GENDER DIFFERENCES IN VIRTUAL TEAMS

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ABSTRACT

Virtual teams have become more common in the workplace and previous studies have shown differences in the way males and females interact. Previous studies have shown that males use communication to establish dominance while females use communication to establish relationships. In this study, we looked at some basic differences between males and females and studied whether they impacted virtual teamwork. Results of this study show that females were more conscientious and agreeable and used social communication more often than males. They were more likely to use a compromising conflict management style while males were more likely to use a dominating style. Males were significantly more likely to be social loafers in the virtual teams.

Keywords: Virtual teams, gender differences, social loafing, Big Five personality traits, conflict management style, communications.

INTRODUCTION

Virtual teams can be defined as geographically or organizationally dispersed groups of individuals that communicate via information communications technology in a synchronous or asynchronous modes [48]. Teams communicating asynchronously in an electronic environment face special challenges which threaten the performance of the virtual team. The flow of communication may be interrupted and confusion about the message cannot be clarified immediately. The lack of media richness (i.e., limited exposure to body language, gestures, and voice tone) also increases the likelihood of the communication being misunderstood.

Extant research of traditional teams shows that the output of teams is often superior to that of an individual because of the synergy that comes from individuals sharing ideas and functional expertise. However, if team members do not participate, that synergy is not present. In (a) previous studies [22] males were found to be significantly more likely to be social loafers than females. In this study, we administered a longer virtual team study than the previous to determine whether males would again be more likely to be social loafers. A semester-long virtual team project with upper division and graduate students from two universities, Niagara University and the University of Hawaii at Hilo, was conducted. To study why males and females may differ in terms of social loafing, participants completed surveys used to assess their

Big Five Personality traits and their dominant conflict management style. In addition, communication scripts from the semester were coded to identify communications as task-, coordination-, or socially-related.

LITERATURE REVIEW

Social loafing occurs when an individual exerts less effort in a team than when working as an individual [32]. Social Impact Theory [37] has been used to explain why individuals may not exert full effort when working in teams. Social Impact Theory views individuals as sources and targets of social impact. When working in groups, individuals perceive themselves and others in terms of social impact and decide based on this assessment, how much they will participate in the group. The greater the sources and targets of social impact within a group, the less the motivation of individual members to contribute to the group effort. Kidwell and Bennett [34] suggested that in large groups, individuals may be less motivated to perform because they perceive their contributions as being marginal or they perceive the rewards as being incongruous with inputs [57].

Chidambaram and Tung [13] suggest that Social Impact Theory explains social loafing in terms of two theoretical dimensions. The first, the "dilution effect" addresses whether an individual feels submerged in a group. The second, the "immediacy gap" suggests that as individuals feel more isolated from the group they will participate less. Therefore, individuals may become social loafers because they feel isolated and do not have a sense of team identity, do not perceive rewards to be congruous with inputs required, or because they feel that their individual efforts may not be visible to those providing rewards or punishments.

Previous studies on social loafing have identified that males are more likely to be social loafers than females [35, 22]. This may be due to the fact that men and women interact differently in teams. Numerous research studies have identified differences in male and female communication styles [1, 18, 50, 55, 54, 56, 36, 7, 9, 28, 33, 2]. When working with others, women's communication goals focus on gaining trust, developing consensus, and establishing relationships with others [56]. On the other hand, men's communication tends to be more task-oriented. Tannen [55] suggests that this may be the result of differences in socialization. Males are socialized to communicate in a "one-up, one down" style in which the goal is to win the discussion. Females, on the other hand, are socialized to communicate in a "rapport-talk" style in which the purpose is to discuss and understand others' perspectives.

If females value relationship building they may begin a team experience with a different set of assumptions than males. Females have been found to enjoy participating in virtual teams more than males [5, 52, 38]. Perhaps this is because it is more difficult for males to establish dominance through electronic communications. Males are more likely to use conversation as a method of gaining information and establishing status [1, 55]. Males have been found to assume dominance in relationships by utilizing verbal interruption [2]. In the asynchronous computer mediated team, it may be more difficult to establish dominance without the ability to engage a team member's attention immediately. It is more difficult to interrupt communication and it may be more difficult to force another to view you as dominant. In this way, virtual communication may have an equalizing effect on relationships.

Since females have been shown to be more likely to engage with other team members to establish relationships, they may be more likely to participate in social communications than their male counterparts. This communication may help women to develop a greater sense of team identity thereby reducing their social loafing behavior. On the other hand, if male communication focuses on establishing dominance, they may be less likely to identify with the team and therefore limit their effort. Therefore, the following hypotheses are proposed:

H1: Males are more likely than females to be social loafers in virtual teams.

H2: Females are more likely than males to participate in social communications in virtual teams.

Two other factors may have an impact on how individuals interact in virtual teams. There may be inherent social differences between males and females in terms of personality and the way they handle conflict.

Personality Traits

McDougall [44] has been credited with launching the effort to systematically organize a taxonomy of personality [3]. He analyzed various personality dimensions and came up with five factors that he titled intellect, character, temperament, disposition, and temper [44]. For the next 40 years, researchers continued efforts to expand on McDougall's work, finding that their data fit well with minor modification of the five dimension model [10-12, 21, 46, 6, 26].

Since the 1980s, research has identified compelling evidence for the robustness of the five personality dimensions across different theoretical frameworks [23] using different instruments [14, 16, 40, 42, 16, 43], and with different cultures [45]. Research has also shown that the five factors affect individual response to stress [41] and occupational interests [15].

While researchers generally agree on the number of factors, there has been some disagreement about how to label these factors. The five factors are measured along a continuum with high levels on one end and low levels on the other. The first factor, extraversion has also been referred to as surgency or disposition in various studies. It refers to the quantity and intensity of an individual's interpersonal activity [8]. Individuals with high levels of extraversion are sociable, gregarious, assertive, talkative, energetic, and optimistic while individuals with low extraversion are more reserved, independent, and quiet [3].

The second factor, emotional stability has also been labeled neuroticism or temper. Individuals with low levels of emotional stability (high neuroticism or temper), exhibit anxiousness, depression, anger, embarrassment, worry or insecurity [3]. Individuals high in emotional stability are even-tempered, relaxed, and easily handle stressful situations without getting upset while those with low emotional stability tend to be more anxious when working on a task [39].

The third factor has been called agreeableness, likeability, or temperament and refers to an individual's interpersonal tendencies. Individuals high in agreeableness are helpful, cooperative, good-natured, sympathetic and tolerant of others. Individuals low in agreeableness are characterized as egocentric, competitive, irritable, and skeptical of other's intentions [8].

The fourth factor, conscientiousness or dependability, assesses individual differences in planning, organizing, and executing tasks. Individuals high in conscientiousness are purposeful,

determined, reliable, organized, and strong-willed. Individuals low in conscientiousness are more lackadaisical in working toward goals, careless, aimless, and unreliable.

The fifth dimension has been called openness to experience, culture, or intellect. This factor identifies how open an individual is to new experiences. Individuals high in this dimension exhibit an active imagination, aesthetic sensitivity, intellectual curiosity, and independent judgment. Individuals who score low on this dimension show conventional and conservative behavior and prefer familiar situations [8].

Previous studies found that females scored lower on emotional stability [39, 19, 15, 53] and that they were more anxious about outcome [27]. Males were found to more assertive or dominant and significantly less anxious [39, 19]. Females were also found to be significantly higher than males in terms of agreeableness [15, 53] and extraversion and conscientiousness [54]. Other studies have shown that extraversion is positively correlated with levels of participation in computer-mediated teams [4] while extraversion, agreeableness, and conscientiousness were positively correlated with self-efficacy, or confidence in abilities, in self-managed work groups. Based on previous research, we developed the following hypothesis.

> *H3: Females will have higher levels of extraversion, conscientiousness, and agreeableness and lower levels of emotional stability than males.*

Conflict Management Style

Conflict in teams has been defined as the disagreement among team members that results from incompatible goals and interests [30]. Individuals are motivated to maintain relationships either because they genuinely want to or because they are required to [29]. Conflict is likely to be more prevalent in virtual teams because of the lack of media richness. Methods for dealing with this conflict are likely to impact team members' idea generation, quality of work, and satisfaction within the team.

Studies of interpersonal conflict management have utilized a theoretical framework comprised of two underlying motives – concern for self and concern for others [17]. Within this theoretical framework, five major conflict management patterns have been identified. Two styles, *integrating* (high concern for self and others) and *compromising* (moderated concern for self and others), are known as cooperative conflict management styles [49]. Other styles include, *dominating* (high concern for self and low concern for others), *obliging* (low concern for self and high concern for others), and *avoiding* (low concern for self and others).

Individuals using an *integrating* conflict management style attempt to integrate all team members' views, individuals using a *compromising* style attempt to find common ground among team members, individuals using a *dominating* style attempts to force their view on others, individuals using the *obliging* style give in to others demands, and individuals using an *avoiding* style intentionally withdraw from conflict when it occurs [47].

The integrative and avoidance conflict management styles are thought to be polar opposites since one involves high regard for all parties concerned and one regards low concern for all involved. The integrative conflict management approach, involves solving problems through the collaboration of team efforts. The avoiding conflict management approach involves ignoring problems. Effective teams utilize a method of conflict management that allows all team members' voices to be heard. Since females are more likely to establish relationships than

males, and males are more likely to use communication in teams to establish dominance, the following hypotheses are proposed.

H4: Females are more likely than males to use a compromising or integrating conflict management style since both focus on finding solutions in which emphasis is place on all team members' needs.

H5: Males are more likely than females to use a dominating conflict management style

METHODOLOGY

Design

In this study, a quasi-experimental design approach was used. Participants in the study were upper- and graduate-level college students enrolled in business courses at two different universities, the University of Hawaii at Hilo and Niagara University. Participants were randomly assigned to teams with the stipulation that at least one of the members had to come from each of the different sites.

Students spent the semester working on three deliverables including an icebreaker activity and two cases in which students were asked to provide written recommendations of how they would handle a business problem. In Deliverable 1, participants were asked to identify and submit a list of five things they all had in common and five things they all varied on. In Deliverable 2, participants were provided a case study of a food company and asked to select one of three strategies for an advertising campaign that would be most profitable. In Deliverable 3, participants were asked to research the grocery industry and suggest ways to use technology to profits. For both Deliverables 2 and 3, a single written report was required from each team.

Tools and Manipulation Checks

Students used the Google Wave product to communicate with team members. Google Wave is a product that allows specified members to interact in a work space in which they can communicate and link documents. Prior to the start of the experiment all participating students were provided orientation about the Google Wave product. They were required to use an assigned Gmail account sign-on to access the system. A dedicated technician, who was a registered member of each team, was available to answer questions and walk participants through the registration steps. The technician provided instructions to team members, the team assignments, and was available to answer on-line questions. Each week, the technician copy and pasted the communications for each team into a separate script that was used for analysis of communications.

After completion of both the second and third deliverables, communication threads were evaluated and communications were coded: task related, coordination related, or socially related.

Data Collection and Analysis

At the onset of the experiment, participants were asked to complete a series of surveys designed to assess their personality dimensions and conflict management styles. In addition, communication scripts were evaluated to determine the number and type of communications by each team member. Finally, both authors studied the scripts to determine whether participants contributed to each of the deliverables or whether they were social loafers.

To test personality dimensions, researchers have used personality scales based on the lexical hypothesis which subscribes to the idea that human personality can be encoded or described in the lexicons of the world's languages [24]. To do this, researchers first identified traits or personality markers as adjective descriptors [31, 23, 51]. For instance, an extroverted individual was described in descriptors such as energetic or talkative. Once these descriptor traits were identified, it was easier to develop scales with adequate construct validity.

A scientific collaboratory to develop advanced measures of personality traits was established by Lewis R. Goldberg and Gerard Saucier through a grant from the National Institute of Mental Health [25]. A collaboratory is a computer-supported system that allows scientists to work together by sharing facilities and databases without regard to geographical location [20]. As a result of Goldberg and Saucier's scientific collaboratory, a non-proprietary big five personality scale has been developed.

Tests of the scientific collaboratory's non-proprietary big-five scale yielded high coefficient alphas and correlations with Goldberg's [23] personality markers. The scale is composed of 20 items for each of the five personality dimensions with coefficient alphas ranging from .88 to .91 [25]. The Goldberg scale is comprised of 50 questions, 10 for each of the five dimensions (Extraversion, Emotional Stability, Agreeableness, Conscientiousness, and Openness to Experience). Each question utilized a 5-point Likert-type response scale and individual questions were averaged to get a total for each dimension ranging from 1 (the lowest measure of the dimension) to 5 (the highest measure of the dimension).

To test conflict management styles, the ROCI-II scale developed by Rahim [49] was used. The scale identifies the extent to which an individual uses a particular conflict management style when dealing with conflict. The scale utilizes a 5-point Likert-type response scale anchored on one end with strongly agree and the other with strongly disagree. Rahim reported reliability of his conflict management style scales in the range of $\alpha=.75$.

Before utilizing the personality and conflict management data, principal components factor analyses were completed to insure that items appropriately tested the intended constructs. Analyses were performed using Analysis of Variance (ANOVA).

Sample

Of the original 115 subjects randomly assigned to teams, 5 were eliminated from the study because they dropped the class prior to the completion of the project. The remaining sample consisted of 110 participants, with 48 being male and 62 being female. Details are available in Table 1.

Table 1
Participant Counts

Sex	Location		Totals
	Niagara University	University of Hawaii	
Male	35	13	48
Female	27	35	62
Totals	62	48	110

Coding Communication Scripts

Students were advised to communicate using only the Google Wave tool. Communication scripts were printed each week. For the first 3 weeks of the project, students who were not posting communications were contacted to determine whether they were having technical difficulties or posting at some other site. This helped train participants to post only on the Google Wave. At the conclusion of the project, communication scripts were printed and reviewed. Two coders read each post and coded the communication as task, coordination, or social. Posts that included several types of communication were coded to include the different types of communication. Task communications dealt with possible solutions for each deliverable. Coordination communications provided clarification of work load delegation or questions about how a task would be handled. Social communications were largely unrelated to task or coordination and involved personal comments. Each communication post could include more than one type of communication. So the counts do not reflect the number of posts, but the number of communications. Table 2 provides some examples of the different types of communication.

Table 2
Examples of Communication

Task Communications • "I think we should choose option 2 because it provides the highest return on investment" • "As far as coupon rate and redemption rate, there is a difference" • "The TV and magazine ads may be slightly more attractive and eye catching but they would take longer to get to the target market"
Coordination Communications • "I will type up the report, who is willing to edit it?" • "My English is not good so someone else should write it" • "Maybe we should divide the task up and each write up a section"
Social Communications • "I'm sorry to hear your daughter was sick" • "I hope you guys had a nice thanksgiving" • "Hello everyone. I hope you had a good weekend. Wishing you a good week and good luck on midterms"

Results

ANOVA tests for Hypothesis 1 showed that males were significantly more likely than females to be social loafers in virtual teams. Evaluation of the number of social loafers by gender for each of the deliverables is provided in Table 3. Deliverable 1, the ice breaker activity, was designed to familiarize participants with the technology and provide a fairly easy way for members to get to know each other on a more personal level. Social loafing at this phase of the team may be the result of participants learning how to use the technology.   Social loafing increased through the duration of the semester for males but remained steady for females at about 10%. Of the 48 males in the study, 27% were social loafers during the first deliverable, 44% for the second and 52% for the final deliverable. Hypothesis 1 is therefore supported. Males are more likely than females to be social loafers in virtual teams.

Table 3
Participants Reported as Social Loafers

Deliverable	Males n=48	Females n=62	F	Sig
D1	13 (27%)	6 (10%)	$F_{1,109} = 5.94$	p = .016
D2	21 (44%)	7 (11%)	$F_{1,109} = 17.08$	p = .000
D3	25 (52%)	6 (10%)	$F_{1,109} = 30.20$	p = .000

Results Using ANOVA tests, also provided acceptance for Hypothesis 2. Table 4 provides a summary of the number and types of communications for Deliverables 2 and 3. For both deliverables, females were significantly more likely to participate in social communications than males. While the number of communications may seem low, keep a few things in mind. A single communication, even if quite long is recorded as one communication and when a communication post included more than one type of communication, for instance task and social, both categories received one tally.

Table 4
Number and Type of Communication Posts

Deliverable	Type of Communication	Males n=48 Mean/SD	Females n=62 Mean/SD	F	Sig
	Task	1.73 (1.61)	3.40 (2.92)	$F_{1,109} = 12.75$	p = .001
D2	Coordination	2.08 (2.09)	4.19 (3.64)	$F_{1,109} = 12.84$	p = .001
	Social	0.48 (1.01)	1.11 (1.57)	$F_{1,109} = 5.92$	p = .017

	Task	1.79 (2.32)	2.71 (2.12)	$F_{1,109} = 4.68$	P = .033
D3	Coordination	1.65 (2.53)	3.39 (2.56)	$F_{1,109} = 12.66$	p = .001
	Social	0.77 (1.40)	1.58 (1.77)	$F_{1,109} = 6.76$	P = .011

To study whether males and females differed in terms of personality dimensions, ANOVA tests were used and the results appear in Table 5. Females were significantly more agreeable ($F_{1,109} = 11.59$, p = .001) and conscientious($F_{1,109} = 4.30$, p = .040) than males. They also scored significantly lower on Emotional Stability ($F_{1,109} = 8.23$, p = .005). Therefore, H3 is partially supported. While females were more agreeable and conscientious, previous studies have also found females to more extraverted. However, in this study, that was not the case.

Table 5
Measures of Big 5 Personality Dimensions

Dimension	Males n=48 Mean/SD	Females n=62 Mean/SD	F	Sig
Extraversion	3.37 (.79)	3.31 (.80)	$F_{1,109} = 0.11$	p = .743
Agreeableness	3.73 (.46)	4.07 (.57)	$F_{1,109} = 11.59$	p = .001
Conscientiousness	3.80 (.47)	4.00 (.53)	$F_{1,109} = 4.30$	p = .040
Emotional Stability	3.65 (.68)	3.29 (.65)	$F_{1,109} = 8.23$	p = .005
Openness to new Experiences	3.67 (.46)	3.55 (.54)	$F_{1,109} = 1.420$	p = .236

In H4, we predicted that females would be more likely to use an Integrating or Compromising conflict management style. Both of these styles emphasize concern for both self and others. This hypothesis was partially supported. Females were significantly more likely to use a compromising conflict management style ($F_{1,109} = 10.99$, p=.001) than males. However, while the females scored the highest on the Integrating Conflict Management Style (4.31 out of 5), males were highly likely to use the Integrating style as well. Our results also show that H5 is supported. Males are significantly more likely to use a Dominating conflict management style ($F_{1,109} = 14.45$, p=.000).

Table 6
Conflict Management Styles

Conflict Management Style	Male n = 48 Mean/SD	Female n = 62 Mean/SD	F	Sig.
Integrating	4.20 (.41)	4.31 (.39)	$F_{1,109} = 2.10$	.150
Avoiding	2.86 (.77)	3.31 (.80)	$F_{1,109} = 9.11$	.003
Dominating	3.29 (.75)	2.76 (.70)	$F_{1,109} = 14.45$	.000
Obliging	3.54 (.40)	3.61 (.47)	$F_{1,109} = 0.58$	.449
Compromising	3.73 (.56)	4.05 (.45)	$F_{1,109} = 10.99$	.001

DISCUSSION AND CONCLUSIONS

In this study, male and female virtual team members were compared. Overwhelming, males were far more likely to be social loafers than females in virtual teams and the rate of social loafing increased for males throughout the course of the team. On average approximately 10% of the females were social loafers during all three of the deliverables in this study. Male social loafing started at 27% for Deliverable 1, and rose to 44% for Deliverable 2 and 52% for Deliverable 3. Our findings support earlier studies that found males to be more likely than females to be social loafers [35, 22]. We know that males use communication to establish dominance in teams [1, 55] and it may be more difficult in the virtual team because communication often takes place asynchronously. In this situation, it is hard for males to use interrupting behaviors to control conversation and dominate the agenda. Males may, therefore, exert less effort because they feel it is not possible to dominate in the team.

An evaluation of communication scripts showed that overall females communicated more than males. They were significantly more likely to post all types of communication (task, coordination, and social). The findings related to social communications are not surprising since females are more likely to use communication to establish relationships and ensure that all team members points of view of heard [55, 9, 2]. As the team progressed, females used more social communications and less task and coordinating communications. Females were more likely to provide personal information and to follow up on social communications from other team members. For instance, several females reported on family challenges such as a child being sick or having to care for an elderly parent. Responses to these comments generally came from other females who sympathized and showed concern for the situation. Males communicated less often and generally focused on the task at hand.

As previously observed [15, 53], females were more likely than males to be agreeable and conscientious. However, unlike Schmitt [53], we did not find females to be more extraverted. Since agreeableness refers to an individual's interpersonal tendencies to be cooperative, good natured and sympathetic [8], it is not surprising that females are more agreeable and utilize social communications more extensively than males. Perhaps these behaviors allow females to feel more vested in the team and discourage social loafing. The higher levels of conscientiousness in females was not surprising given the fact that up to 50% of males were social loafers by the end of the project phase. Previous research has also shown that females tend to be more neurotic (lower emotional stability) and our study confirmed these

results. Individuals with low emotional stability are more likely to exhibit worry, anxiousness, and insecurity. There is likely a link between this increased neuroticism and the higher conscientiousness and lower social loafing performed by females. Further studies are needed to confirm this idea however.

There are likely many different reasons for why individuals social loaf in teams. They may feel apathetic because they do not believe their individual efforts can be monitored or they may be frustrated for any number of difference reasons. Our study of conflict management styles showed that males were significantly more likely to solve problems using a dominating style. This is not surprising since males use communication to dominate or establish position [1, 2]. Surprisingly, both males and females in our study were most likely to use an integrating conflict management style which shows high concern for self and high concern for others. Females were also significantly more likely to use a compromising style in which there is medium concern for self and others. Females tend to prefer that team members work collaboratively in an environment where members compromise when conflicts arise. Females were much more likely however to use an avoiding conflict management style which may limit the effectiveness of the team. When conflict is avoided, alternative ideas may not be considered.

Our study revealed that females and males differ in several ways. Females are more likely to use communication to establish relationships and to ensure that the viewpoints of all team members are considered. They are more agreeable and conscientious, have higher levels of neuroticism, are more likely to use a compromising or avoiding conflict management style and are significantly less likely to be social loafers in virtual teams. Alternatively, males are more likely to use a dominating conflict management style, communicate less often and are far more likely to be social loafers in virtual teams.

It should be noted that this study used students as proxies in the study. While one review article of virtual team studies identified that 90% of published articles utilize student teams as research subjects the team experience and motivations may differ between a work setting and an academic setting. This may limit the generalizability of the findings.

While our findings are similar to past studies, it is important to keep in mind that gender roles may be changing. Behaviors associated with gender roles may change as equality improves for females in the work force. Future research on evolving gender roles is necessary. For now, however, the message is clear. Females seem to be much better suited to the virtual team environment. They are more conscientious, they work to develop and improve relationships among team members, and they are far less likely to be social loafers.

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