction between virtual and face-to-face groups for students enrolled in a master's program, researchers found that members in face-to-face groups were more satisfied with their team's work than those in virtual groups (Cicei, 2012).

Group performance has been defined as the quantity or quality of the outcomes produced, or time required to complete a task in a group setting (Weldon & Weingart, 1993). Many studies in academic and industrial research employ performance as a dependent variable. This may be due to the desire for researchers to discover what leads to optimal outcomes (highest degree of performance). Quality of performance for individuals and groups, in both in-person and virtual settings, have been shown to increase when feedback and perceived trust between group members is high (Geister et al., 2006). Positive affect toward group members has also been shown to increase group performance (Peñalver et al., 2019).

These group characteristics, and many others, have instructed many institutions on how to treat and handle groups to make them more productive and engaged in their roles. Crucially, though, most research devoted to team processes have been focused on in-person group processes, while group communication and function in a virtual space have not received as much academic

attention. Taken together, this results in a world that has recently put an increased emphasis on teamwork, and is quickly shifting to virtual collaboration rather than in-person collaboration, but remains largely naïve to the potential differences in how feel about their group members in a virtual space as opposed to the (much more familiar) in-person setting.

CHAPTER III

Methods

Participants

The present study used survey data from 52 University of New Haven graduate students in the university's Masters of Industrial and Organizational Psychology (MAIOP) program, Master of Clinical Mental Health Counseling Program, Masters of Community Psychology Program, and Masters of Business Administration Program. (36 females, 16 males; 33 second-year students, 19 first-year students). Students who were in the MAIOP program for at least one semester prior to taking the survey were eligible for inclusion in the data pool.

Design

This study employed a single-administration survey to collect students' retrospective and current attitudes towards their work teams. The main part of the questionnaire assessed level of virtuality, team process~~es~~ variables (conflict and social loafing), emergent states (cohesion), and affect (positive and negative), and outputs (satisfaction and performance). Participants completed these items twice: once when asked to retrospectively recall their attitudes and experiences during their F2f team experiences (pre-COVID lockdown), and again, during their present remote team experiences (post-COVID lockdown). The wording of the prompts indicated the time period of

interest. Participants were asked to “Think back to group work that you participated in BEFORE the COVID-19 pandemic” and responded to the items, and then to “Think back to group work that you participated in AFTER (and/or currently) the COVID-19 pandemic” and responded to the same items. Periods of time (pre- and post-COVID), were emphasized to make them salient to the participants. This set of prompts resulted in within-group comparisons on the constructs referred to earlier in this thesis. Students completed the surveys between June and May 2021, which was closer to the winding down of the pandemic, but still entrenched enough in the pandemic for its effects to be fresh in the minds of the students. Due to the pre-/post-test design of this study, dependent sample t-tests were used to identify significant differences in student data. For each variable, three groups were analyzed and compared (all students pre- vs post-COVID; second year students’ pre- vs post-COVID; first-year students’ pre- vs post-COVID). Correlations between core variables were also analyzed.

Procedure

The Institutional Review Board of the University of New Haven approved the present study. Between May and June 2021, students were sent a SurveyMonkey link via email to participate in the survey at the request of myself and a professor teaching MAIOP courses in the spring 2021 semester. After clicking the link, students were provided an informational letter detailing the purpose of the study. Student consent was obtained by asking the students to click an option saying that they consented to participating in the study before they were given any further questions. Students who did not consent were taken to the end of the survey and no further questions were asked of them. Those who chose to participate responded to 40 questions that took an average of 12.3 minutes to complete.

Measures

A questionnaire comprising demographic items, questions about degree of virtuality experience, and questions about team processes, states and outcomes, were developed by the author of this study. Survey items not only asked about specific aspects of group functioning (such as the aforementioned constructs in the framework portion) but also about the nature of their group work (whether it was primarily online or in-person, and the prevalence of such meetings) and the respondents' perceptions of the group work and their group members in both virtual and face-to-face settings.

Degree of Virtuality

For both the before and after prompts, two items assessed the degree of virtuality when working in their project teams experienced in pre- and post-COVID work teams. Specifically, on a five-point scale (1 = Never, 5 = every time we interacted) respondents indicated the prevalence of which the group met using a virtual medium and how often the group met in person.

Team Measures

Using a five-point scale (1 = Never, 5 = Every time we interacted), the regularity of positive and negative experiences, conflict, and social loafing behavior were measured in the before and after conditions. Sample items included: "How often did you experience conflict within the group?" and "How often did you have positive group experiences?"

Perceptions of team cohesiveness, satisfaction with the team and perceived team performance were assessed using a five-point scale (1 = strongly disagree; 5 = strongly agree). A

sample item “In general, I was very satisfied with my group experiences before/after the COVID pandemic.” All survey items can be found in the Appendix.

Demographic Measures

To be able to describe the sample, participants were asked to report their gender, program of study and year in their program.

CHAPTER IV

Results

Dependent Sample T-Test

Dependent sample t-test were conducted on pre- and post-COVID responses to survey questions regarding positive group experiences, negative group experiences, conflict, social loafing of both one’s self and groupmates, satisfaction, cohesion, and performance (see Table 1). The same analysis was then run again but with both first-year and second-year students separated. This furthered the analysis by showing how the aggregate results of all students were skewed because of one group of students in particular.

Table 1

Descriptive Statistics for All Students, (First-Year Students and Second-Year Students) on Team Variables Before and After Lockdown

	Full Sample		**First-year Sample**		**Second-year Sample**	
	Before	After	Before	After	Before	After
Positive Experiences	3.94[a] (.90)	3.65[a] (.81)	3.69[a] (.83)	4.04[a] (.51)	4.08[a] (.92)	3.44[b] (.88)
Negative Experiences	2.37[a] (.88)	2.54[a] (.91)	2.38[a] (.96)	2.34[a] (.60)	2.37[a] (.86)	2.66[a] (1.04)
Conflict	2.25[a] (.79)	2.18[a] (.90)	2.22[a] (.81)	2.15[a] (.78)	2.28[a] (.80)	2.20[a] (.99)
Social Loafing (other)	2.56[a] (1.11)	2.54[a] (1.17)	2.53[a] (1.13)	2.13[a] (.92)	2.58[a] (1.12)	2.79[a] (1.25)
Social Loafing (self)	2.06[a] (.83)	2.09[a] (1.01)	2.08[a] (.79)	1.89[a] (.80)	2.07[a] (.87)	2.22[a] (1.12)
Satisfaction	3.97[a] (1.04)	3.47[b] (.99)	3.81[a] (.90)	3.98[a] (.93)	4.07[a] (1.03)	3.32[b] (1.00)
Cohesiveness	4.00[a] (.98)	3.56[b] (1.00)	3.81[a] (.90)	3.98[a] (.93)	4.11[a] (1.02)	3.32[b] (.99)
Performance	4.23[a] (.67)	4.05[a] (.82)	4.16[a] (.67)	4.24[a] (.92)	4.28[a] (.68)	3.94[b] (.75)

Note: Paired t-tests were performed for each before and after variable pair. Within the three sample headings, superscripts that differ between columns depict mean differences at $p < .01$.

Meeting Face-to-Face and Meeting Virtually: Unsurprisingly, the incidences of meeting face-to-face with group members were significantly lessened by the pandemic for both first- and second-year students ($p = 0.00$). Naturally, occurrences of virtual meetings were significantly more post-COVID than they were before the pandemic for both groups ($p = 0.00$).

Positive Group Experiences: The number of positive group experiences post-COVID were found to be significantly less than they were pre-COVID but only for second-year students ($p = 0.00$). No difference was found for first-year students.

Negative Group Experiences: No differences were found between the frequencies of negative group experiences for either group of students.

Conflict: No differences were found between the incidences of conflict for either group of students.

Prevalence of Group Members Social Loafing: No differences were found between the prevalence of group members social loafing for either group of students.

Prevalence of Self-Social Loafing: No differences were found between the prevalence of self-social loafing for either group of students.

Group Satisfaction: Group satisfaction was found to be significantly less post-COVID than it was pre-COVID for all students as a whole ($p = 0.01$). However, first-year students showed no difference in group satisfaction levels. Second-year students scored significantly lower post-COVID than pre-COVID ($p = 0.00$).

Group Cohesion: Group cohesion was found to be significantly less post-COVID than it was pre-COVID for all students as a whole ($p = 0.01$). However, first-year students showed no difference in group satisfaction levels. Second-year students scored significantly lower post-COVID than pre-COVID ($p = 0.00$).

Group Performance: Group performance showed no significant difference in all students. No significant difference was found for first-year students. However, second-year students reported significantly worse performance in their groups post-COVID as compared to pre-COVID ($p = 0.04$).

Correlations

Table 2

Correlations between study variables. Pre-COVID condition below the diagonal and Post-COVID condition above.

	1	2	3	4	5	6	7	8	9	10	11	12
1. VRTM_IND	-	.39**	.11	.03	.21	-.19	-.28*	-.11	-.02	.23	.22	.16
2. VRTM_F2FTM	.39**	-	.15	-.10	.00	.09	-.10	.06	.25	.11	.03	-.00
3. MEET_F2F	-.03	-.15	-	-.43**	.13	-.19	.04	-.07	-.05	-.20	.09	-.15
4. MEET_VRT	-.01	.01	-.18	-	.13	.11	-.01	.12	-.04	.40**	.16	.26
5. POS_EXP	.11	.11	.08	.18	-	-.48***	-.41**	-.48***	-.17	.65***	.69***	.60***
6. NEG_EXP	-.21	-.03	-.04	-.17	-.57***	-	.52***	.34*	.32*	-.32*	-.53***	-.34*
7. CONFLICT	-.02	.07	-.05	.05	-.36**	.60***	-	.46***	.25	-.47***	-.50***	-.39**
8. SL_OTHER	-.08	.01	-.13	-.12	-.34*	.56***	.44	-	.63***	-.33*	-.45***	-.31*
9. SL_SELF	-.33*	-.02	-.11	-.02	-.05	.26	.22	.65***	-	-.14	.35*	-.43**
10. SATIS	.25	.22	.33*	.12	.64***	-.69***	-.44**	-.59***	-.32*	-	.70***	.65***
11. COHESIVE	.28	.28*	.39**	.11	.63***	-.63***	-.41**	-.56***	-.33*	.88***	-	.73***
12. PERFORM	.22	.13	.34*	-.06	.49***	-.58***	-.52***	-.46***	-.29*	.78***	.76***	-

*p <.05, **p < .01, ***p < .001.

Positive Group Experiences: Positive group experiences before the pandemic were not correlated with positive or negative group experiences, conflict, social loafing behaviors in either group members or oneself, group satisfaction, group cohesion, or group performance **post-pandemic.**

Negative Group Experiences: Negative group experiences before the pandemic were not correlated with positive or negative group experiences, conflict, social loafing behaviors in either group members or oneself, group satisfaction, group cohesion, or group performance **post-pandemic.**

Conflict: Conflict before the pandemic was not correlated with positive or negative group experiences, social loafing behaviors in either group members or oneself, group satisfaction, group cohesion, or group performance post-pandemic. However, conflict before the pandemic was positively correlated with conflict **post-pandemic** ($r = .31$, $p < 0.05$). This relationship was found in the aggregate, but only for the second-year students, not the first-year students, when groups were separated.

Prevalence of Group Members Social Loafing: Prevalence of group members social loafing before the pandemic was not correlated with positive or negative group experiences, conflict, social loafing behaviors in either group members or oneself, group satisfaction, group cohesion, or group performance **post-pandemic**.

Prevalence of Self-Social Loafing: Prevalence of an individual to self-loaf before the pandemic was positively correlated with negative group experiences ($r = .34$, $p < 0.05$) post-pandemic and social loafing behaviors in both group members ($r = .39$, $p < 0.05$) and oneself ($r = .53$, $p < 0.05$) post-pandemic. Each of these correlations were significant in the aggregate but only

for second-year students when separated out by year. Correlations with positive group experiences, conflict, group satisfaction, cohesion, and performance were not significant.

Group Satisfaction: Group satisfaction before the pandemic was not correlated with positive or negative group experiences, conflict, social loafing behaviors in either group members or oneself, group satisfaction, group cohesion, or group performance **post-pandemic.**

Group Cohesion: Group cohesion before the pandemic was not correlated with positive or negative group experiences, conflict, social loafing behaviors in either **group members or oneself, group satisfaction, group cohesion, or group performance post-pandemic.**

Group Performance: Group performance before the pandemic was not correlated with positive or negative group experiences, conflict, social loafing behaviors in either **group members or oneself, group satisfaction, group cohesion, or group performance post-pandemic.**

Other Notable Correlations:

Prevalence of meeting virtually before the pandemic was positively correlated with positive group experiences post-pandemic ($r = .51$, $p < 0.05$), and negatively correlated with negative group experiences post-pandemic ($r = -.28$, $p < 0.05$). These correlations were significant in the aggregate and for second-year students, but not for first-year students individually. Second-year students alone showed significant positive correlations between regularity of meeting virtually before the pandemic and both group cohesion ($r = .36$, $p < 0.05$) and group performance ($r = .39$, $p < 0.05$) post-pandemic.

Feeling positive about group members before the pandemic was negatively correlated with post-COVID group satisfaction ($r = -.28$, $p < 0.05$). This correlation was found in the aggregate and for the first-year students but not for second-year students.

CHAPTER V

Discussion

The purpose of this study was to add to the existing literature a new perspective on how individuals' attitudes toward their own work groups change as a result of a change in the method of communication and collaboration between group members. Positive group experiences, group satisfaction, cohesion, and performance, were all found to be significantly, negatively impacted by the change from in-person group work to virtual group work. No focal aspect of group work was made better by the adoption of virtual work, rather than in-person work. Overall, the results imply a negative impact on students who are forced to work with each other virtually. However, correlational data suggest that experience with group work in a virtual setting leads to more favorable team outcomes when virtual work becomes mandatory. From this, it may be inferred that working in a virtual setting is a skill that can be developed, and should be exercised in higher education for the benefit of the students.

Additionally, correlational data did well to describe that students who met face-to-face more frequently before the pandemic had more positive feelings about their groups and group members, while also reporting higher group cohesion, satisfaction, and performance. Interestingly, the more individuals met *virtually* after the pandemic correlated only with satisfaction with one's group. Therefore, the medium through which students interacted showed to influence their perspectives of their overall group experiences. This is further supported by the fact that neither preference for virtual vs face-to-face group work nor preference for team vs individual work had any impact on team constructs.

Liberman, Trope, and Stephan (2007) discussed the concept of psychological distance, the idea that people "believe that they directly experience themselves and their immediate

surroundings at the present moment" (p. 353). They clarify the impact of the phenomenon by saying that "anything that is not present is distal" and that anything that does not exist in the individual's direct physical presence "may be thought of, constructed, or reconstructed, but it cannot be experienced directly" (p. 353). This implies that anything that is kept physically away from an individual cannot be fully connected with by the individual on a deeper cognitive level, unlike things that are physically proximate to the person, and this explains the phenomena observed in this study. Being distant from those with whom one works may result in an increased sense of indifference toward group members.

One type of psychological distance is social distance, defined as a person's perception of how close or how far an individual is from another individual or group (Magee & Smith, 2013). Research into social distance has shown that greater distance between individuals and others or the groups to which they belong results in lower quality communication (Sexe, 2018). Specifically, social distance results in lower trust between individuals and groups, and this leads to less willingness to share ideas with others as well as poorer quality communication (Sexe, 2018). Combined with the fact that use of a virtual interface decreases the efficiency of group conversations due to ambiguity of relevant and irrelevant communication and a lack of nonverbal cues (Bilotta et al., 2021), group cohesion suffers greatly, and less cohesive groups tend to produce outputs of lesser quality than those with better cohesion (Gil et al., 2017). Therefore, the use of virtual means to communicate in group increases social distance, worsening communication, cohesion, and work outcomes. Many group outcomes (e.g., cohesion), are then unable to flourish, while any indifference can worsen, becoming distrust and/or negative affect or conflict.

When conflict arises in a virtual, socially distant, group, settling differences becomes a hassle of both overcoming the psychological distance and burying hatchets. Previous research has

shown that conflict decreases the positive emergent states within groups (e.g., trust, respect, and cohesion) which then decreases the team's long-term viability (Jehn et al., 2008). It is unsurprising how conflict may arise in virtual teams and is consequently more difficult to resolve because of weaker communication between group mates in a virtual setting. Obviously, the entire goal of a project group is to develop the highest quality work that it possibly can with as little difficulty as possible. Quality communication has been shown to influence positive group experiences and cohesion between groupmates, which then leads to higher group satisfaction and performance, and communication through a virtual medium has been shown to preclude these constructs and outcomes (Garro-Abarca et al., 2021).

Between the pre- and post-Covid conditions, greater differences were found for the second-year students as opposed to the first-years. Among the reasons why this may be the case is familiarity with their particular graduate program and the people in their classes. By the time they took the survey for this research, the second-year students had already spent one year in-person, getting to know the people in their graduate programs. They have been given time to see how the demands of the graduate programs differ from their undergraduate programs, which is to say the graduate programs were likely more demanding. After a year, though, it is reasonable to assume that most students had acclimated to the raised expectations of the graduate programs, and even of the particular professors within their programs. It is also reasonable to assume that, within that time, students had made friends and planned out which classes they could take to maximize collaboration with those friends. Any groups they may have formed in their second year could have been more cohesive because they were always meant to be that way; the students were in the particular groups because they knew the people who they were working with very well. First-year students had none of these advantages. First-years not only entered a new program with heightened

expectations of them, but had to collaborate with new acquaintances and professors in a virtual manner.

It is unquestionable that many of the negative outcomes found in data analysis were influenced by the stress associated with living during a pandemic. Graduate students, in the best of times, have to worry about finding internships and job opportunities while they keep on top of their studies, all while continuing to attend to whatever familial or social responsibilities they already have. It is understandable that the addition of a global health emergency that robs them of in-person interaction with their friends, families, classmates, professors, and work colleagues, would be an increased emotional tax on them and may result in latent anger or dissatisfaction with their work.

Connected to this is the notion that school work during the pandemic is not the same thing as true online learning. Dr. Steven Shisley (2020) distinguishes between online learning programs and “Emergency Remote Learning” by pointing out that the former is constructed intentionally and with specific design to the course well before its beginning, whereas the latter is a reaction to a sudden challenge to all participants (professors, students, school administrators, etc.). Students who enroll in online courses understand that they may be working in virtual teams, and are therefore more prepared for the challenges associated with virtual group work, than students and professors who expect to be face-to-face. The COVID-19 pandemic, in this light, was not a perfect case study for online schoolwork due to its unexpectedness.

Limitations of this study include a limited sample size and the need for retrospective thinking. The MAIOP program at the University of New Haven is not the largest sample from which to draw data, and because of this the power of the measures applied in this study is not very high. This was further lessened when first- and second-year students were split to run independent

analyses by year. Retrospective recall is not ideal to elicit because it could become increasingly difficult to remember how one was thinking as time goes by, particularly if the previous time period was long ago. However, retrospective pretests can reduce response-shift bias as participants are using the same context to respond to questions at the same time therefore enhancing validity (Young, 2016). This being said, steps were taken to minimize the negative effect of retrospective thinking in the survey. Data derived shortly before the pandemic were compared to data found in the present study, meaning that the survey participants did not need to think retrospectively in order for the study to be completed.

Future researchers would do well to increase the sample size used for a survey similar to the present study by looking at a graduate program with a larger population or at multiple graduate programs. They may also choose to expand beyond the constructs used in this study to develop a more robust view of what it is like to work collaboratively in a virtual setting. Researchers may want to alter the type of study run with these constructs in mind, such as by running a longitudinal study that could look at how those in higher education go on to feel about virtual work in their occupations following graduate school.

No matter what development with the COVID-19 virus unfolds, the usage of electronic media to host classes and work on group projects is only going to become more commonplace. Because of this, students will need guidance in how to develop skills such as online communication and collaboration. Much like how they encourage face-to-face team work, educational institutions should provide students with opportunities to hone those skills in an online medium. And not only would the promotion of these skills help students with their schoolwork but also prepare them to use those same skills later on in life in their careers. Working more through electronic media would also lessen the impact of future emergency events, such as a pandemic that moves all industries

online. The need for students to advance their teamwork via online media is apparent, and cannot be delayed any further.

Appendix

Survey Items.

Think back to the group work (professional and academic) that you participated in during the time before the COVID-19 pandemic.

1. How often did your groups meet in person?
    a. Every time we interacted
    b. Often
    c. Every so often
    d. Seldom
    e. Never
2. How often did your groups meet virtually (phone call or video meeting)?
    a. Every time we interacted
    b. Often
    c. Every so often
    d. Seldom
    e. Never
3. How often did you have positive group experiences?
    a. Every time we interacted
    b. Often
    c. Every so often
    d. Seldom
    e. Never
4. How often did you have negative group experiences?
    a. Every time we interacted
    b. Often
    c. Every so often
    d. Seldom
    e. Never
5. How often did you experience conflict within a group?
    a. Every time we interacted
    b. Often
    c. Every so often
    d. Seldom
    e. Never
6. In general, how cohesive were your teams?
    a. Very cohesive
    b. Mostly cohesive
    c. Somewhat cohesive
    d. Not very cohesive
    e. Not at all cohesive
7. How often did you notice your groupmates loafing?
    a. Every time we interacted
    b. Often

c. Every so often
d. Seldom
e. Never

8. How often did you notice yourself loafing?
    a. Every time we interacted
    b. Often
    c. Every so often
    d. Seldom
    e. Never

9. Please describe the ways in which your groups worked together effectively.

10. Please describe the ways in which your groups did not work together effectively.

Now, think about the group work (professional and academic) in which you are CURRENTLY taking part.

1. How often do your current work groups meet in person?
    a. Every time we interact
    b. Often
    c. Every so often
    d. Seldom
    e. Never
2. How often do your current work groups meet virtually (phone call or video meeting)?
    a. Every time we interact
    b. Often
    c. Every so often
    d. Seldom
    e. Never
3. How often do you have positive group experiences?
    a. Every time we interact
    b. Often
    c. Every so often
    d. Seldom
    e. Never
4. How often do you have negative group experiences?
    a. Every time we interact
    b. Often
    c. Every so often
    d. Seldom
    e. Never
5. How often do you experience conflict within a group?
    a. Every time we interact
    b. Often
    c. Every so often

   d. Seldom
   e. Never
6. In general, how cohesive are your current teams?
   a. Very cohesive
   b. Mostly cohesive
   c. Somewhat cohesive
   d. Not very cohesive
   e. Not at all cohesive
7. How often do you notice your groupmates loafing?
   a. Every time we interacted
   b. Often
   c. Every so often
   d. Seldom
   e. Never
8. How often do you notice yourself loafing?
   a. Every time we interacted
   b. Often
   c. Every so often
   d. Seldom
   e. Never

9. Please describe the ways in which your groups work together effectively.

10. Please describe the ways in which your groups do not work together effectively.

11. How would you rate the quality of positive group experiences in current work groups as they relate to positive group experiences in work groups before the COVID-19 pandemic? (Ex: I would say that a positive group experience before the pandemic felt more positive than a positive group experience in my current work groups.).
   a. Much more positive
   b. A bit more positive
   c. About the same
   d. A bit less positive
   e. Much less positive
12. How would you rate the quality of negative group experiences in current work groups as they relate to negative group experiences in work groups before the COVID-19 pandemic? (Ex: I would say that a negative group experience before the pandemic felt more negative than a negative group experience in my current work groups.).
   a. Much more negative
   b. A bit more negative
   c. About the same
   d. A bit less negative
   e. Much less negative

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I was more satisfied with the group experiences before the pandemic than I am now.					
I was less satisfied with the group experiences before the pandemic than I am now.					
I am more satisfied with the group experiences now than before the pandemic.					
I am less satisfied with the group experiences now than before the pandemic.					
Before the pandemic, in general, I felt positively about members of my work groups.					
Before the pandemic, in general, I felt negatively about members of my work groups.					

Currently, in general, I feel positively about members of my work groups.	
Currently, in general, I feel negatively about members of my work groups.	

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